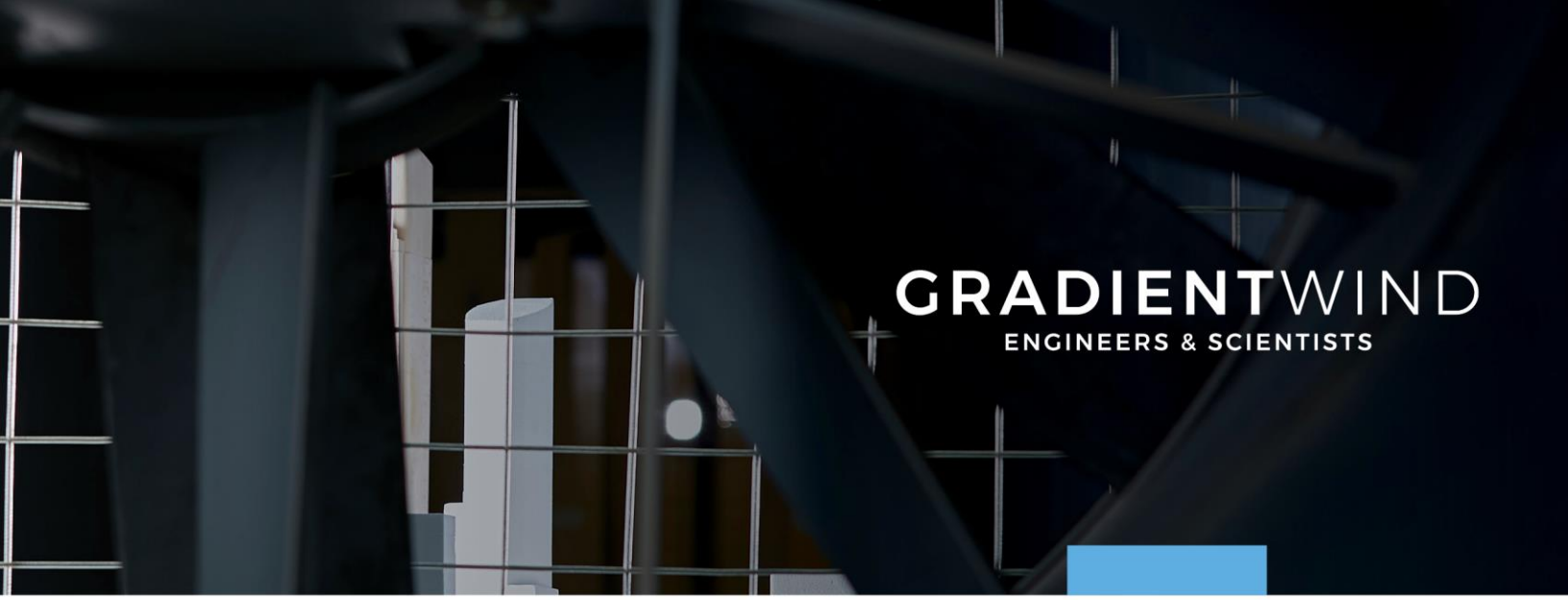
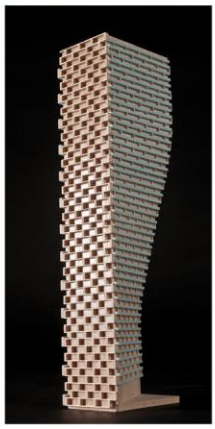


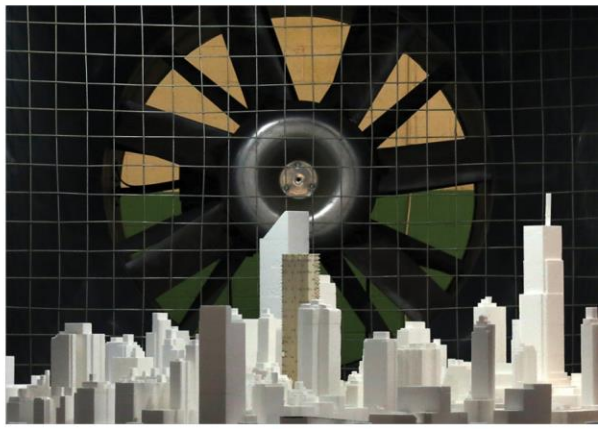
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE ASSESSMENT

112 Nelson Street
Ottawa, Ontario

REPORT: 21-227 – Traffic Noise





July 27, 2021

PREPARED FOR

Smart Living Properties
226 Argyle Avenue
Ottawa, ON K2P 1B9

PREPARED BY

Giuseppe Garro, MASc., Junior Environmental Scientist
Joshua Foster, P.Eng., Principal

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

EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken to satisfy the requirements for Site Plan Control for the proposed residential development located at 112 Nelson Street in Ottawa, Ontario. The proposed development comprises a nine-storey residential building with an 'L'-shaped planform. The primary sources of roadway traffic noise on the development include King Edward Avenue and Rideau Street. 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 & Associates Ltd., in June 2021.

The results of the current analysis indicate that noise levels will range between 50 and 56 dBA during the daytime period (07:00-23:00) and between 42 and 49 dBA during the nighttime period (23:00-07:00). The highest noise level (56 dBA) occurs at the west façade, which is nearest and most exposed to King Edward Avenue. As noise levels are between 55 dBA and 65 dBA, standard OBC building components will be sufficient.

Results of the calculations also indicate the development will require forced air heating with provisions for central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Warning Clause will also be required on all Lease, Purchase and Sale Agreements, as summarized in Section 6. Noise levels at the Level 7 terrace are expected to fall below 55 dBA during the daytime period with the inclusion of the proposed 1.1 m perimeter guard. Therefore, no additional acoustic mitigation is required.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed building become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical

equipment will primarily reside in the mechanical level/penthouse located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Smart Living Properties to undertake a roadway traffic noise assessment to satisfy the requirements for Site Plan Control for the proposed residential development located at 112 Nelson Street 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 & Associates Ltd., in June 2021, 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 nine-storey residential building with an 'L'-shaped planform located at 112 Nelson Street in Ottawa, Ontario. The subject site is situated adjacent to Nelson Street on a rectangular parcel of land, between York Street to the north, King Edward Avenue to the west, and Rideau Street to the south, where an industrial building currently resides. The development includes amenity spaces at grade, while ramp access to below-grade parking is provided via Nelson Street. The remaining floors contain residential space exclusively. The building is set back from its north end at Level 7 to accommodate a common amenity terrace, while a roof garden is provided at Level 2. The rooftop terrace associated with the development was included in the assessment as an outdoor living area (OLA). Balconies and terraces less than 4 meters in depth are not classified as noise sensitive spaces as per ENCG.

The surroundings of the subject site comprise low-rise buildings in all directions, with some mid-rise buildings interspersed in the near-field, and a dense cluster of mid- to high-rise buildings to the direct south and in the southwest quadrant of the near-field. The primary sources of roadway traffic noise on the

[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

development include King Edward Avenue and Rideau Street. Figure 1 illustrates a complete site plan with surrounding context.

With regard to stationary noise impacts, a stationary noise study is recommended for the site during the detailed design once mechanical plans for the proposed building become available. This study would assess impacts of stationary noise from rooftop mechanical units serving the proposed building on surrounding noise sensitive areas. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels fall below ENCG limits. As the mechanical equipment will primarily reside in the mechanical level/penthouse located on the high roof, noise levels on the surrounding noise sensitive properties are expected to be negligible. In the event that noise levels exceed the ENCG criteria, noise impacts can generally be minimized by judicious selection and placement of the equipment.

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

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125

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 (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA but are less than 60 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Noise levels at the OLA should not exceed 60 dBA.

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.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- For select sources where appropriate, receptors considered the existing and the proposed buildings as a barrier partially or fully obstructing exposure to the source as illustrated by exposure angles in Figures 2 and 3.
- Noise receptors were strategically placed at 4 locations around the study area (see Figures 2 and 3).

[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

- Receptor distances and exposure angles are illustrated in Figures 2 and 3.
- The Level 7 terrace was assumed to have a standard 1.1-meter-tall guard along the perimeter.

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
King Edward Avenue	4-Lane Urban Arterial Divided (4-UAD)	40	**35,000**
Rideau Street	2-Lane Urban Arterial Undivided (2-UAU)	50	**15,000**

[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	25.3	POW – 9th Floor – South Façade	55	48
2	25.3	POW – 9th Floor – West Façade	56	49
3	17.2	POW – 6th Floor – North Façade	50	42
4	19.9	OLA – Level 7 Terrace	53	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 50 and 56 dBA during the daytime period (07:00-23:00) and between 42 and 49 dBA during the nighttime period (23:00-07:00). The highest noise level (56 dBA) occurs at the west façade, which is nearest and most exposed to King Edward Avenue. 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 are between 55 dBA and 65 dBA for the development. Therefore, this building will require forced air heating with provisions for central air conditioning, which if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6. As for the Level 7 rooftop terrace, noise levels are expected to fall below the noise level criteria for OLAs with the proposed 1.1 m perimeter guard. Therefore, no additional acoustic mitigation is required.

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 50 and 56 dBA during the daytime period (07:00-23:00) and between 42 and 49 dBA during the nighttime period (23:00-07:00). The highest noise level (56 dBA) occurs at the west façade, which is nearest and most exposed to King Edward Avenue. As noise levels are between 55 dBA and 65 dBA, standard OBC building components will be sufficient.

Results of the calculations also indicate that the development will require forced air heating with provisions for central air conditioning as a minimum, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause will also be required on all Lease, Purchase and Sale Agreements, as summarized below:

> *"Purchasers/tenants are advised that sound levels due to increasing road 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.*
>
> *This dwelling unit has also 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."*

Noise levels at the Level 7 terrace are expected to fall below 55 dBA during the daytime period with the inclusion of the proposed 1.1 m perimeter guard. Therefore, no additional 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.
Junior Environmental Scientist

Joshua Foster, P.Eng.
Principal

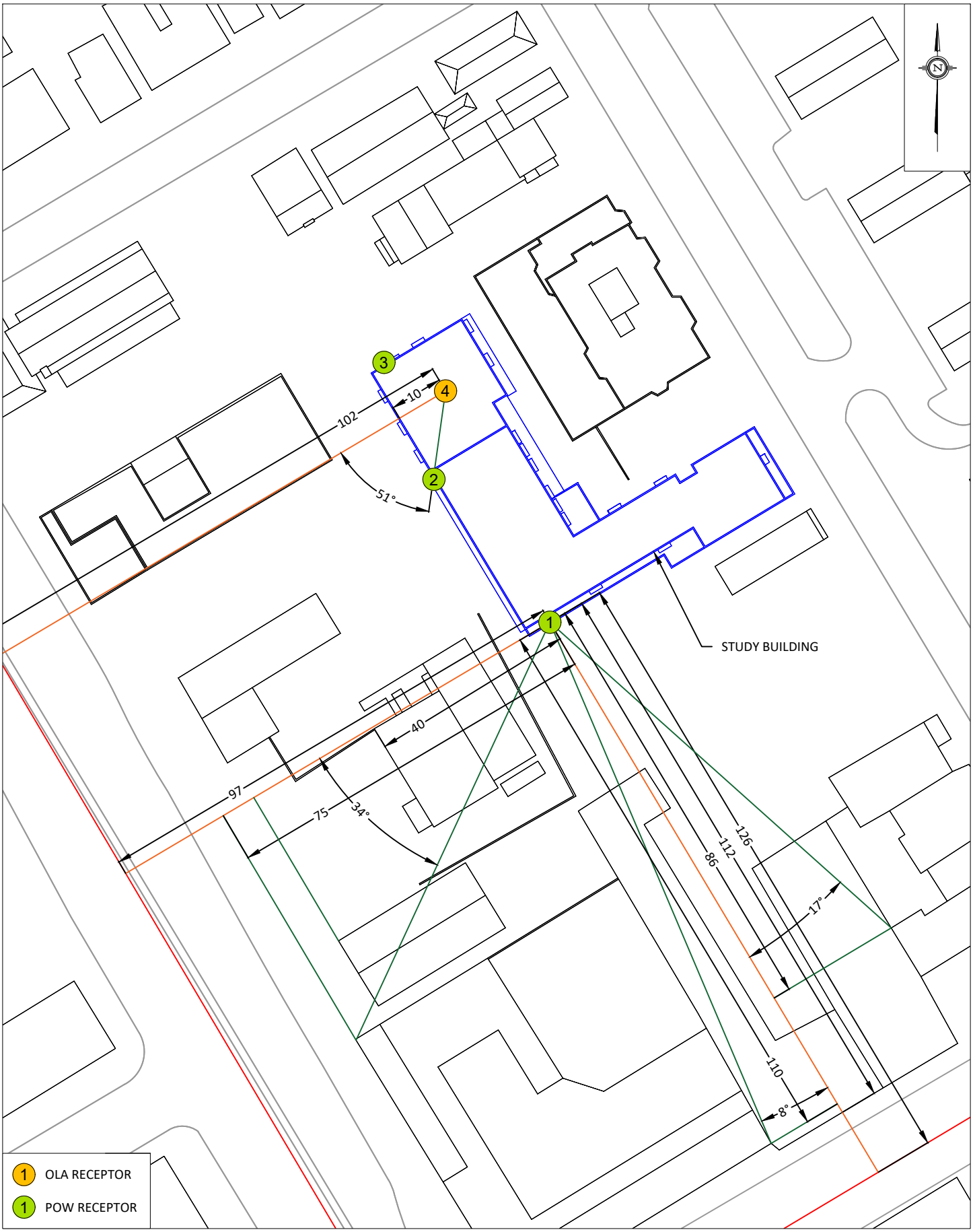
Gradient Wind Report #21-227 – Traffic Noise

GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	112 NELSON STREET, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-227-1
DATE	JULY 26, 2021	DRAWN BY	G.G.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



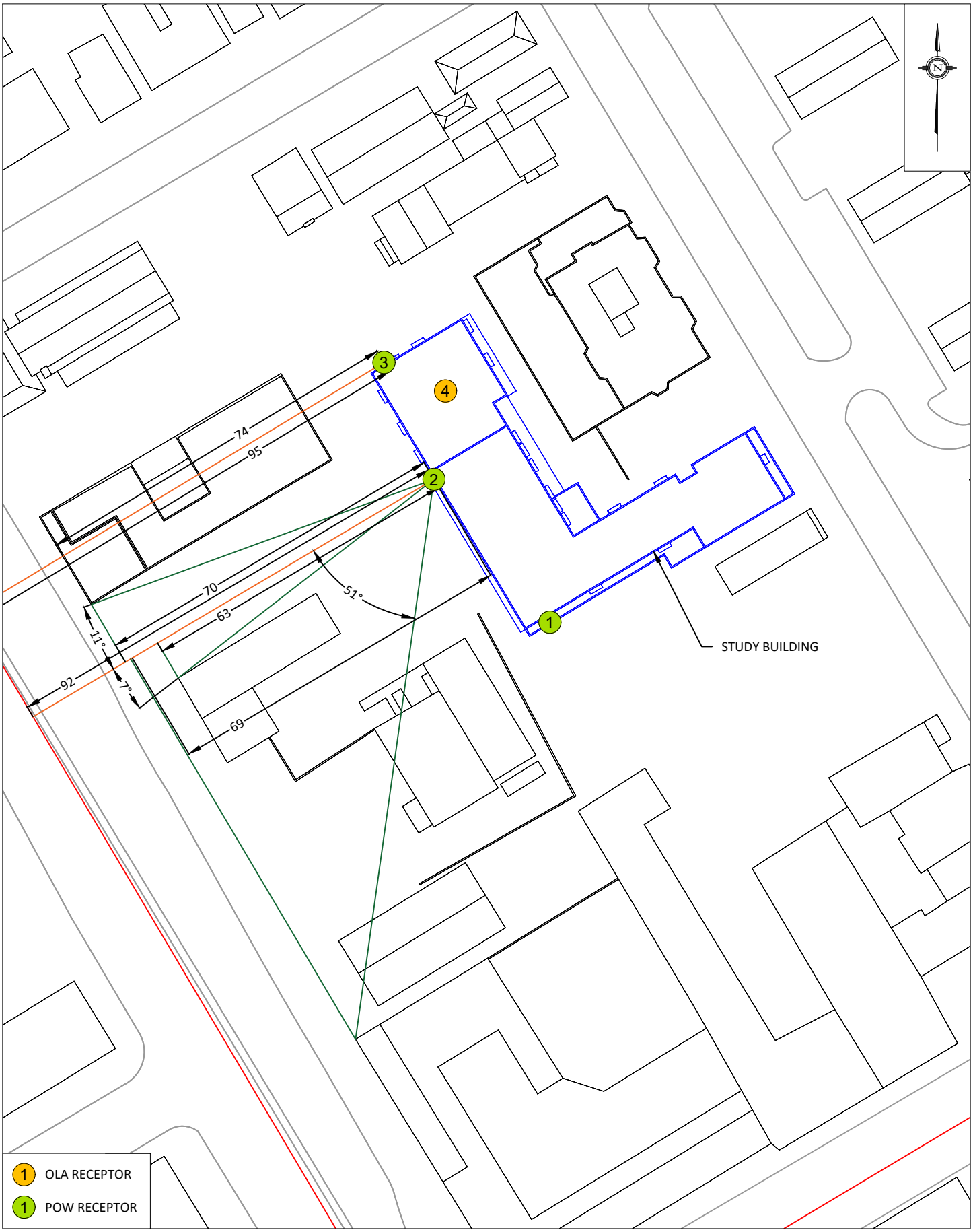
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	112 NELSON STREET, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GW21-227-2
DATE	JULY 26, 2021	DRAWN BY	G.G.

DESCRIPTION

FIGURE 2:
STAMSON INPUT PARAMETERS AND RECEPTOR LOCATIONS



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

PROJECT	112 NELSON STREET, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW21-227-3
DATE	JULY 26, 2021
DRAWN BY	G.G.

DESCRIPTION

FIGURE 3:
STAMSON INPUT PARAMETERS AND RECEPTOR 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: 23-07-2021 12:14:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: KEA1 (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  :    40 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: KEA1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -34.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  97.00 / 97.00  m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -34.00 deg
Barrier height            :  41.00 m
Barrier receiver distance :  75.00 / 75.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: KEA2 (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  :    40 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: KEA2 (day/night)
---------------------------------------
Angle1   Angle2           : -34.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  97.00 / 97.00  m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -34.00 deg   Angle2 : 0.00 deg
Barrier height            :  14.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: RS1 (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 # 3: RS1 (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   -17.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 126.00 / 126.00 m
```

```
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -17.00 deg
Barrier height            :  27.00 m
Barrier receiver distance :  86.00 / 86.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: RS2 (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 # 4: RS2 (day/night)
-------------------------------------
Angle1   Angle2           : -17.00 deg   8.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 126.00 / 126.00 m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -17.00 deg   Angle2 : 8.00 deg
Barrier height            :  12.00 m
Barrier receiver distance : 112.00 / 112.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 5: RS3 (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: RS3 (day/night)
-------------------------------------
Angle1   Angle2           :   8.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 126.00 / 126.00 m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   8.00 deg   Angle2 : 90.00 deg
Barrier height            :  41.00 m
Barrier receiver distance : 110.00 / 110.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: KEA1 (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 !       25.30 !        6.89 !         6.89

ROAD (0.00 + 38.09 + 0.00) = 38.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -34   0.00  70.37   0.00  -8.11  -5.07   0.00   0.00 -19.10
38.09
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 38.09 dBA

Results segment # 2: KEA2 (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 !       25.30 !       15.48 !        15.48

ROAD (0.00 + 55.02 + 0.00) = 55.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -34      0   0.00  70.37   0.00  -8.11  -7.24   0.00   0.00  -2.39
52.63*
   -34      0   0.00  70.37   0.00  -8.11  -7.24   0.00   0.00   0.00
55.02
-------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 55.02 dBA

Results segment # 3: RS1 (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 !       25.30 !        9.05 !         9.05

ROAD (0.00 + 37.74 + 0.00) = 37.74 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -17   0.00  68.48   0.00  -9.24  -3.92   0.00   0.00 -17.58
37.74
-------------------------------------------------------------------------
--
```

```
Segment Leq : 37.74 dBA

Results segment # 4: RS2 (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 !       25.30 !        4.14 !         4.14

ROAD (0.00 + 30.66 + 0.00) = 30.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -17      8   0.00  68.48   0.00  -9.24  -8.57   0.00   0.00 -20.00
30.66
-------------------------------------------------------------------------------
--

Segment Leq : 30.66 dBA

Results segment # 5: RS3 (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 !       25.30 !        4.52 !         4.52

ROAD (0.00 + 36.38 + 0.00) = 36.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     8     90   0.00  68.48   0.00  -9.24  -3.41   0.00   0.00 -19.45
36.38
-------------------------------------------------------------------------------
--

Segment Leq : 36.38 dBA
```

```
Total Leq All Segments: 55.26 dBA

Results segment # 1: KEA1 (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 !       25.30 !        6.89 !         6.89

ROAD (0.00 + 30.49 + 0.00) = 30.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -34   0.00  62.77   0.00  -8.11  -5.07   0.00   0.00 -19.10
30.49
-------------------------------------------------------------------------------
--

Segment Leq : 30.49 dBA

Results segment # 2: KEA2 (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 !       25.30 !       15.48 !        15.48

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
-------------------------------------------------------------------------------
--
   -34      0   0.00  62.77   0.00  -8.11  -7.24   0.00   0.00  -2.39
45.03*
   -34      0   0.00  62.77   0.00  -8.11  -7.24   0.00   0.00   0.00
47.42
-------------------------------------------------------------------------------
--

 * Bright Zone !
```

```
Segment Leq : 47.42 dBA

Results segment # 3: RS1 (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 !       25.30 !        9.05 !         9.05

ROAD (0.00 + 30.14 + 0.00) = 30.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -17   0.00  60.88   0.00  -9.24  -3.92   0.00   0.00 -17.58
30.14
-------------------------------------------------------------------------------
--

Segment Leq : 30.14 dBA

Results segment # 4: RS2 (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 !       25.30 !        4.14 !         4.14

ROAD (0.00 + 23.07 + 0.00) = 23.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -17      8   0.00  60.88   0.00  -9.24  -8.57   0.00   0.00 -20.00
23.07
-------------------------------------------------------------------------------
--

Segment Leq : 23.07 dBA
```

```
Results segment # 5: RS3 (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 !       25.30 !        4.52 !         4.52

ROAD (0.00 + 28.78 + 0.00) = 28.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     8     90   0.00  60.88   0.00  -9.24  -3.41   0.00   0.00 -19.45
28.78
-------------------------------------------------------------------------------
--

Segment Leq : 28.78 dBA

Total Leq All Segments: 47.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.26
                           (NIGHT): 47.66
```

```
STAMSON 5.0        NORMAL REPORT        Date: 23-07-2021 12:14:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: KEA1 (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  :    40 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: KEA1 (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   -51.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -51.00 deg
Barrier height            :  41.00 m
Barrier receiver distance :  69.00 / 69.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: KEA2 (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  :    40 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: KEA2 (day/night)
---------------------------------------
Angle1   Angle2           : -51.00 deg   -7.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -51.00 deg   Angle2 : -7.00 deg
Barrier height            :  14.00 m
Barrier receiver distance :  63.00 / 63.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: KEA3 (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  :    40 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: KEA3 (day/night)
---------------------------------------
Angle1   Angle2           :  -7.00 deg   11.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
```

```
Receiver height           :  25.30 / 25.30  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 4: KEA4 (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  :    40 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 # 4: KEA4 (day/night)
--------------------------------------
Angle1   Angle2           :  11.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  92.00 / 92.00  m
Receiver height           :  25.30 / 25.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  11.00 deg   Angle2 : 90.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  70.00 / 70.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: KEA1 (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 !       25.30 !        7.45 !         7.45
```

```
ROAD (0.00 + 37.12 + 0.00) = 37.12 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -51   0.00  70.37   0.00  -7.88  -6.64   0.00   0.00 -18.73
37.12
-------------------------------------------------------------------------
--

Segment Leq : 37.12 dBA

Results segment # 2: KEA2 (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 !       25.30 !        9.00 !         9.00

ROAD (0.00 + 41.99 + 0.00) = 41.99 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -51     -7   0.00  70.37   0.00  -7.88  -6.12   0.00   0.00 -14.38
41.99
-------------------------------------------------------------------------
--

Segment Leq : 41.99 dBA

Results segment # 3: KEA3 (day)
-------------------------------

Source height = 1.50 m

ROAD (0.00 + 52.49 + 0.00) = 52.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -7     11   0.00  70.37   0.00  -7.88 -10.00   0.00   0.00   0.00
52.49
-------------------------------------------------------------------------
--
```

```
Segment Leq : 52.49 dBA

Results segment # 4: KEA4 (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 !       25.30 !        7.19 !         7.19

ROAD (0.00 + 53.40 + 0.00) = 53.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    11     90   0.00  70.37   0.00  -7.88  -3.58   0.00   0.00  -5.52
53.40
-------------------------------------------------------------------------
--

Segment Leq : 53.40 dBA

Total Leq All Segments: 56.20 dBA

Results segment # 1: KEA1 (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 !       25.30 !        7.45 !         7.45

ROAD (0.00 + 29.52 + 0.00) = 29.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90    -51   0.00  62.77   0.00  -7.88  -6.64   0.00   0.00 -18.73
29.52
-------------------------------------------------------------------------
--

Segment Leq : 29.52 dBA
```

```
Results segment # 2: KEA2 (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 !       25.30 !        9.00 !         9.00

ROAD (0.00 + 34.40 + 0.00) = 34.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -51     -7   0.00  62.77   0.00  -7.88  -6.12   0.00   0.00 -14.38
34.40
-------------------------------------------------------------------------
--

Segment Leq : 34.40 dBA

Results segment # 3: KEA3 (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 44.89 + 0.00) = 44.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -7     11   0.00  62.77   0.00  -7.88 -10.00   0.00   0.00   0.00
44.89
-------------------------------------------------------------------------
--

Segment Leq : 44.89 dBA

Results segment # 4: KEA4 (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 !       25.30 !        7.19 !         7.19

ROAD (0.00 + 45.80 + 0.00) = 45.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    11     90   0.00  62.77   0.00  -7.88  -3.58   0.00   0.00  -5.52
45.80
-------------------------------------------------------------------------
--

Segment Leq : 45.80 dBA

Total Leq All Segments: 48.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.20
                           (NIGHT): 48.60
```

```
STAMSON 5.0        NORMAL REPORT        Date: 23-07-2021 12:14:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: KEA (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  :    40 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: KEA (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  :  95.00 / 95.00  m
Receiver height           :  17.20 / 17.20  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 90.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  74.00 / 74.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: KEA (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 !       17.20 !        4.97 !         4.97

ROAD (0.00 + 49.75 + 0.00) = 49.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  70.37   0.00  -8.02  -3.01   0.00   0.00  -9.59
49.75
-------------------------------------------------------------------------
--

Segment Leq : 49.75 dBA

Total Leq All Segments: 49.75 dBA

Results segment # 1: KEA (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 !       17.20 !        4.97 !         4.97

ROAD (0.00 + 42.15 + 0.00) = 42.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  62.77   0.00  -8.02  -3.01   0.00   0.00  -9.59
42.15
-------------------------------------------------------------------------
--

Segment Leq : 42.15 dBA

Total Leq All Segments: 42.15 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.75
                           (NIGHT): 42.15
```

```
STAMSON 5.0        NORMAL REPORT        Date: 23-07-2021 12:14:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: KEA1 (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  :    40 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: KEA1 (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   -51.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 102.00 / 102.00 m
Receiver height           :  19.90 / 19.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -51.00 deg
Barrier height            :  30.00 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: KEA2 (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  :    40 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: KEA2 (day/night)
---------------------------------------
Angle1   Angle2           : -51.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 102.00 / 102.00 m
Receiver height           :  19.90 / 19.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -51.00 deg   Angle2 : 90.00 deg
Barrier height            :  19.50 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: KEA1 (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 !       19.90 !       18.10 !        18.10

ROAD (0.00 + 38.54 + 0.00) = 38.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -51   0.00  70.37   0.00  -8.33  -6.64   0.00   0.00 -16.86
38.54
-------------------------------------------------------------------------------
--

Segment Leq : 38.54 dBA
```

```
Results segment # 2: KEA2 (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 !       19.90 !       18.10 !        18.10

ROAD (0.00 + 53.10 + 0.00) = 53.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -51     90   0.00  70.37   0.00  -8.33  -1.06   0.00   0.00  -7.88
53.10
-------------------------------------------------------------------------------
--

Segment Leq : 53.10 dBA

Total Leq All Segments: 53.25 dBA

Results segment # 1: KEA1 (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 !       19.90 !       18.10 !        18.10

ROAD (0.00 + 30.94 + 0.00) = 30.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -51   0.00  62.77   0.00  -8.33  -6.64   0.00   0.00 -16.86
30.94
-------------------------------------------------------------------------------
--

Segment Leq : 30.94 dBA
```

```
Results segment # 2: KEA2 (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 !       19.90 !       18.10 !        18.10

ROAD (0.00 + 45.51 + 0.00) = 45.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -51     90   0.00  62.77   0.00  -8.33  -1.06   0.00   0.00  -7.88
45.51
-------------------------------------------------------------------------------
--

Segment Leq : 45.51 dBA

Total Leq All Segments: 45.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.25
                           (NIGHT): 45.66
```