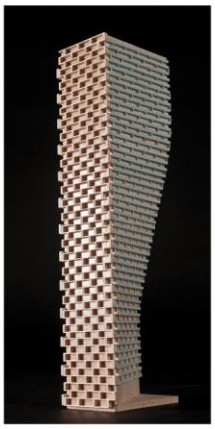
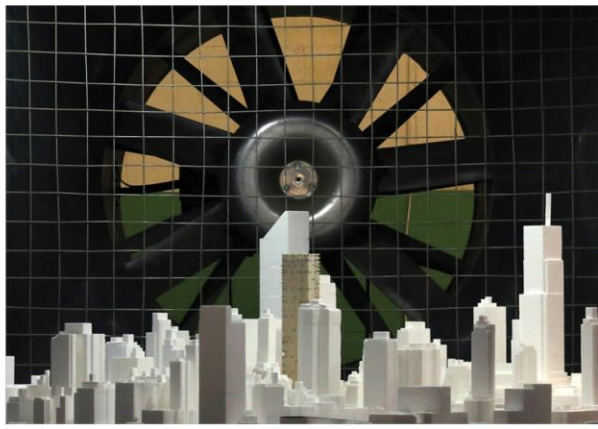
GRADIENTWIND
ENGINEERS & SCIENTISTS

TRAFFIC NOISE ASSESSMENT

The Meadows in Half Moon Bay
Phase 7 & 8
Ottawa, Ontario

GRADIENT WIND REPORT: 19-103 – Traffic Noise





July 22, 2019

PREPARED FOR

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EXECUTIVE SUMMARY

This report describes a traffic noise assessment undertaken in support of a Plan of Subdivision Registration Application for a proposed subdivision development called The Meadows in Half Moon Bay Phase 7 & 8, Ottawa Ontario. Phase 7 and 8 of the proposed subdivision comprises a mixture of townhome blocks and detached dwellings lots located throughout the development, as well as numerous internal roadways, labelled Street 1 through 10. The development site is bordered by future Greenbank Road to the east, undeveloped land to the west and northwest, a future secondary school and commercial unit to the northeast (part of Mattamy Half Moon Bay West) and a future development to the south. The major sources of traffic noise are the realigned Greenbank Road to the east, minor influence from the Bus Rapid Transit (BRT) lane in the center of the realigned Greenbank Road, as well as proposed Street 1 interior of the site. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (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; (iv) plan of subdivision drawings provided by Stantec.

The results of the current analysis indicate that noise levels will range between 54 and 71 dBA during the daytime period (07:00-23:00) and between 46 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (71 dBA) occurs at the east façade of Block 140, which is nearest and most exposed to the realigned Greenbank Road. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figures 4 and 5.

Results of the calculations also indicate that Lots/Blocks 52, 96, 165 (west unit), 140, 141, 181-183 (east units), 179-180 (east units) will require central air conditioning which allows occupants to keep windows closed and maintain a comfortable living environment (see Figures 6 and 7). Lots/Blocks 53, 95, 133-138, 176-178, 165 (east units), 75-77, 116-118, 129-132, 139, 142, 143, 145, 147, 179 (southwest unit), 180 (northwest unit), 181 (southwest unit), 183 (northwest unit) will require forced air hearting with provisions for air conditioning. In addition to ventilation requirements, Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels at backyards/side yards for properties adjacent to Street 1 and near the realigned Greenbank Road are expected to exceed 55dBA during the daytime period. According to the ENCG, if these areas are to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA, were technically and administratively feasible. For acoustic barrier walls the City's preferred maximum height is 2.5 m. To achieve extra height, the wall would need to be placed on top of an earth berm, which requires setback from the property line. Investigation into the application of a noise barrier surrounding the rear yards proved that noise levels can be reduced to below 60 dBA, as outlined in Table 4 and Figures 8 and 9. Noise barriers shall flank along the rear property line where not continued into adjacent developments (as per Lot 96).

The barrier must be constructed from materials having a minimum surface density of 20 kg/m2 (STC rating of 30) and contain no gaps. Design of the barrier will conform to the requirements outlined in Part 5 of the ENCG. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Tamarack Developments & Taggart Investments to undertake a traffic noise assessment in support of a Plan of Subdivision Registration Application for a proposed subdivision development called The Meadows in Half Moon Bay Phase 7 & 8, Ottawa Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on plan of subdivision drawings provided by Stantec, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

Phase 7 and 8 of the proposed subdivision comprises a mixture of townhome blocks and detached dwellings lots located throughout the development, as well as numerous internal roadways, labelled Street 1 through 10. Additionally, Phase 8 features a park at the centre of the site and a school at the southwest corner. The development site is bordered by future Greenbank Road to the east, undeveloped land to the west and northwest, a future secondary school and commercial unit to the northeast (part of Mattamy Half Moon Bay West) and a future development to the south.

The major sources of traffic noise are the realigned Greenbank Road to the east, minor influence from the Bus Rapid Transit (BRT) lane in the center of the realigned Greenbank Road, as well as proposed Street 1 interior of the site. Figure 1 illustrates a complete site plan with surrounding context.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings 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 4.2 of this report.

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For 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) [3]

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[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. 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 triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation[6].

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.

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

4.2.2 Theoretical Roadway Noise Predictions

Noise predictions were performed with the aid of the MECP 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, as per ENCG requirements.
- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics. Generally, OLA and POW receptors considered soft-ground due to grassland between the sources and receivers. Receptors fronting onto roadways were assessed with hard ground to account for paved driveways.
- Receptor heights taken to be 4.5 meters for the center of the plane of window (POW) of the 2-storey single home / town house blocks, as per ORNAMENT recommendations.
- Topography for the development was assumed to be a flat/gentle slope.
- Noise receptors were strategically placed at 17 locations around the study area (see Figure 2 and 3).
- Receptor distances and exposure angles are illustrated in Figures A1-A6 in Appendix A.

4.2.3 Roadway 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[7] 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.

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

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Realigned Greenbank Road	4-Lane Urban Arterial Divided (4-UAD)	70	**35,000**
Bus Rapid Transit	BRT	80	**200/70***
Street 1	2-Lane Urban Collector Undivided (2-UCU)	40	**8,000**

* Daytime and nighttime volumes

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 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[8] considers:

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

- 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

Based on published research[9], 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).

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.

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	4.5	POW – Lot 52 – West Façade	66	58
2	4.5	POW – Lot 54 – South Façade	54	46
3	4.5	POW – Block 133 – East Façade	65	58
4	4.5	POW – Block 182 – East Façade	69	62
5	4.5	POW – Block 140 – East Façade	71	64
6	4.5	POW – Block 140 – North Façade	67	60
7	4.5	POW – Block 139 – North Façade	63	56
8	4.5	POW – Block 181 – South Façade	64	57
9	4.5	POW – Lot 118 – South Façade	56	49
10	4.5	POW – Lot 75 – North Façade	55	48
11	1.5	OLA – Lot 52 – Rear Yard	62	54
12	1.5	OLA – Lot 54 – Rear Yard	54	46
13	1.5	OLA – Lot 53 – Rear Yard	57	49
14	1.5	OLA – Block 140 – Rear Yard	66	59
15	1.5	OLA – Block 139 – Rear Yard	58	51
16	1.5	OLA – Lot 132 – Rear Yard	55	47
17	1.5	OLA – Lot 77 – Rear Yard	58	50

The results of the current analysis indicate that noise levels will range between 54 and 71 dBA during the daytime period (07:00-23:00) and between 46 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (71 dBA) occurs at the east façade of Block 140, which is nearest and most exposed to the realigned Greenbank Road.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 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 and 5):

- **Bedroom Windows**

(i) Bedroom windows facing west on Lot 52, 96, 165 and north/south on Block 140, 141 will require a minimum STC of 30

(ii) Bedroom windows facing east on Block 181, 182, 183, 179, 180 will require a minimum STC of 32

(iii) Bedroom windows facing east on Block 140, 141 will require a minimum STC of 34

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

- **Living Room Windows**

(i) Living room windows facing west on Lot 52, 96, 165 and north/south on Block 140,141 will require a minimum STC of 25

(ii) Living room windows facing east on Block 181, 182, 183, 179, 180 will require a minimum STC of 27

(iii) Living room windows facing east on Block 140, 141 will require a minimum STC of 29

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

- **Exterior Walls**

(i) Exterior wall components on these façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[10]

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

The STC requirements apply to windows and door. 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. We have specified an example window configuration, however 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 Lots/Blocks 52, 96, 165 (west unit), 140, 141, 181-183 (east units), 179-180 (east units) will require central air conditioning which allows occupants to keep windows closed and maintain a comfortable living environment (see Figures 6 and 7). Lots/Blocks 53, 95, 133-138, 176-178, 165 (east units), 75-77, 116-118, 129-132, 139, 142, 143, 145, 147, 179 (southwest unit), 180 (northwest unit), 181 (southwest unit), 183 (northwest unit) will require forced air hearting with provisions for air conditioning. In addition to ventilation requirements, Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

5.3 Noise Barrier Calculation

Noise levels at backyards/side yards for properties adjacent to Street 1 and near the realigned Greenbank Road are expected to exceed 55dBA during the daytime period. According to the ENCG, if these areas are to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA, were technically and administratively feasible. For acoustic barrier walls the City's preferred maximum height is 2.5 m. To achieve extra height, the wall would need to be placed on top of an earth berm, which requires setback from the property line. Investigation into the application of a noise barrier surrounding the rear yards proved that noise levels can be reduced to below 60 dBA, as outlined in Table 4 and Figures 8 and 9. Noise barriers shall flank along the rear property line where not continued into adjacent developments (as per Lot 96).

TABLE 4: RESULTS OF BARRIER INVESTIGATION

Reference Receptor	Location	Daytime L_{eq} Noise Level (dBA)		
		Without Barrier	Barrier Height (m)	With Barrier
11	OLA – Lot 52 – Rear Yard	62	2.2	55
14	OLA – Block 140 – Rear Yard	66	2.5	59
			4	55
17	OLA – Lot 77 – Rear Yard	58	2.2	54

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 54 and 71 dBA during the daytime period (07:00-23:00) and between 46 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (71 dBA) occurs at the east façade of Block 140, which is nearest and most exposed to the realigned Greenbank Road. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figures 4 and 5.

The following Warning Clause[11] will also be required to be placed on all Lease, Purchase and Sale Agreements of Lots/Blocks 181-183 (east units), 179-180 (east units), as summarized below:

> *"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 and Climate Change. To help address the need for sound attenuation, this development includes:*
>
> - *STC rated multi-pane glazing elements*
> - *East façade bedroom/living room: STC 32/27*
> - *STC rated exterior walls*
> - *East façade: STC 45*

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

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."

The following Warning Clause[12] will also be required to be placed on all Lease, Purchase and Sale Agreements of Lots/Blocks 52, 96, 165 (west unit), 140, 141, as summarized below:

"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*
  - *Block 140,141 east façade bedroom/living room: STC 34/29*
  - *Lot 52,96,165 west façade bedroom/living room: STC 30/25*
- *STC rated exterior walls*
  - *Block 140,141 east façade: STC 45*
  - *Lot 52,96,165 west façade: STC 45*
- *Block 140,141 a 2.5-metre acoustic fence surrounding the rear yard*
- *Block 52,96,165 a 2.2-metre acoustic fence surrounding the rear yard*

The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.

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

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."

The following Warning Clause[13] will also be required to be placed on all Lease, Purchase and Sale Agreements of Lots/Blocks 133-138, 176-178, 75-76, 116-118, 129-132, 143, 145, 147, 179 (southwest unit), 180 (northwest unit), 181 (southwest unit), 183 (northwest unit), as summarized below:

"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 dwelling unit has been designed with forced air heating with provisions for central air conditioning at the occupant's discretion. These noise measures 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 Environment, Conservation and Parks.

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

The following Warning Clause[14] will also be required to be placed on all Lease, Purchase and Sale Agreements of Lots/Blocks 53, 95, 165 (east units), 77, 139, 142, as summarized below:

[13] City of Ottawa Environmental Noise Control Guidelines, January 2016
[14] 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 dwelling unit has been designed with forced air heating with provisions for central air conditioning at the occupant's discretion. These noise measures 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 Environment, Conservation and Parks. The development also contains the following:

- *Block 53,77,95,165 (east units) a 2.2-metre acoustic fence surrounding the rear yard*
- *Block 139,142 a 2.5-metre acoustic fence surrounding the rear yard of neighboring property*

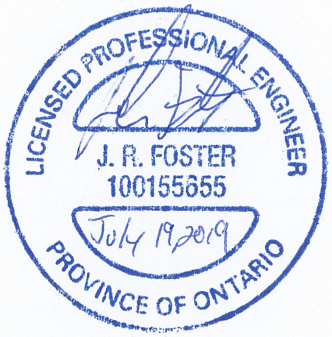
To ensure that provincial sound level limits are not exceeded, it is important the owner or neighbor maintain these sound attenuation features."

Noise levels at backyards/side yards for properties adjacent to Street 1 and near the realigned Greenbank Road are expected to exceed 55dBA during the daytime period. According to the ENCG, if these areas are to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA, were technically and administratively feasible. For acoustic barrier walls the City's preferred maximum height is 2.5 m. To achieve extra height, the wall would need to be placed on top of an earth berm, which requires setback from the property line. Investigation into the application of a noise barrier surrounding the rear yards proved that noise levels can be reduced to below 60 dBA, as outlined in Table 4 and Figures 8 and 9. Noise barriers shall flank along the rear property line where not continued into adjacent developments (as per Lot 96).

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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Gradient Wind File #19-103 – Traffic Noise

GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT		
SCALE	1:3500 (APPROX.)	DRAWING NO.	GWE19-103-1
DATE	JUNE 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT
SCALE	1:1500 (APPROX.)
DRAWING NO.	GWE19-103-2
DATE	JUNE 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE 2:
RECEPTOR LOCATIONS

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PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-3
DATE	JUNE 20, 2019	DRAWN BY	M.L.

FIGURE 3:
RECEPTOR LOCATIONS

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PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT
SCALE	1:1500 (APPROX.)
DRAWING NO.	GWE19-103-4
DATE	JUNE 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE 4:
WINDOW STC REQUIREMENTS

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127 WALGREEN ROAD , OTTAWA, ON
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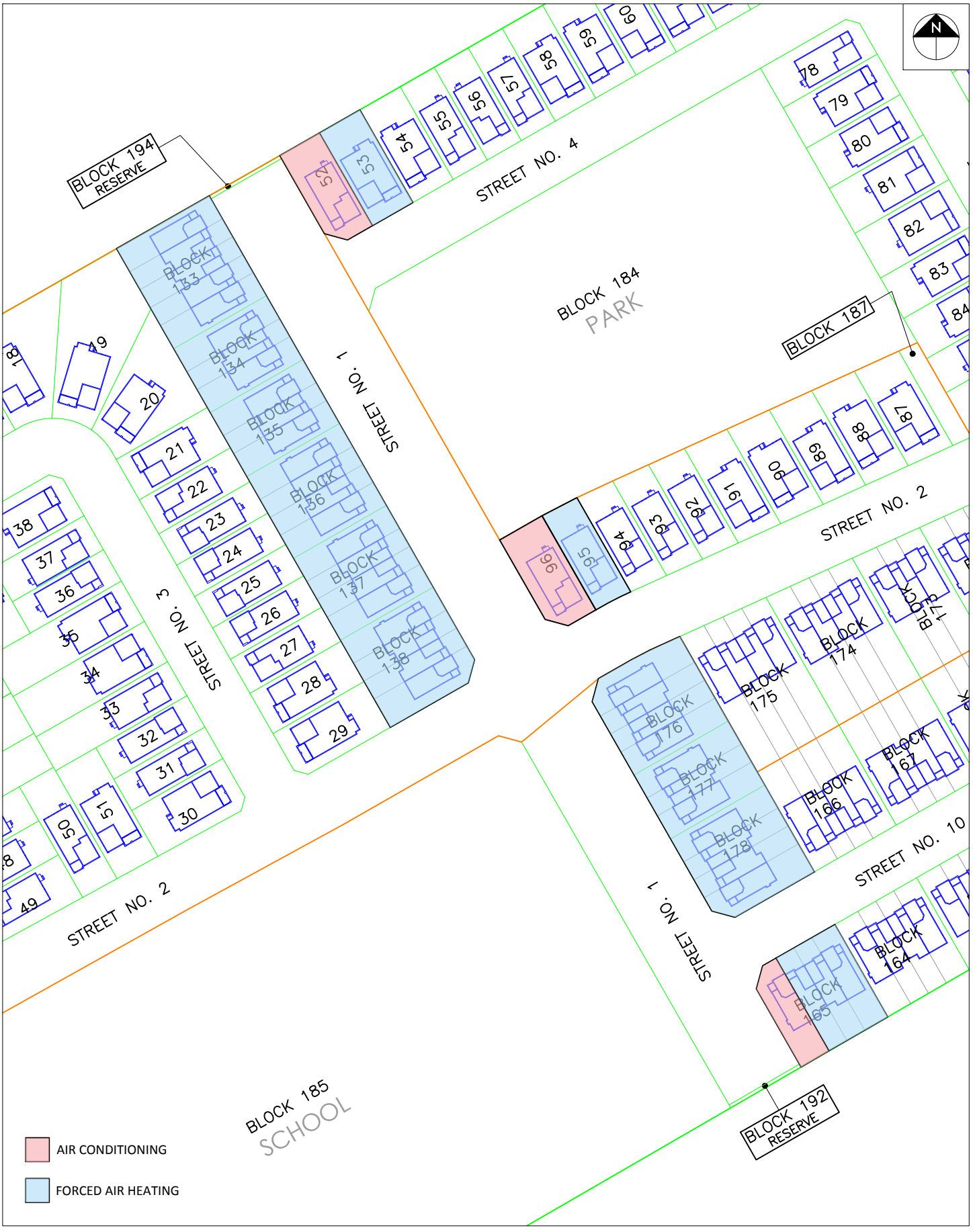
PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT
SCALE	1:1500 (APPROX.)
DRAWING NO.	GWE19-103-5
DATE	JUNE 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE 5:
WINDOW STC REQUIREMENTS



GRADIENTWIND
ENGINEERS & SCIENTISTS
127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-6
DATE	JUNE 20, 2019	DRAWN BY	M.L.

FIGURE 6:
VENTILATION REQUIREMENTS

GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-7
DATE	JUNE 20, 2019	DRAWN BY	M.L.

FIGURE 7:
VENTILATION REQUIREMENTS

GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT		
SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-8
DATE	JUNE 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE 8:
NOISE BARRIER LOCATIONS

GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	THE MEADOWS IN HALF MOON BAY PHASE 7 & 8 DETAILED TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-9
DATE	JUNE 20, 2019	DRAWN BY	M.L.

FIGURE 9:
NOISE BARRIER LOCATIONS

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:27:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Street 1 (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 # 1: Street 1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Street 1 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.75 + 0.00) = 65.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  65.75   0.00   0.00   0.00   0.00   0.00   0.00  65.75
-------------------------------------------------------------------------------

Segment Leq : 65.75 dBA

Total Leq All Segments: 65.75 dBA


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

Source height = 1.50 m

ROAD (0.00 + 58.16 + 0.00) = 58.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  58.16   0.00   0.00   0.00   0.00   0.00   0.00  58.16
-------------------------------------------------------------------------------

Segment Leq : 58.16 dBA

Total Leq All Segments: 58.16 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 65.75
                           (NIGHT): 58.16
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Street 1 (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 # 1: Street 1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  46.00 / 46.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Street 1 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.79 + 0.00) = 53.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.57  65.75   0.00  -7.64  -4.31   0.00   0.00   0.00  53.79
-------------------------------------------------------------------------------

Segment Leq : 53.79 dBA

Total Leq All Segments: 53.79 dBA


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

Source height = 1.50 m

ROAD (0.00 + 46.20 + 0.00) = 46.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.57  58.16   0.00  -7.64  -4.31   0.00   0.00   0.00  46.20
-------------------------------------------------------------------------------

Segment Leq : 46.20 dBA

Total Leq All Segments: 46.20 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 53.79
                           (NIGHT): 46.20
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Street 1 (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 # 1: Street 1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  17.00 / 17.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Street 1 (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.21 + 0.00) = 65.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  65.75   0.00  -0.54   0.00   0.00   0.00   0.00  65.21
-------------------------------------------------------------------------------

Segment Leq : 65.21 dBA

Total Leq All Segments: 65.21 dBA


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

Source height = 1.50 m

ROAD (0.00 + 57.61 + 0.00) = 57.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  58.16   0.00  -0.54   0.00   0.00   0.00   0.00  57.61
-------------------------------------------------------------------------------

Segment Leq : 57.61 dBA

Total Leq All Segments: 57.61 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 65.21
                           (NIGHT): 57.61
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  43.00 / 43.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.10 + 0.00) = 69.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  73.68   0.00  -4.57   0.00   0.00   0.00   0.00  69.10
-------------------------------------------------------------------------------

Segment Leq : 69.10 dBA

Total Leq All Segments: 69.10 dBA


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

Source height = 1.50 m

ROAD (0.00 + 61.51 + 0.00) = 61.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.08   0.00  -4.57   0.00   0.00   0.00   0.00  61.51
-------------------------------------------------------------------------------

Segment Leq : 61.51 dBA

Total Leq All Segments: 61.51 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  43.00 / 43.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 52.05 + 0.00) = 52.05 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  56.63  -4.57   0.00   0.00   0.00   0.00  52.05
-------------------------------------------------------------------------

Segment Leq : 52.05 dBA

Total Leq All Segments: 52.05 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 50.51 + 0.00) = 50.51 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  55.08  -4.57   0.00   0.00   0.00   0.00  50.51
-------------------------------------------------------------------------

Segment Leq : 50.51 dBA

Total Leq All Segments: 50.51 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 69.18
                           (NIGHT): 61.84
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:29:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  28.00 / 28.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 70.97 + 0.00) = 70.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  73.68   0.00  -2.71   0.00   0.00   0.00   0.00  70.97
-------------------------------------------------------------------------------

Segment Leq : 70.97 dBA

Total Leq All Segments: 70.97 dBA


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

Source height = 1.50 m

ROAD (0.00 + 63.37 + 0.00) = 63.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.08   0.00  -2.71   0.00   0.00   0.00   0.00  63.37
-------------------------------------------------------------------------------

Segment Leq : 63.37 dBA

Total Leq All Segments: 63.37 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  28.00 / 28.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 53.92 + 0.00) = 53.92 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  56.63  -2.71   0.00   0.00   0.00   0.00  53.92
-------------------------------------------------------------------------

Segment Leq : 53.92 dBA

Total Leq All Segments: 53.92 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 52.37 + 0.00) = 52.37 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  55.08  -2.71   0.00   0.00   0.00   0.00  52.37
-------------------------------------------------------------------------

Segment Leq : 52.37 dBA

Total Leq All Segments: 52.37 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 71.05
                           (NIGHT): 63.70
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:29:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  32.00 / 32.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.38 + 0.00) = 67.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  73.68   0.00  -3.29  -3.01   0.00   0.00   0.00  67.38
-------------------------------------------------------------------------------

Segment Leq : 67.38 dBA

Total Leq All Segments: 67.38 dBA


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

Source height = 1.50 m

ROAD (0.00 + 59.78 + 0.00) = 59.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  66.08   0.00  -3.29  -3.01   0.00   0.00   0.00  59.78
-------------------------------------------------------------------------------

Segment Leq : 59.78 dBA

Total Leq All Segments: 59.78 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  32.00 / 32.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 50.33 + 0.00) = 50.33 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  56.63  -3.29  -3.01   0.00   0.00   0.00  50.33
-------------------------------------------------------------------------

Segment Leq : 50.33 dBA

Total Leq All Segments: 50.33 dBA


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

Source height = 0.50 m

RT/Custom (0.00 + 48.78 + 0.00) = 48.78 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.00  55.08  -3.29  -3.01   0.00   0.00   0.00  48.78
-------------------------------------------------------------------------

Segment Leq : 48.78 dBA

Total Leq All Segments: 48.78 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.46
                           (NIGHT): 60.11
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:29:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -59.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 !        4.50 !        3.72 !         3.72

ROAD (0.00 + 52.87 + 62.96) = 63.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -59   0.00  73.68   0.00  -5.87  -7.64   0.00   0.00  -7.29  52.87
-------------------------------------------------------------------------------
   -59      0   0.00  73.68   0.00  -5.87  -4.84   0.00   0.00   0.00  62.96
-------------------------------------------------------------------------------

Segment Leq : 63.36 dBA

Total Leq All Segments: 63.36 dBA

#
```

```
Results segment # 1: Greenbank (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 !        4.50 !        3.72 !         3.72

ROAD (0.00 + 45.27 + 55.36) = 55.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -59   0.00  66.08   0.00  -5.87  -7.64   0.00   0.00  -7.29  45.27
-------------------------------------------------------------------------------
   -59      0   0.00  66.08   0.00  -5.87  -4.84   0.00   0.00   0.00  55.36
-------------------------------------------------------------------------------

Segment Leq : 55.77 dBA

Total Leq All Segments: 55.77 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -59.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT (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 !        4.50 !        3.47 !         3.47

RT/Custom (0.00 + 35.45 + 45.91) = 46.28 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -59   0.00  56.63  -5.87  -7.64   0.00   0.00  -7.67  35.45
-------------------------------------------------------------------------
   -59      0   0.00  56.63  -5.87  -4.84   0.00   0.00   0.00  45.91
-------------------------------------------------------------------------

Segment Leq : 46.28 dBA

Total Leq All Segments: 46.28 dBA

#
```

```
Results segment # 1: BRT (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 !        4.50 !        3.47 !         3.47

RT/Custom (0.00 + 33.90 + 44.36) = 44.73 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -59   0.00  55.08  -5.87  -7.64   0.00   0.00  -7.67  33.90
-------------------------------------------------------------------------
   -59      0   0.00  55.08  -5.87  -4.84   0.00   0.00   0.00  44.36
-------------------------------------------------------------------------

Segment Leq : 44.73 dBA

Total Leq All Segments: 44.73 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 63.44
                           (NIGHT): 56.10
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:29:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  54.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  19.00 / 19.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 !        4.50 !        3.29 !         3.29

ROAD (63.49 + 53.54 + 0.00) = 63.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     54   0.00  73.68   0.00  -4.96  -5.23   0.00   0.00   0.00  63.49
-------------------------------------------------------------------------------
    54     90   0.00  73.68   0.00  -4.96  -6.99   0.00   0.00  -8.18  53.54
-------------------------------------------------------------------------------

Segment Leq : 63.91 dBA

Total Leq All Segments: 63.91 dBA


Results segment # 1: Greenbank (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 !        4.50 !        3.29 !         3.29

ROAD (55.89 + 45.95 + 0.00) = 56.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     54   0.00  66.08   0.00  -4.96  -5.23   0.00   0.00   0.00  55.89
-------------------------------------------------------------------------------
    54     90   0.00  66.08   0.00  -4.96  -6.99   0.00   0.00  -8.18  45.95
-------------------------------------------------------------------------------

Segment Leq : 56.31 dBA

Total Leq All Segments: 56.31 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  54.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  19.00 / 19.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: BRT (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 !        4.50 !        2.88 !         2.88

RT/Custom (46.44 + 35.90 + 0.00) = 46.81 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     54   0.00  56.63  -4.96  -5.23   0.00   0.00   0.00  46.44
-------------------------------------------------------------------------
    54     90   0.00  56.63  -4.96  -6.99   0.00   0.00  -8.78  35.90
-------------------------------------------------------------------------

Segment Leq : 46.81 dBA

Total Leq All Segments: 46.81 dBA

#
```

```
Results segment # 1: BRT (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 !        4.50 !        2.88 !         2.88

RT/Custom (44.89 + 34.35 + 0.00) = 45.26 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     54   0.00  55.08  -4.96  -5.23   0.00   0.00   0.00  44.89
-------------------------------------------------------------------------
    54     90   0.00  55.08  -4.96  -6.99   0.00   0.00  -8.78  34.35
-------------------------------------------------------------------------

Segment Leq : 45.26 dBA

Total Leq All Segments: 45.26 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 63.99
                           (NIGHT): 56.64
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:29:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 119.00 / 119.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  16.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  91.00 / 91.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 !        4.50 !        2.20 !         2.20

ROAD (54.17 + 51.02 + 0.00) = 55.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     16   0.00  73.68   0.00  -8.99 -10.51   0.00   0.00   0.00  54.17
-------------------------------------------------------------------------------
    16     90   0.00  73.68   0.00  -8.99  -3.86   0.00   0.00  -9.80  51.02
-------------------------------------------------------------------------------

Segment Leq : 55.88 dBA

Total Leq All Segments: 55.88 dBA


Results segment # 1: Greenbank (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 !        4.50 !        2.20 !         2.20

ROAD (46.57 + 43.42 + 0.00) = 48.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     16   0.00  66.08   0.00  -8.99 -10.51   0.00   0.00   0.00  46.57
-------------------------------------------------------------------------------
    16     90   0.00  66.08   0.00  -8.99  -3.86   0.00   0.00  -9.80  43.42
-------------------------------------------------------------------------------

Segment Leq : 48.29 dBA

Total Leq All Segments: 48.29 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 119.00 / 119.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  16.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  91.00 / 91.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: BRT (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 !        4.50 !        1.44 !         1.44

RT/Custom (37.12 + 32.97 + 0.00) = 38.54 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     16   0.00  56.63  -8.99 -10.51   0.00   0.00   0.00  37.12
-------------------------------------------------------------------------
    16     90   0.00  56.63  -8.99  -3.86   0.00   0.00 -10.80  32.97
-------------------------------------------------------------------------

Segment Leq : 38.54 dBA

Total Leq All Segments: 38.54 dBA

#
```

```
Results segment # 1: BRT (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 !        4.50 !        1.44 !         1.44

RT/Custom (35.57 + 31.42 + 0.00) = 36.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     16   0.00  55.08  -8.99 -10.51   0.00   0.00   0.00  35.57
-------------------------------------------------------------------------
    16     90   0.00  55.08  -8.99  -3.86   0.00   0.00 -10.80  31.42
-------------------------------------------------------------------------

Segment Leq : 36.99 dBA

Total Leq All Segments: 36.99 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 55.96
                           (NIGHT): 48.60
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:27:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.41 + 0.00) = 55.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.57  73.68   0.00 -13.95  -4.31   0.00   0.00   0.00  55.41
-------------------------------------------------------------------------------

Segment Leq : 55.41 dBA

Total Leq All Segments: 55.41 dBA


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

Source height = 1.50 m

ROAD (0.00 + 47.82 + 0.00) = 47.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.57  66.08   0.00 -13.95  -4.31   0.00   0.00   0.00  47.82
-------------------------------------------------------------------------------

Segment Leq : 47.82 dBA

Total Leq All Segments: 47.82 dBA

#
```

```
RT/Custom data, segment # 1: BRT (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 116.00 / 116.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 0.50 m

RT/Custom (0.00 + 38.05 + 0.00) = 38.05 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.60  56.63 -14.21  -4.37   0.00   0.00   0.00  38.05
-------------------------------------------------------------------------

Segment Leq : 38.05 dBA

Total Leq All Segments: 38.05 dBA

#
```

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

Source height = 0.50 m

RT/Custom (0.00 + 36.50 + 0.00) = 36.50 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90      0   0.60  55.08 -14.21  -4.37   0.00   0.00   0.00  36.50
-------------------------------------------------------------------------

Segment Leq : 36.50 dBA

Total Leq All Segments: 36.50 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 55.49
                           (NIGHT): 48.13
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:27:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Street1 (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 # 1: Street1 (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   -36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -36.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Street2 (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 # 2: Street2 (day/night)
-----------------------------------------
Angle1   Angle2           : -36.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -36.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Street1 (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 + 42.64 + 0.00) = 42.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -36   0.30  65.75   0.00  -1.33  -6.52   0.00   0.00 -15.25  42.64
-------------------------------------------------------------------------------

Segment Leq : 42.64 dBA


Results segment # 2: Street2 (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 + 61.44 + 0.00) = 61.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -36     90   0.66  65.75   0.00  -1.70  -2.61   0.00   0.00  -0.24  61.20*
   -36     90   0.66  65.75   0.00  -1.70  -2.61   0.00   0.00   0.00  61.44
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 61.44 dBA

Total Leq All Segments: 61.50 dBA

#
```

```
Results segment # 1: Street1 (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 + 35.05 + 0.00) = 35.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -36   0.30  58.16   0.00  -1.33  -6.52   0.00   0.00 -15.25  35.05
-------------------------------------------------------------------------------

Segment Leq : 35.05 dBA


Results segment # 2: Street2 (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 + 53.85 + 0.00) = 53.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -36     90   0.66  58.16   0.00  -1.70  -2.61   0.00   0.00  -0.24  53.61*
   -36     90   0.66  58.16   0.00  -1.70  -2.61   0.00   0.00   0.00  53.85
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 53.85 dBA

Total Leq All Segments: 53.91 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 61.50
                           (NIGHT): 53.91
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:27:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11b.te              Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Street1 (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 # 1: Street1 (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   -36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -36.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Street2 (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 # 2: Street2 (day/night)
-----------------------------------------
Angle1   Angle2           : -36.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -36.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Street1 (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 + 42.64 + 0.00) = 42.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -36   0.30  65.75   0.00  -1.33  -6.52   0.00   0.00 -15.25  42.64
-------------------------------------------------------------------------------

Segment Leq : 42.64 dBA


Results segment # 2: Street2 (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 + 55.01 + 0.00) = 55.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -36     90   0.53  65.75   0.00  -1.57  -2.44   0.00   0.00  -6.73  55.01
-------------------------------------------------------------------------------

Segment Leq : 55.01 dBA

Total Leq All Segments: 55.25 dBA

#
```

```
Results segment # 1: Street1 (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 + 35.05 + 0.00) = 35.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -36   0.30  58.16   0.00  -1.33  -6.52   0.00   0.00 -15.25  35.05
-------------------------------------------------------------------------------

Segment Leq : 35.05 dBA


Results segment # 2: Street2 (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 + 47.42 + 0.00) = 47.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -36     90   0.53  58.16   0.00  -1.57  -2.44   0.00   0.00  -6.73  47.42
-------------------------------------------------------------------------------

Segment Leq : 47.42 dBA

Total Leq All Segments: 47.66 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 55.25
                           (NIGHT): 47.66
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:27:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Street 1 (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 # 1: Street 1 (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  46.00 / 46.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -6.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  31.00 / 31.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Street 1 (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 + 41.96 + 53.59) = 53.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -6   0.30  65.75   0.00  -6.33  -4.14   0.00   0.00 -13.33  41.96
-------------------------------------------------------------------------------
    -6     90   0.66  65.75   0.00  -8.08  -4.08   0.00   0.00   0.00  53.59
-------------------------------------------------------------------------------

Segment Leq : 53.88 dBA

Total Leq All Segments: 53.88 dBA


Results segment # 1: Street 1 (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 + 34.36 + 46.00) = 46.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -6   0.30  58.16   0.00  -6.33  -4.14   0.00   0.00 -13.33  34.36
-------------------------------------------------------------------------------
    -6     90   0.66  58.16   0.00  -8.08  -4.08   0.00   0.00   0.00  46.00
-------------------------------------------------------------------------------

Segment Leq : 46.29 dBA

Total Leq All Segments: 46.29 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 53.88
                           (NIGHT): 46.29
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Street 1 (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 # 1: Street 1 (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  32.00 / 32.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -11.00 deg
Barrier height            :   6.00 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

#
```

```
Results segment # 1: Street 1 (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 + 43.09 + 56.50) = 56.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -11   0.30  65.75   0.00  -4.28  -4.46   0.00   0.00 -13.92  43.09
-------------------------------------------------------------------------------
   -11     90   0.66  65.75   0.00  -5.46  -3.78   0.00   0.00   0.00  56.50
-------------------------------------------------------------------------------

Segment Leq : 56.70 dBA

Total Leq All Segments: 56.70 dBA


Results segment # 1: Street 1 (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 + 35.50 + 48.91) = 49.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -11   0.30  58.16   0.00  -4.28  -4.46   0.00   0.00 -13.92  35.50
-------------------------------------------------------------------------------
   -11     90   0.66  58.16   0.00  -5.46  -3.78   0.00   0.00   0.00  48.91
-------------------------------------------------------------------------------

Segment Leq : 49.10 dBA

Total Leq All Segments: 49.10 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 56.70
                           (NIGHT): 49.10
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Greenbank2 (day/night)
--------------------------------------------
Angle1   Angle2           : -42.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -42.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 + 47.40 + 0.00) = 47.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -42   0.30  73.68   0.00  -4.10  -7.17   0.00   0.00 -15.00  47.40
-------------------------------------------------------------------------------

Segment Leq : 47.40 dBA


Results segment # 2: Greenbank2 (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 + 66.05 + 0.00) = 66.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -42     90   0.66  73.68   0.00  -5.23  -2.39   0.00   0.00  -0.28  65.77*
   -42     90   0.66  73.68   0.00  -5.23  -2.39   0.00   0.00   0.00  66.05
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 66.05 dBA

Total Leq All Segments: 66.11 dBA

#
```

```
Results segment # 1: Greenbank (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 + 39.81 + 0.00) = 39.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -42   0.30  66.08   0.00  -4.10  -7.17   0.00   0.00 -15.00  39.81
-------------------------------------------------------------------------------

Segment Leq : 39.81 dBA


Results segment # 2: Greenbank2 (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 + 58.46 + 0.00) = 58.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -42     90   0.66  66.08   0.00  -5.23  -2.39   0.00   0.00  -0.28  58.18*
   -42     90   0.66  66.08   0.00  -5.23  -2.39   0.00   0.00   0.00  58.46
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 58.46 dBA

Total Leq All Segments: 58.52 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
RT/Custom data, segment # 2: BRT2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
--------------------------------------
Angle1   Angle2           : -42.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -42.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Results segment # 1: BRT1 (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 !        1.40 !         1.40

RT/Custom (0.00 + 29.97 + 0.00) = 29.97 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -42   0.33  56.63  -4.19  -7.30   0.00   0.00 -15.17  29.97
-------------------------------------------------------------------------

Segment Leq : 29.97 dBA

#
```

```
Results segment # 2: BRT2 (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 !        1.27 !         1.27

RT/Custom (0.00 + 49.01 + 0.00) = 49.01 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -42     90   0.66  56.63  -5.23  -2.39   0.00   0.00  -0.40  48.61*
   -42     90   0.66  56.63  -5.23  -2.39   0.00   0.00   0.00  49.01
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.01 dBA

Total Leq All Segments: 49.06 dBA


Results segment # 1: BRT1 (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 !        1.40 !         1.40

RT/Custom (0.00 + 28.42 + 0.00) = 28.42 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -42   0.33  55.08  -4.19  -7.30   0.00   0.00 -15.17  28.42
-------------------------------------------------------------------------

Segment Leq : 28.42 dBA

#
```

```
Results segment # 2: BRT2 (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 !        1.27 !         1.27

RT/Custom (0.00 + 47.46 + 0.00) = 47.46 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -42     90   0.66  55.08  -5.23  -2.39   0.00   0.00  -0.40  47.06*
   -42     90   0.66  55.08  -5.23  -2.39   0.00   0.00   0.00  47.46
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 47.46 dBA

Total Leq All Segments: 47.51 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 66.19
                           (NIGHT): 58.85
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r14b1.te             Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: Greenbank2 (day/night)
--------------------------------------------
Angle1   Angle2           : -42.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -42.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.50 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 + 47.40 + 0.00) = 47.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -42   0.30  73.68   0.00  -4.10  -7.17   0.00   0.00 -15.00  47.40
-------------------------------------------------------------------------------

Segment Leq : 47.40 dBA


Results segment # 2: Greenbank2 (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 + 59.13 + 0.00) = 59.13 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -42     90   0.51  73.68   0.00  -4.76  -2.20   0.00   0.00  -7.59  59.13
-------------------------------------------------------------------------------

Segment Leq : 59.13 dBA

Total Leq All Segments: 59.41 dBA

#
```

```
Results segment # 1: Greenbank (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 + 39.81 + 0.00) = 39.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -42   0.30  66.08   0.00  -4.10  -7.17   0.00   0.00 -15.00  39.81
-------------------------------------------------------------------------------

Segment Leq : 39.81 dBA


Results segment # 2: Greenbank2 (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 + 51.53 + 0.00) = 51.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -42     90   0.51  66.08   0.00  -4.76  -2.20   0.00   0.00  -7.59  51.53
-------------------------------------------------------------------------------

Segment Leq : 51.53 dBA

Total Leq All Segments: 51.81 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


RT/Custom data, segment # 2: BRT2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
-------------------------------------
Angle1   Angle2           : -42.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -42.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.50 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT1 (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 !        1.40 !         1.40

RT/Custom (0.00 + 29.97 + 0.00) = 29.97 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -42   0.33  56.63  -4.19  -7.30   0.00   0.00 -15.17  29.97
-------------------------------------------------------------------------

Segment Leq : 29.97 dBA


Results segment # 2: BRT2 (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 !        1.27 !         1.27

RT/Custom (0.00 + 41.08 + 0.00) = 41.08 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -42     90   0.54  56.63  -4.86  -2.24   0.00   0.00  -8.45  41.08
-------------------------------------------------------------------------

Segment Leq : 41.08 dBA

Total Leq All Segments: 41.40 dBA

#
```

```
Results segment # 1: BRT1 (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 !        1.40 !         1.40

RT/Custom (0.00 + 28.42 + 0.00) = 28.42 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -42   0.33  55.08  -4.19  -7.30   0.00   0.00 -15.17  28.42
-------------------------------------------------------------------------

Segment Leq : 28.42 dBA


Results segment # 2: BRT2 (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 !        1.27 !         1.27

RT/Custom (0.00 + 39.53 + 0.00) = 39.53 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -42     90   0.54  55.08  -4.86  -2.24   0.00   0.00  -8.45  39.53
-------------------------------------------------------------------------

Segment Leq : 39.53 dBA

Total Leq All Segments: 39.85 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 59.48
                           (NIGHT): 52.08
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r14b2.te             Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Angle1   Angle2           : -42.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -42.00 deg   Angle2 : 90.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 + 47.40 + 0.00) = 47.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -42   0.30  73.68   0.00  -4.10  -7.17   0.00   0.00 -15.00  47.40
-------------------------------------------------------------------------------

Segment Leq : 47.40 dBA


Results segment # 2: Greenbank2 (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 + 54.63 + 0.00) = 54.63 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -42     90   0.42  73.68   0.00  -4.48  -2.08   0.00   0.00 -12.49  54.63
-------------------------------------------------------------------------------

Segment Leq : 54.63 dBA

Total Leq All Segments: 55.38 dBA

#
```

```
Results segment # 1: Greenbank (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 + 39.81 + 0.00) = 39.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -42   0.30  66.08   0.00  -4.10  -7.17   0.00   0.00 -15.00  39.81
-------------------------------------------------------------------------------

Segment Leq : 39.81 dBA


Results segment # 2: Greenbank2 (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 + 47.03 + 0.00) = 47.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -42     90   0.42  66.08   0.00  -4.48  -2.08   0.00   0.00 -12.49  47.03
-------------------------------------------------------------------------------

Segment Leq : 47.03 dBA

Total Leq All Segments: 47.78 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


RT/Custom data, segment # 2: BRT2 (day/night)
-----------------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
-------------------------------------
Angle1   Angle2           : -42.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.00 / 31.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -42.00 deg   Angle2 : 90.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT1 (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 !        1.40 !         1.40

RT/Custom (0.00 + 29.97 + 0.00) = 29.97 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -42   0.33  56.63  -4.19  -7.30   0.00   0.00 -15.17  29.97
-------------------------------------------------------------------------

Segment Leq : 29.97 dBA


Results segment # 2: BRT2 (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 !        1.27 !         1.27

RT/Custom (0.00 + 36.86 + 0.00) = 36.86 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -42     90   0.45  56.63  -4.57  -2.12   0.00   0.00 -13.07  36.86
-------------------------------------------------------------------------

Segment Leq : 36.86 dBA

Total Leq All Segments: 37.67 dBA

#
```

```
Results segment # 1: BRT1 (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 !        1.40 !         1.40

RT/Custom (0.00 + 28.42 + 0.00) = 28.42 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -42   0.33  55.08  -4.19  -7.30   0.00   0.00 -15.17  28.42
-------------------------------------------------------------------------

Segment Leq : 28.42 dBA


Results segment # 2: BRT2 (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 !        1.27 !         1.27

RT/Custom (0.00 + 35.32 + 0.00) = 35.32 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -42     90   0.45  55.08  -4.57  -2.12   0.00   0.00 -13.07  35.32
-------------------------------------------------------------------------

Segment Leq : 35.32 dBA

Total Leq All Segments: 36.13 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 55.46
                           (NIGHT): 48.07
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank1 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank1 (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   -6.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -6.00 deg
Barrier height            :   6.00 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

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Angle1   Angle2           :  -6.00 deg   27.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -6.00 deg   Angle2 : 27.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  35.00 / 35.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 3: Greenbank3 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: Greenbank3 (day/night)
-----------------------------------------------
Angle1   Angle2           :  27.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  27.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 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: Greenbank1 (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 + 49.68 + 0.00) = 49.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -90     -6   0.30  73.68   0.00  -7.64  -4.14   0.00   0.00 -12.22  49.68
--------------------------------------------------------------------------------

Segment Leq : 49.68 dBA


Results segment # 2: Greenbank2 (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 + 56.47 + 0.00) = 56.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
    -6     27   0.66  73.68   0.00  -9.75  -7.46   0.00   0.00   0.00  56.47*
    -6     27   0.66  73.68   0.00  -9.75  -7.46   0.00   0.00   0.00  56.47
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 56.47 dBA

#
```

```
Results segment # 3: Greenbank3 (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 + 48.89 + 0.00) = 48.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    27     90   0.30  73.68   0.00  -7.64  -5.68   0.00   0.00 -11.47  48.89
-------------------------------------------------------------------------------

Segment Leq : 48.89 dBA

Total Leq All Segments: 57.88 dBA


Results segment # 1: Greenbank1 (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 + 42.08 + 0.00) = 42.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -6   0.30  66.08   0.00  -7.64  -4.14   0.00   0.00 -12.22  42.08
-------------------------------------------------------------------------------

Segment Leq : 42.08 dBA

#
```

```
Results segment # 2: Greenbank2 (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 + 48.87 + 0.00) = 48.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -6     27   0.66  66.08   0.00  -9.75  -7.46   0.00   0.00   0.00  48.87*
    -6     27   0.66  66.08   0.00  -9.75  -7.46   0.00   0.00   0.00  48.87
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 48.87 dBA


Results segment # 3: Greenbank3 (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 + 41.30 + 0.00) = 41.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    27     90   0.30  66.08   0.00  -7.64  -5.68   0.00   0.00 -11.47  41.30
-------------------------------------------------------------------------------

Segment Leq : 41.30 dBA

Total Leq All Segments: 50.28 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   -6.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -6.00 deg
Barrier height            :   6.00 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


RT/Custom data, segment # 2: BRT2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
--------------------------------------
Angle1   Angle2           :  -6.00 deg   27.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -6.00 deg   Angle2 : 27.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  35.00 / 35.00  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: BRT3 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 3: BRT3 (day/night)
--------------------------------------
Angle1   Angle2           :  27.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  27.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 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: BRT1 (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 !        0.98 !         0.98

RT/Custom (0.00 + 31.71 + 0.00) = 31.71 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     -6   0.33  56.63  -7.81  -4.21   0.00   0.00 -12.89  31.71
-------------------------------------------------------------------------

Segment Leq : 31.71 dBA

#
```

```
Results segment # 2: BRT2 (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 !        0.90 !         0.90

RT/Custom (0.00 + 39.42 + 0.00) = 39.42 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    -6     27   0.66  56.63  -9.75  -7.46   0.00   0.00  -3.30  36.12*
    -6     27   0.66  56.63  -9.75  -7.46   0.00   0.00   0.00  39.42
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 39.42 dBA


Results segment # 3: BRT3 (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 !        0.98 !         0.98

RT/Custom (0.00 + 30.93 + 0.00) = 30.93 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    27     90   0.33  56.63  -7.81  -5.78   0.00   0.00 -12.11  30.93
-------------------------------------------------------------------------

Segment Leq : 30.93 dBA

Total Leq All Segments: 40.60 dBA

#
```

```
Results segment # 1: BRT1 (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 !        0.98 !         0.98

RT/Custom (0.00 + 30.16 + 0.00) = 30.16 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     -6   0.33  55.08  -7.81  -4.21   0.00   0.00 -12.89  30.16
-------------------------------------------------------------------------

Segment Leq : 30.16 dBA


Results segment # 2: BRT2 (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 !        0.90 !         0.90

RT/Custom (0.00 + 37.87 + 0.00) = 37.87 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    -6     27   0.66  55.08  -9.75  -7.46   0.00   0.00  -3.30  34.57*
    -6     27   0.66  55.08  -9.75  -7.46   0.00   0.00   0.00  37.87
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 37.87 dBA

#
```

```
Results segment # 3: BRT3 (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 !        0.98 !         0.98

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
-------------------------------------------------------------------------
    27     90   0.33  55.08  -7.81  -5.78   0.00   0.00 -12.11  29.38
-------------------------------------------------------------------------

Segment Leq : 29.38 dBA

Total Leq All Segments: 39.05 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 57.96
                           (NIGHT): 50.60
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank1 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank1 (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   -3.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -3.00 deg
Barrier height            :   6.00 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

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Angle1   Angle2           :  -3.00 deg   15.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -3.00 deg   Angle2 : 15.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  35.00 / 35.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 3: Greenbank3 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Greenbank3 (day/night)
-----------------------------------------------
Angle1   Angle2           :  15.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  15.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 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: Greenbank1 (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 + 48.70 + 0.00) = 48.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -3   0.30  73.68   0.00  -9.52  -3.96   0.00   0.00 -11.50  48.70
-------------------------------------------------------------------------------

Segment Leq : 48.70 dBA


Results segment # 2: Greenbank2 (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 + 51.49 + 0.00) = 51.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -3     15   0.66  73.68   0.00 -12.16 -10.03   0.00   0.00  -1.03  50.46*
    -3     15   0.66  73.68   0.00 -12.16 -10.03   0.00   0.00   0.00  51.49
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 51.49 dBA

#
```

```
Results segment # 3: Greenbank3 (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 + 48.27 + 0.00) = 48.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    15     90   0.30  73.68   0.00  -9.52  -4.74   0.00   0.00 -11.14  48.27
-------------------------------------------------------------------------------

Segment Leq : 48.27 dBA

Total Leq All Segments: 54.51 dBA


Results segment # 1: Greenbank1 (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 + 41.10 + 0.00) = 41.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     -3   0.30  66.08   0.00  -9.52  -3.96   0.00   0.00 -11.50  41.10
-------------------------------------------------------------------------------

Segment Leq : 41.10 dBA

#
```

```
Results segment # 2: Greenbank2 (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 + 43.89 + 0.00) = 43.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -3     15   0.66  66.08   0.00 -12.16 -10.03   0.00   0.00  -1.03  42.87*
    -3     15   0.66  66.08   0.00 -12.16 -10.03   0.00   0.00   0.00  43.89
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 43.89 dBA


Results segment # 3: Greenbank3 (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 + 40.68 + 0.00) = 40.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    15     90   0.30  66.08   0.00  -9.52  -4.74   0.00   0.00 -11.14  40.68
-------------------------------------------------------------------------------

Segment Leq : 40.68 dBA

Total Leq All Segments: 46.91 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   -3.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -3.00 deg
Barrier height            :   6.00 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


RT/Custom data, segment # 2: BRT2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
--------------------------------------
Angle1   Angle2           :  -3.00 deg   15.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -3.00 deg   Angle2 : 15.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  35.00 / 35.00  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: BRT3 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 3: BRT3 (day/night)
--------------------------------------
Angle1   Angle2           :  15.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  15.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 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: BRT1 (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 !        1.13 !         1.13

RT/Custom (0.00 + 30.88 + 0.00) = 30.88 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     -3   0.33  56.63  -9.74  -4.02   0.00   0.00 -11.98  30.88
-------------------------------------------------------------------------

Segment Leq : 30.88 dBA

#
```

```
Results segment # 2: BRT2 (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 !        1.07 !         1.07

RT/Custom (0.00 + 34.44 + 0.00) = 34.44 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    -3     15   0.66  56.63 -12.16 -10.03   0.00   0.00  -3.28  31.16*
    -3     15   0.66  56.63 -12.16 -10.03   0.00   0.00   0.00  34.44
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 34.44 dBA


Results segment # 3: BRT3 (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 !        1.13 !         1.13

RT/Custom (0.00 + 30.46 + 0.00) = 30.46 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    15     90   0.33  56.63  -9.74  -4.82   0.00   0.00 -11.61  30.46
-------------------------------------------------------------------------

Segment Leq : 30.46 dBA

Total Leq All Segments: 37.09 dBA

#
```

```
Results segment # 1: BRT1 (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 !        1.13 !         1.13

RT/Custom (0.00 + 29.33 + 0.00) = 29.33 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     -3   0.33  55.08  -9.74  -4.02   0.00   0.00 -11.98  29.33
-------------------------------------------------------------------------

Segment Leq : 29.33 dBA


Results segment # 2: BRT2 (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 !        1.07 !         1.07

RT/Custom (0.00 + 32.89 + 0.00) = 32.89 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    -3     15   0.66  55.08 -12.16 -10.03   0.00   0.00  -3.28  29.61*
    -3     15   0.66  55.08 -12.16 -10.03   0.00   0.00   0.00  32.89
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 32.89 dBA

#
```

```
Results segment # 3: BRT3 (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 !        1.13 !         1.13

RT/Custom (0.00 + 28.91 + 0.00) = 28.91 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    15     90   0.33  55.08  -9.74  -4.82   0.00   0.00 -11.61  28.91
-------------------------------------------------------------------------

Segment Leq : 28.91 dBA

Total Leq All Segments: 35.54 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 54.58
                           (NIGHT): 47.21
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 14.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Angle1   Angle2           :  14.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  14.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  48.00 / 48.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 + 57.14 + 0.00) = 57.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     14   0.66  73.68   0.00 -12.92  -3.62   0.00   0.00  -0.44  56.71*
   -90     14   0.66  73.68   0.00 -12.92  -3.62   0.00   0.00   0.00  57.14
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 57.14 dBA


Results segment # 2: Greenbank2 (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 + 48.20 + 0.00) = 48.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    14     90   0.30  73.68   0.00 -10.12  -4.67   0.00   0.00 -10.69  48.20
-------------------------------------------------------------------------------

Segment Leq : 48.20 dBA

Total Leq All Segments: 57.66 dBA

#
```

```
Results segment # 1: Greenbank (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 + 49.54 + 0.00) = 49.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     14   0.66  66.08   0.00 -12.92  -3.62   0.00   0.00  -0.44  49.11*
   -90     14   0.66  66.08   0.00 -12.92  -3.62   0.00   0.00   0.00  49.54
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.54 dBA


Results segment # 2: Greenbank2 (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 + 40.61 + 0.00) = 40.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    14     90   0.30  66.08   0.00 -10.12  -4.67   0.00   0.00 -10.69  40.61
-------------------------------------------------------------------------------

Segment Leq : 40.61 dBA

Total Leq All Segments: 50.06 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 14.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   7.00 / 7.00   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: BRT2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
--------------------------------------
Angle1   Angle2           :  14.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  14.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  48.00 / 48.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT1 (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 !        1.42 !         1.42

RT/Custom (0.00 + 40.09 + 0.00) = 40.09 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     14   0.66  56.63 -12.92  -3.62   0.00   0.00  -0.49  39.60*
   -90     14   0.66  56.63 -12.92  -3.62   0.00   0.00   0.00  40.09
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 40.09 dBA


Results segment # 2: BRT2 (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 !        0.97 !         0.97

RT/Custom (0.00 + 30.20 + 0.00) = 30.20 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    14     90   0.33  56.63 -10.35  -4.75   0.00   0.00 -11.33  30.20
-------------------------------------------------------------------------

Segment Leq : 30.20 dBA

Total Leq All Segments: 40.51 dBA

#
```

```
Results segment # 1: BRT1 (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 !        1.42 !         1.42

RT/Custom (0.00 + 38.54 + 0.00) = 38.54 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     14   0.66  55.08 -12.92  -3.62   0.00   0.00  -0.49  38.05*
   -90     14   0.66  55.08 -12.92  -3.62   0.00   0.00   0.00  38.54
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 38.54 dBA


Results segment # 2: BRT2 (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 !        0.97 !         0.97

RT/Custom (0.00 + 28.65 + 0.00) = 28.65 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    14     90   0.33  55.08 -10.35  -4.75   0.00   0.00 -11.33  28.65
-------------------------------------------------------------------------

Segment Leq : 28.65 dBA

Total Leq All Segments: 38.96 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 57.74
                           (NIGHT): 50.39
#
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-07-2019 10:28:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r17b.te              Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Greenbank (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Greenbank (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 14.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Road data, segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: Greenbank2 (day/night)
-----------------------------------------------
Angle1   Angle2           :  14.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  14.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  48.00 / 48.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: Greenbank (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 + 52.17 + 0.00) = 52.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     14   0.53  73.68   0.00 -11.89  -3.43   0.00   0.00  -6.19  52.17
-------------------------------------------------------------------------------

Segment Leq : 52.17 dBA


Results segment # 2: Greenbank2 (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 + 48.20 + 0.00) = 48.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    14     90   0.30  73.68   0.00 -10.12  -4.67   0.00   0.00 -10.69  48.20
-------------------------------------------------------------------------------

Segment Leq : 48.20 dBA

Total Leq All Segments: 53.63 dBA

#
```

```
Results segment # 1: Greenbank (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 + 44.58 + 0.00) = 44.58 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     14   0.53  66.08   0.00 -11.89  -3.43   0.00   0.00  -6.19  44.58
-------------------------------------------------------------------------------

Segment Leq : 44.58 dBA


Results segment # 2: Greenbank2 (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 + 40.61 + 0.00) = 40.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    14     90   0.30  66.08   0.00 -10.12  -4.67   0.00   0.00 -10.69  40.61
-------------------------------------------------------------------------------

Segment Leq : 40.61 dBA

Total Leq All Segments: 46.04 dBA

#
```

```
RT/Custom data, segment # 1: BRT1 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 1: BRT1 (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 14.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   7.00 / 7.00   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: BRT2 (day/night)
-----------------------------------------
1 - Bus:
Traffic volume    :   200/70    veh/TimePeriod
Speed             :    60 km/h

Data for Segment # 2: BRT2 (day/night)
--------------------------------------
Angle1   Angle2           :  14.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  14.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  48.00 / 48.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

#
```

```
Results segment # 1: BRT1 (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 !        1.42 !         1.42

RT/Custom (0.00 + 34.61 + 0.00) = 34.61 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     14   0.56  56.63 -12.12  -3.47   0.00   0.00  -6.42  34.61
-------------------------------------------------------------------------

Segment Leq : 34.61 dBA


Results segment # 2: BRT2 (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 !        0.97 !         0.97

RT/Custom (0.00 + 30.20 + 0.00) = 30.20 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    14     90   0.33  56.63 -10.35  -4.75   0.00   0.00 -11.33  30.20
-------------------------------------------------------------------------

Segment Leq : 30.20 dBA

Total Leq All Segments: 35.95 dBA

#
```

```
Results segment # 1: BRT1 (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 !        1.42 !         1.42

RT/Custom (0.00 + 33.07 + 0.00) = 33.07 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     14   0.56  55.08 -12.12  -3.47   0.00   0.00  -6.42  33.07
-------------------------------------------------------------------------

Segment Leq : 33.07 dBA


Results segment # 2: BRT2 (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 !        0.97 !         0.97

RT/Custom (0.00 + 28.65 + 0.00) = 28.65 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    14     90   0.33  55.08 -10.35  -4.75   0.00   0.00 -11.33  28.65
-------------------------------------------------------------------------

Segment Leq : 28.65 dBA

Total Leq All Segments: 34.41 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 53.71
                           (NIGHT): 46.33
```

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SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-A1
DATE	JUNE 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE A1:
STAMSON INPUT PARAMETERS - RECEPTOR 1-3

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	SCALE: 1:1500 (APPROX.)	DRAWING NO.: GWE19-103-A2	FIGURE A1: STAMSON INPUT PARAMETERS - RECEPTOR 11
	DATE: JUNE 20, 2019	DRAWN BY: M.L.	

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SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-A2
DATE	JUNE 20, 2019	DRAWN BY	M.L.

DESCRIPTION

FIGURE A1:
STAMSON INPUT PARAMETERS - RECEPTOR 12,13

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SCALE	1:1500 (APPROX.)
DRAWING NO.	GWE19-103-A4
DATE	JUNE 20, 2019
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DESCRIPTION

FIGURE A4:
STAMSON INPUT PARAMETERS - RECEPTOR 4,5,6,10

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SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE19-103-A5
DATE	JUNE 20, 2019	DRAWN BY	M.L.

FIGURE A5:
STAMSON INPUT PARAMETERS - RECEPTOR 7,8,14,17

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SCALE	1:1500 (APPROX.)
DRAWING NO.	GWE19-103-A6
DATE	JUNE 20, 2019
DRAWN BY	M.L.

DESCRIPTION

FIGURE A6:
STAMSON INPUT PARAMETERS - RECEPTOR 9,15,16