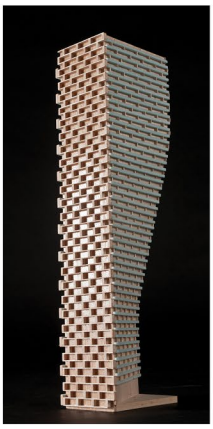
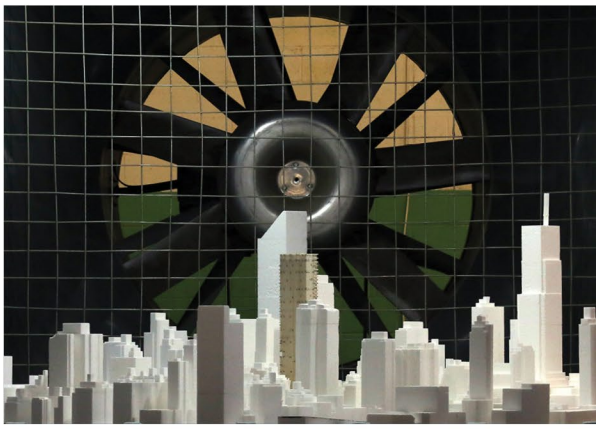
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE ASSESSMENT

15 Oblats Avenue
Ottawa, Ontario

GRADIENT WIND REPORT: 22-094 – Traffic Noise





July 27, 2022

PREPARED FOR

Forum/SLP 15 Oblats Limited Partnership
181 Bay Street
Toronto, ON M5J 2T3

PREPARED BY

Giuseppe Garro, MASc., Environmental Scientist
Joshua Foster, P.Eng., Lead Engineer

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

EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of a Zoning By-law Amendment (ZBA) and Site Plan Control (SPC) application for a proposed development located at 15 Oblats Avenue in Ottawa, Ontario. The proposed development comprises a pre-existing four-storey 'T' shaped residential building with a four-storey 'L' shaped addition to the north encompassed by Springhurst Avenue to the north, Main Street to the west, and Oblats Avenue to the south. The new addition includes a basement level with residential units, bike storage, and lockers. At grade the site contains an outdoor amenities space with a raised seating area encompassed by the new and existing walls of the building, two lobbies, indoor amenities, maintenance spaces, and residential units. Levels 2-4 contain residential units. The primary sources of roadway traffic noise on the development include Main Street and Highway 417. 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; and (iv) architectural drawings provided by Woodman Architect and Associates LTD. in July 2022.

The results of the current analysis indicate that noise levels will range between 38 and 55 dBA during the daytime period (07:00-23:00) and between 30 and 47 dBA during the nighttime period (23:00-07:00). The highest noise level (55 dBA) occurs at the north façade, which is nearest and most exposed to Highway 417.

Results of the calculations also indicate that standard building components will be sufficient. In addition, the building will not require upgraded ventilation for noise mitigation purposes as noise levels at the facades are not expected to exceed 55 dBA during the daytime. However, the building is expected to have air conditioning for occupant comfort purposes.

Noise levels at the rooftop amenity area are expected to fall below 60 dBA during the daytime period. Therefore, no acoustic mitigation is required.

As the building design progresses, the stationary noise impacts of the building on the surroundings would be considered at a future stage. Stationary noise sources associated with the development are expected to comprise of DX Split Air Conditioning units. These sources are not expected to be a concern at noise sensitive spaces and surrounding properties, provided the following are considered in the design: judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens. Installation of the equipment should be done in accordance with NPC-216 Residential Air Conditioning Devices.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Forum/SLP 15 Oblats Limited Partnership to undertake a roadway traffic noise assessment in support of a Zoning By-law Amendment (ZBA) and Site Plan Control (SPC) application for a proposed development located at 15 Oblats Avenue in 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 architectural drawings provided by Woodman Architect and Associates LTD. in July 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise assessment is a proposed development comprising a pre-existing four-storey 'T' shaped residential building with a four-storey 'L' shaped addition to the north. The site is situated on a rectangular parcel of land encompassed by Springhurst Avenue to the north, Main Street to the west, and Oblats Avenue to the south. The new addition includes a basement level with residential units, bike storage, and lockers. At grade the site contains an outdoor amenities space with a raised seating area encompassed by the new and existing walls of the building, two lobbies, indoor amenities, maintenance spaces, and residential units. Levels 2-4 contain residential units. A proposed indoor and outdoor amenities area is located on the roof of the additional building section to the northwest. The site is surrounded by a mix of low-rise to mid-rise residential, commercial, and educational buildings.

The rooftop terrace associated with the development was included in the assessment as an outdoor living area (OLA). The primary sources of roadway traffic noise on the development include Main Street and Highway 417. 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

As the building design progresses, the stationary noise impacts of the building on the surroundings would be considered at a future stage. Stationary noise sources associated with the development are expected to comprise of DX Split Air Conditioning units. These sources are not expected to be a concern at noise sensitive spaces and surrounding properties, provided the following are considered in the design: judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens. Installation of the equipment should be done in accordance with NPC-216 Residential Air Conditioning Devices.

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. Based on Gradient Wind's experience, more comfortable indoor noise levels should be targeted, towards 42 and 37 dBA, respectively, to control peak noise and deficiencies in building envelope construction.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [3]

Type of Space	Time Period	L_{eq} (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

[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

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 60 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 60 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

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.
- For noise generated from Main Street, ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- For noise generated from Highway 417, ground surfaces were taken to be absorptive to account for scattering effects from the intervening geometry and greenery buffering the highway to the north and the development. In addition, 6 rows of houses were modelled between the highway and the development with an approximate first row density of 79%.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- The highway was modelled with an elevation of approximately 8 metres above local grade for the site.
- Receptor height was taken to be 10.5 metres above grade at the 4th storey for the centre of the plane of window for Receptors 1-4, and 13.5 meters above grade for the roof top terrace outdoor living area (OLA) for Receptor 5.

[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

- For select sources where appropriate, the receptor considered the surrounding existing and proposed buildings as a barrier partially or fully obstructing exposure to the sources as illustrated by exposure angles in Figures 3 and 4.
- Noise receptors were strategically placed at 5 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3 and 4.
- For conservatism, the aged noise/privacy screen composed of thin sheet metal along the highway was omitted.

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.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Main Street	2-Lane Urban Arterial Undivided (2-UAU)	50	**15,000**
Highway 417 Westbound	Freeway	100	**55,000**
Highway 417 Eastbound	Freeway	100	**55,000**

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

5. ROADWAY TRAFFIC NOISE RESULTS

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	10.5	POW – 4th Floor – South Façade	38	30
2	10.5	POW – 4th Floor – West Façade	54	47
3	10.5	POW – 4th Floor – North Façade	55	47
4	10.5	POW – 4th Floor – East Façade	47	39
5	13.5	OLA – Roof Top Terrace	52	N/A*

*Nighttime noise levels for the OLA are not considered as per ENCG

The results of the current analysis indicate that noise levels will range between 38 and 55 dBA during the daytime period (07:00-23:00) and between 30 and 47 dBA during the nighttime period (23:00-07:00). The highest noise level (55 dBA) occurs at the north façade, which is nearest and most exposed to Highway 417. Since noise levels are less than 65 dBA at the building façade, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed.

The noise levels predicted due to roadway traffic do not exceed 55 dBA for the development. Therefore, the building will not require ventilation for noise mitigation purposes. However, the building is expected to have air conditioning for occupant comfort purposes.

As for the rooftop amenity area, noise levels are expected to be below the noise level criteria for OLAs. Therefore, no acoustic mitigation is required for the roof top terrace.

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 38 and 55 dBA during the daytime period (07:00-23:00) and between 30 and 47 dBA during the nighttime period (23:00-07:00). The highest noise level (55 dBA) occurs at the north façade, which is nearest and most exposed to Highway 417.

Results of the calculations also indicate that standard building components will be sufficient. In addition, the building will not require upgraded ventilation for noise mitigation purposes as noise levels at the facades are not expected to exceed 55 dBA during the daytime. However, the building is expected to have air conditioning for occupant comfort purposes.

Noise levels at the rooftop amenity area are expected to fall below 60 dBA during the daytime period. Therefore, no acoustic mitigation is required.

This concludes our roadway 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.

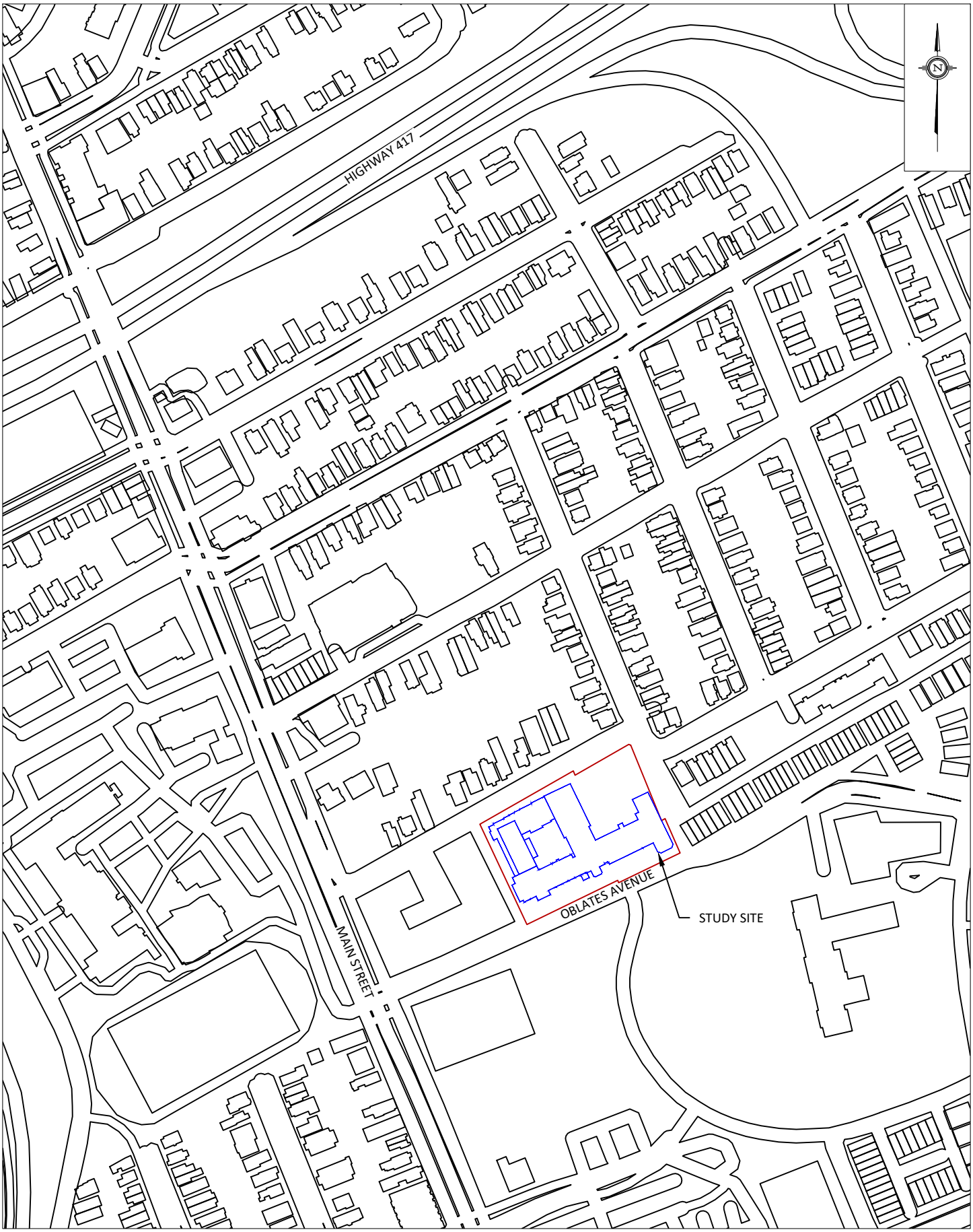
Sincerely,

Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.
Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind Report #22-094



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	15 OBLATS AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:3000 (APPROX.)	DRAWING NO.	GW22-094-1
DATE	JULY 27, 2022	DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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

PROJECT	15 OBLATS AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW22-094-2
DATE	JULY 27, 2022
DRAWN BY	G.G.

DESCRIPTION

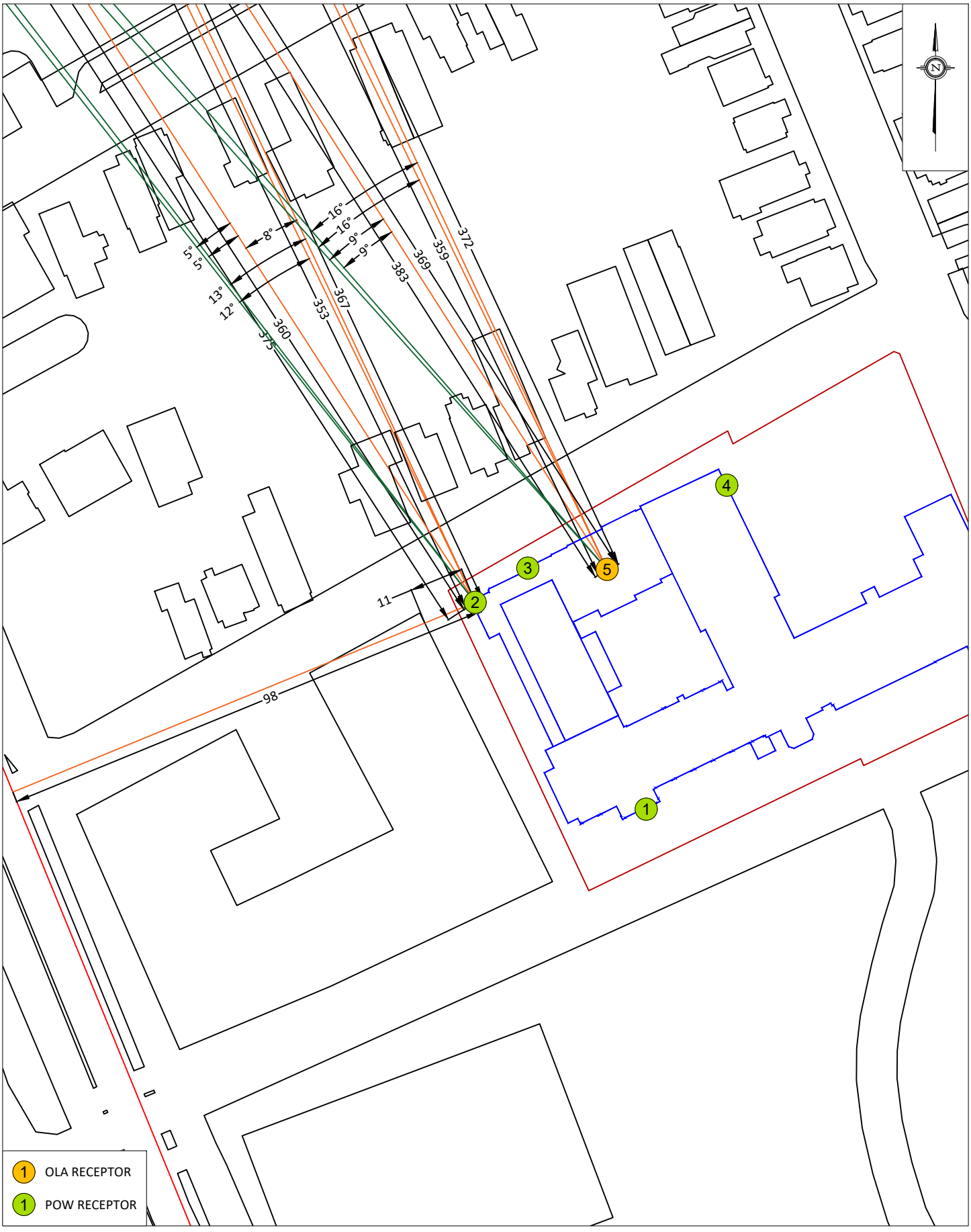
FIGURE 2:
RECEPTOR LOCATIONS

GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	15 OBLATS AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW22-094-3
DATE	JULY 27, 2022	DRAWN BY	G.G.

FIGURE 3:
STAMSON INPUT PARAMETERS



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	15 OBLATS AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW22-094-4
DATE	JULY 27, 2022	DRAWN BY	G.G.

FIGURE 4:
STAMSON INPUT PARAMETERS

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: 11-05-2022 16:59:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: MS (day/night)
----------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    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: MS (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  : 114.00 / 114.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :  20.00 m
Barrier receiver distance : 103.00 / 103.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

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

Source height = 1.50 m

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

```
------------+-------------+-------------+--------------
       1.50 !       10.50 !        2.36 !         2.36

ROAD (0.00 + 37.79 + 0.00) = 37.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  68.48   0.00  -8.81  -3.01   0.00   0.00 -18.87
37.79
-------------------------------------------------------------------------
--

Segment Leq : 37.79 dBA

Total Leq All Segments: 37.79 dBA

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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        2.36 !         2.36

ROAD (0.00 + 30.20 + 0.00) = 30.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  60.88   0.00  -8.81  -3.01   0.00   0.00 -18.87
30.20
-------------------------------------------------------------------------
--

Segment Leq : 30.20 dBA

Total Leq All Segments: 30.20 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 37.79
                           (NIGHT): 30.20
```

```
STAMSON 5.0        NORMAL REPORT        Date: 11-05-2022 16:59:44
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417WB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: HWY417WB_1 (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   -13.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 367.00 / 367.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -89.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: HWY417EB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: HWY417EB_1 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -12.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 353.00 / 353.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -89.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: HWY417WB_2 (day/night)
-----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: HWY417WB_2 (day/night)
---------------------------------------------
Angle1   Angle2           :  -5.00 deg   8.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
```

```
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 375.00 / 375.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -1.00 deg   Angle2 : 0.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: HWY417EB_2 (day/night)
-----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: HWY417EB_2 (day/night)
--------------------------------------------
Angle1   Angle2           :  -5.00 deg   8.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 360.00 / 360.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -1.00 deg   Angle2 : 0.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 5: MS (day/night)
--------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 5: MS (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  :  98.00 / 98.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :  20.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: HWY417WB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 17.58 + 43.58) = 43.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
```

```
-------------------------------------------------------------------------
--
   -90    -89   0.39  80.15   0.00 -19.30 -30.84   0.00 -12.43   0.00
17.58
   -90    -89   0.39  80.15   0.00 -19.30 -30.84   0.00   0.00  -0.83
29.17*
   -90    -89   0.39  80.15   0.00 -19.30 -30.84   0.00   0.00   0.00
30.00
-------------------------------------------------------------------------
--
   -89    -13   0.39  80.15   0.00 -19.30  -4.84   0.00 -12.43   0.00
43.58
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 43.59 dBA

Results segment # 2: HWY417EB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 17.78 + 43.85) = 43.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -89   0.39  80.15   0.00 -19.07 -30.84   0.00 -12.45   0.00
17.78
   -90    -89   0.39  80.15   0.00 -19.07 -30.84   0.00   0.00  -0.83
29.41*
   -90    -89   0.39  80.15   0.00 -19.07 -30.84   0.00   0.00   0.00
30.24
-------------------------------------------------------------------------
--
   -89    -12   0.39  80.15   0.00 -19.07  -4.77   0.00 -12.45   0.00
43.85
-------------------------------------------------------------------------
--

 * Bright Zone !
```

```
Segment Leq : 43.86 dBA

Results segment # 3: HWY417WB_2 (day)
-----------------------------------

Source height = 1.50 m

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

ROAD (31.77 + 25.75 + 34.78) = 36.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -5     -1   0.39  80.15   0.00 -19.43 -16.53   0.00 -12.41   0.00
31.77
-------------------------------------------------------------------------
--
    -1      0   0.39  80.15   0.00 -19.43 -22.55   0.00 -12.41   0.00
25.75
    -1      0   0.39  80.15   0.00 -19.43 -22.55   0.00   0.00   0.00
38.16*
    -1      0   0.39  80.15   0.00 -19.43 -22.55   0.00   0.00   0.00
38.16
-------------------------------------------------------------------------
--
     0      8   0.39  80.15   0.00 -19.43 -13.53   0.00 -12.41   0.00
34.78
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 36.89 dBA

Results segment # 4: HWY417EB_2 (day)
-----------------------------------

Source height = 1.50 m

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

```
ROAD (31.99 + 25.97 + 34.99) = 37.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -5     -1   0.39  80.15   0.00 -19.19 -16.53   0.00 -12.44   0.00
31.99
-------------------------------------------------------------------------
--
    -1      0   0.39  80.15   0.00 -19.19 -22.55   0.00 -12.44   0.00
25.97
    -1      0   0.39  80.15   0.00 -19.19 -22.55   0.00   0.00   0.00
38.41*
    -1      0   0.39  80.15   0.00 -19.19 -22.55   0.00   0.00   0.00
38.41
-------------------------------------------------------------------------
--
     0      8   0.39  80.15   0.00 -19.19 -13.53   0.00 -12.44   0.00
34.99
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 37.10 dBA

Results segment # 5: MS (day)
------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        9.49 !         9.49

ROAD (0.00 + 39.42 + 53.18) = 53.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  68.48   0.00  -8.15  -3.01   0.00   0.00 -17.89
39.42
-------------------------------------------------------------------------
--
     0     90   0.39  68.48   0.00 -11.33  -3.97   0.00   0.00   0.00
53.18
```

```
-------------------------------------------------------------------------------
--

Segment Leq : 53.36 dBA

Total Leq All Segments: 54.38 dBA

Results segment # 1: HWY417WB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 9.98 + 35.98) = 35.99 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -89   0.39  72.55   0.00 -19.30 -30.84   0.00 -12.43   0.00
9.98
   -90    -89   0.39  72.55   0.00 -19.30 -30.84   0.00   0.00  -0.83
21.58*
   -90    -89   0.39  72.55   0.00 -19.30 -30.84   0.00   0.00   0.00
22.41
-------------------------------------------------------------------------------
--
   -89    -13   0.39  72.55   0.00 -19.30  -4.84   0.00 -12.43   0.00
35.98
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 35.99 dBA

Results segment # 2: HWY417EB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 10.19 + 36.26) = 36.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -89   0.39  72.55   0.00 -19.07 -30.84   0.00 -12.45   0.00
10.19
   -90    -89   0.39  72.55   0.00 -19.07 -30.84   0.00   0.00  -0.83
21.81*
   -90    -89   0.39  72.55   0.00 -19.07 -30.84   0.00   0.00   0.00
22.64
-------------------------------------------------------------------------
--
   -89    -12   0.39  72.55   0.00 -19.07  -4.77   0.00 -12.45   0.00
36.26
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 36.27 dBA

Results segment # 3: HWY417WB_2 (night)
---------------------------------------

Source height = 1.50 m

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

ROAD (24.17 + 18.15 + 27.18) = 29.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -5     -1   0.39  72.55   0.00 -19.43 -16.53   0.00 -12.41   0.00
24.17
-------------------------------------------------------------------------
--
    -1      0   0.39  72.55   0.00 -19.43 -22.55   0.00 -12.41   0.00
18.15
    -1      0   0.39  72.55   0.00 -19.43 -22.55   0.00   0.00   0.00
30.56*
    -1      0   0.39  72.55   0.00 -19.43 -22.55   0.00   0.00   0.00
30.56
```

```
-------------------------------------------------------------------------
--
     0      8    0.39  72.55    0.00 -19.43 -13.53    0.00 -12.41    0.00
27.18
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 29.29 dBA

Results segment # 4: HWY417EB_2 (night)
---------------------------------------

Source height = 1.50 m

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

ROAD (24.39 + 18.37 + 27.40) = 29.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -5     -1    0.39  72.55    0.00 -19.19 -16.53    0.00 -12.44    0.00
24.39
-------------------------------------------------------------------------
--
    -1      0    0.39  72.55    0.00 -19.19 -22.55    0.00 -12.44    0.00
18.37
    -1      0    0.39  72.55    0.00 -19.19 -22.55    0.00   0.00    0.00
30.81*
    -1      0    0.39  72.55    0.00 -19.19 -22.55    0.00   0.00    0.00
30.81
-------------------------------------------------------------------------
--
     0      8    0.39  72.55    0.00 -19.19 -13.53    0.00 -12.44    0.00
27.40
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 29.51 dBA
```

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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        9.49 !         9.49

ROAD (0.00 + 31.83 + 45.58) = 45.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  60.88   0.00  -8.15  -3.01   0.00   0.00 -17.89
31.83
-------------------------------------------------------------------------------
--
     0     90   0.39  60.88   0.00 -11.33  -3.97   0.00   0.00   0.00
45.58
-------------------------------------------------------------------------------
--

Segment Leq : 45.76 dBA

Total Leq All Segments: 46.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.38
                           (NIGHT): 46.78
```


```
STAMSON 5.0         NORMAL REPORT         Date: 11-05-2022 16:59:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417WB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: HWY417WB_1 (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   -14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 365.00 / 365.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -89.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: HWY417EB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: HWY417EB_1 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -14.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 352.00 / 352.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -89.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: HWY417WB_2 (day/night)
-----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: HWY417WB_2 (day/night)
---------------------------------------------
Angle1   Angle2           :  -7.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
```

```
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 375.00 / 375.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -7.00 deg   Angle2 : -6.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: HWY417EB_2 (day/night)
-----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: HWY417EB_2 (day/night)
--------------------------------------------
Angle1   Angle2           :  -7.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 360.00 / 360.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -7.00 deg   Angle2 : -6.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 5: MS (day/night)
--------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    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):  15000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 5: MS (day/night)
------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 111.00 / 111.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: HWY417WB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 17.61 + 43.53) = 43.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -89   0.39  80.15   0.00 -19.27 -30.84   0.00 -12.43   0.00
17.61
   -90    -89   0.39  80.15   0.00 -19.27 -30.84   0.00   0.00  -0.83
29.20*
```

```
   -90    -89   0.39  80.15   0.00 -19.27 -30.84   0.00   0.00   0.00
30.04
-------------------------------------------------------------------------
--
   -89    -14   0.39  80.15   0.00 -19.27  -4.92   0.00 -12.43   0.00
43.53
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 43.54 dBA

Results segment # 2: HWY417EB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 17.80 + 43.72) = 43.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -89   0.39  80.15   0.00 -19.05 -30.84   0.00 -12.46   0.00
17.80
   -90    -89   0.39  80.15   0.00 -19.05 -30.84   0.00   0.00  -0.83
29.42*
   -90    -89   0.39  80.15   0.00 -19.05 -30.84   0.00   0.00   0.00
30.25
-------------------------------------------------------------------------
--
   -89    -14   0.39  80.15   0.00 -19.05  -4.92   0.00 -12.46   0.00
43.72
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 43.73 dBA

Results segment # 3: HWY417WB_2 (day)
-----------------------------------

Source height = 1.50 m
```

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

ROAD (0.00 + 25.74 + 44.68) = 44.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -7     -6   0.39  80.15   0.00 -19.43 -22.56   0.00 -12.41   0.00
25.74
    -7     -6   0.39  80.15   0.00 -19.43 -22.56   0.00   0.00   0.00
38.15*
    -7     -6   0.39  80.15   0.00 -19.43 -22.56   0.00   0.00   0.00
38.15
-------------------------------------------------------------------------
--
    -6     90   0.39  80.15   0.00 -19.43  -3.62   0.00 -12.41   0.00
44.68
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 44.73 dBA

Results segment # 4: HWY417EB_2 (day)
-------------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 25.96 + 44.90) = 44.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -7     -6   0.39  80.15   0.00 -19.19 -22.56   0.00 -12.44   0.00
25.96
    -7     -6   0.39  80.15   0.00 -19.19 -22.56   0.00   0.00   0.00
38.40*
```

```
    -7     -6   0.39  80.15   0.00 -19.19 -22.56   0.00   0.00   0.00
38.40
-------------------------------------------------------------------------
--
    -6     90   0.39  80.15   0.00 -19.19  -3.62   0.00 -12.44   0.00
44.90
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 44.95 dBA

Results segment # 5: MS (day)
------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.42 + 0.00) = 52.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.39  68.48   0.00 -12.08  -3.97   0.00   0.00   0.00
52.42
-------------------------------------------------------------------------
--

Segment Leq : 52.42 dBA

Total Leq All Segments: 54.50 dBA

Results segment # 1: HWY417WB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 10.01 + 35.93) = 35.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -89   0.39  72.55   0.00 -19.27 -30.84   0.00 -12.43   0.00
10.01
```

```
   -90    -89   0.39  72.55   0.00 -19.27 -30.84   0.00   0.00  -0.83
21.61*
   -90    -89   0.39  72.55   0.00 -19.27 -30.84   0.00   0.00   0.00
22.44
-------------------------------------------------------------------------
--
   -89    -14   0.39  72.55   0.00 -19.27  -4.92   0.00 -12.43   0.00
35.93
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 35.95 dBA

Results segment # 2: HWY417EB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 10.20 + 36.13) = 36.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -89   0.39  72.55   0.00 -19.05 -30.84   0.00 -12.46   0.00
10.20
   -90    -89   0.39  72.55   0.00 -19.05 -30.84   0.00   0.00  -0.83
21.83*
   -90    -89   0.39  72.55   0.00 -19.05 -30.84   0.00   0.00   0.00
22.66
-------------------------------------------------------------------------
--
   -89    -14   0.39  72.55   0.00 -19.05  -4.92   0.00 -12.46   0.00
36.13
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 36.14 dBA
```

```
Results segment # 3: HWY417WB_2 (night)
---------------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 18.14 + 37.08) = 37.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    -7     -6   0.39  72.55   0.00 -19.43 -22.56   0.00 -12.41   0.00
18.14
    -7     -6   0.39  72.55   0.00 -19.43 -22.56   0.00   0.00   0.00
30.55*
    -7     -6   0.39  72.55   0.00 -19.43 -22.56   0.00   0.00   0.00
30.55
-------------------------------------------------------------------------------
--
    -6     90   0.39  72.55   0.00 -19.43  -3.62   0.00 -12.41   0.00
37.08
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 37.14 dBA

Results segment # 4: HWY417EB_2 (night)
---------------------------------------

Source height = 1.50 m

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

ROAD (0.00 + 18.36 + 37.30) = 37.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
```

```
    -7     -6   0.39  72.55   0.00 -19.19 -22.56   0.00 -12.44   0.00
18.36
    -7     -6   0.39  72.55   0.00 -19.19 -22.56   0.00   0.00   0.00
30.80*
    -7     -6   0.39  72.55   0.00 -19.19 -22.56   0.00   0.00   0.00
30.80
-------------------------------------------------------------------------
--
    -6     90   0.39  72.55   0.00 -19.19  -3.62   0.00 -12.44   0.00
37.30
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 37.35 dBA

Results segment # 5: MS (night)
-------------------------------

Source height = 1.50 m

ROAD (0.00 + 44.83 + 0.00) = 44.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.39  60.88   0.00 -12.08  -3.97   0.00   0.00   0.00
44.83
-------------------------------------------------------------------------
--

Segment Leq : 44.83 dBA

Total Leq All Segments: 46.91 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.50
                           (NIGHT): 46.91
```

```
STAMSON 5.0         NORMAL REPORT         Date: 11-05-2022 17:01:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417WB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: HWY417WB_1 (day/night)
--------------------------------------------
Angle1   Angle2           :   8.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 382.00 / 382.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   8.00 deg   Angle2 : 9.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: HWY417EB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: HWY417EB_1 (day/night)
--------------------------------------------
Angle1   Angle2           :   8.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 368.00 / 368.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   8.00 deg   Angle2 : 9.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: HWY417WB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 25.63 + 43.66) = 43.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     8      9   0.39  80.15   0.00 -19.54 -22.57   0.00 -12.40   0.00
25.63
     8      9   0.39  80.15   0.00 -19.54 -22.57   0.00   0.00   0.00
38.03*
     8      9   0.39  80.15   0.00 -19.54 -22.57   0.00   0.00   0.00
38.03
```

```
-------------------------------------------------------------------------
--
     9     90    0.39  80.15   0.00 -19.54  -4.55   0.00 -12.40   0.00
43.66
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 43.72 dBA

Results segment # 2: HWY417EB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 25.83 + 43.85) = 43.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     8      9    0.39  80.15   0.00 -19.32 -22.57   0.00 -12.42   0.00
25.83
     8      9    0.39  80.15   0.00 -19.32 -22.57   0.00   0.00   0.00
38.26*
     8      9    0.39  80.15   0.00 -19.32 -22.57   0.00   0.00   0.00
38.26
-------------------------------------------------------------------------
--
     9     90    0.39  80.15   0.00 -19.32  -4.55   0.00 -12.42   0.00
43.85
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 43.92 dBA

Total Leq All Segments: 46.83 dBA

Results segment # 1: HWY417WB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 18.04 + 36.06) = 36.13 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     8      9   0.39  72.55   0.00 -19.54 -22.57   0.00 -12.40   0.00
18.04
     8      9   0.39  72.55   0.00 -19.54 -22.57   0.00   0.00   0.00
30.43*
     8      9   0.39  72.55   0.00 -19.54 -22.57   0.00   0.00   0.00
30.43
-------------------------------------------------------------------------
--
     9     90   0.39  72.55   0.00 -19.54  -4.55   0.00 -12.40   0.00
36.06
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 36.13 dBA

Results segment # 2: HWY417EB_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 !       10.50 !       10.50 !        10.50

ROAD (0.00 + 18.24 + 36.26) = 36.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     8      9   0.39  72.55   0.00 -19.32 -22.57   0.00 -12.42   0.00
18.24
     8      9   0.39  72.55   0.00 -19.32 -22.57   0.00   0.00   0.00
30.66*
```

```
     8       9    0.39   72.55    0.00 -19.32 -22.57    0.00    0.00    0.00
30.66
-------------------------------------------------------------------------------
--
     9      90    0.39   72.55    0.00 -19.32  -4.55    0.00 -12.42    0.00
36.26
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 36.33 dBA

Total Leq All Segments: 39.24 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 46.83
                           (NIGHT): 39.24
```

```
STAMSON 5.0        NORMAL REPORT        Date: 27-07-2022 11:25:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HWY417WB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: HWY417WB_1 (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   -16.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 372.00 / 372.00 m
Receiver height           :  13.50 / 13.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -16.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: HWY417EB_1 (day/night)
----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: HWY417EB_1 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -16.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 359.00 / 359.00 m
Receiver height           :  13.50 / 13.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -16.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: HWY417WB_2 (day/night)
-----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: HWY417WB_2 (day/night)
---------------------------------------------
Angle1   Angle2           :  -9.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
```

```
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 383.00 / 383.00 m
Receiver height           :  13.50 / 13.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -9.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: HWY417EB_2 (day/night)
-----------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: HWY417EB_2 (day/night)
--------------------------------------------
Angle1   Angle2           :  -9.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      6 / 6
House density             :     79 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 369.00 / 369.00 m
Receiver height           :  13.50 / 13.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -9.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   8.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: HWY417WB_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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 44.79 + 0.00) = 44.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -16   0.30  80.15   0.00 -18.13  -4.81   0.00 -12.42   0.00
44.79
   -90    -16   0.30  80.15   0.00 -18.13  -4.81   0.00   0.00  -0.01
57.20*
   -90    -16   0.30  80.15   0.00 -18.13  -4.81   0.00   0.00   0.00
57.21
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 44.79 dBA

Results segment # 2: HWY417EB_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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 44.96 + 0.00) = 44.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -16   0.30  80.15   0.00 -17.93  -4.81   0.00 -12.44   0.00
44.96
   -90    -16   0.30  80.15   0.00 -17.93  -4.81   0.00   0.00  -0.01
57.40*
```

```
   -90    -16    0.30  80.15    0.00 -17.93  -4.81    0.00    0.00    0.00
57.41
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 44.96 dBA

Results segment # 3: HWY417WB_2 (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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 46.17 + 0.00) = 46.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    -9     90    0.30  80.15    0.00 -18.29  -3.29    0.00 -12.39    0.00
46.17
    -9     90    0.30  80.15    0.00 -18.29  -3.29    0.00    0.00  -0.01
58.56*
    -9     90    0.30  80.15    0.00 -18.29  -3.29    0.00    0.00    0.00
58.56
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 46.17 dBA

Results segment # 4: HWY417EB_2 (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 !       13.50 !       13.49 !        13.49
```

```
ROAD (0.00 + 46.35 + 0.00) = 46.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -9     90   0.30  80.15   0.00 -18.08  -3.29   0.00 -12.42   0.00
46.35
    -9     90   0.30  80.15   0.00 -18.08  -3.29   0.00   0.00  -0.01
58.77*
    -9     90   0.30  80.15   0.00 -18.08  -3.29   0.00   0.00   0.00
58.77
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 46.35 dBA

Total Leq All Segments: 51.64 dBA

Results segment # 1: HWY417WB_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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 37.19 + 0.00) = 37.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -16   0.30  72.55   0.00 -18.13  -4.81   0.00 -12.42   0.00
37.19
   -90    -16   0.30  72.55   0.00 -18.13  -4.81   0.00   0.00  -0.01
49.60*
   -90    -16   0.30  72.55   0.00 -18.13  -4.81   0.00   0.00   0.00
49.61
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 37.19 dBA
```

```
Results segment # 2: HWY417EB_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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 37.37 + 0.00) = 37.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -16   0.30  72.55   0.00 -17.93  -4.81   0.00 -12.44   0.00
37.37
   -90    -16   0.30  72.55   0.00 -17.93  -4.81   0.00   0.00  -0.01
49.80*
   -90    -16   0.30  72.55   0.00 -17.93  -4.81   0.00   0.00   0.00
49.81
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 37.37 dBA

Results segment # 3: HWY417WB_2 (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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 38.57 + 0.00) = 38.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    -9     90   0.30  72.55   0.00 -18.29  -3.29   0.00 -12.39   0.00
38.57
    -9     90   0.30  72.55   0.00 -18.29  -3.29   0.00   0.00  -0.01
50.96*
```

```
    -9     90    0.30  72.55    0.00 -18.29  -3.29    0.00    0.00    0.00
50.97
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 38.57 dBA

Results segment # 4: HWY417EB_2 (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 !       13.50 !       13.49 !        13.49

ROAD (0.00 + 38.75 + 0.00) = 38.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -9     90    0.30  72.55    0.00 -18.08  -3.29    0.00 -12.42    0.00
38.75
    -9     90    0.30  72.55    0.00 -18.08  -3.29    0.00    0.00  -0.01
51.17*
    -9     90    0.30  72.55    0.00 -18.08  -3.29    0.00    0.00    0.00
51.18
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 38.75 dBA

Total Leq All Segments: 44.05 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.64
                           (NIGHT): 44.05
```