Transportation Noise & Vibration Feasibility Assessment

383 Albert Street & 340 Queen Street
Ottawa, Ontario

REPORT: GWE18-111 – Noise & Vibration

DRAFT

Prepared For:

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August 7, 2018

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EXECUTIVE SUMMARY

This document describes a transportation noise and vibration feasibility assessment performed for a proposed mixed-use development located at 383 Albert Street & 340 Queen Street in Ottawa, Ontario. The proposed development comprises three building components, referred to as Tower A Condo (26 storeys), Tower B Hotel (9 storeys), and Tower C Rental (26 storeys), which are connected by an 'L'- shaped 2-storey podium. Towers A, B, and C are situated clockwise beginning at the northeast corner of the site, respectively. Retail space is located at grade with hotel and residential amenity space and suites located on the remaining floors. Outdoor amenity space is provided atop the common podium, as well a atop Tower B as common terraces. The Confederation Line LRT will run underground along Queen street, just north of the site, which is a source of ground vibration. Major sources of transportation noise include roadway traffic along Lyon Street and Albert 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 (MOECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); and (iii) architectural drawings received from Neuf Architects, dated July 13, 2018.

The results of the current analysis indicate that noise levels will range between 39 and 70 dBA during the daytime period (07:00-23:00) and between 31 and 63 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 70 dBA) occur near the corner of Lyon Street and Albert Street.

The noise levels predicted due to roadway and LRT traffic exceed the criteria listed in Section 4.2 for building components. Upgraded building components, including STC rated glazing elements and exterior walls, will be required where noise levels exceed 65 dBA, as discussed in Section 4.2.1. Results of the calculations also indicate that the development will require air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements. Specific noise control measures can be developed once the design of the building has progressed sufficiently, these are typically identified at the time of site plan control.

With regards to stationary noise impacts from roof top mechanical units, generators and other stationary sources associated with the development, on the proposed building and on surrounding noise-sensitive areas, once the mechanical plans for the proposed building become available, a stationary noise study will be performed. This study will include recommendations for any noise control measures that may be necessary to ensure noise levels at the proposed building and noise levels at the surrounding noise-sensitive buildings are below the City of Ottawa's Noise Guidelines. For this development potential equipment includes generators, roof top air-handling equipment, cooling towers or dry coolers, as well as refrigeration equipment for a possible grocery store tenant, located on the podium roof. Noise control for these units can be achieved by placing units away from noise-sensitive windows, judicious selection of quieter units, and introduction of silencers and noise screens.

Estimated vibration levels at the nearest property line to the LRT corridor are expected to be 0.06 mm/s RMS (67 dBV), based on the FTA protocol and a conservative offset distance of 13 m to the nearest track centerline. Details of the calculation are provided in Appendix B. Since predicted vibration levels do not exceed the criterion of 0.1 mm/s RMS at the property line, vibration mitigation would not be required. As vibration levels are acceptable, correspondingly regenerated noise levels are also expected to be acceptable.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Claridge Homes to undertake a transportation noise and vibration feasibility assessment for a proposed mixed-use development located at 383 Albert Street & 340 Queen Street in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a transportation noise and vibration feasibility assessment, prepared in support of a rezoning application. GWE's scope of work involved assessing exterior noise and vibration levels generated by local roadway and railway traffic. The assessment was performed based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment and Climate Change (MOECC)[2] guidelines. Noise calculations were based on architectural drawings received from Neuf Architects, dated July 13, 2018, with future roadway traffic volumes based on the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this transportation noise and vibration feasibility assessment is the proposed mixed-use development located at 383 Albert Street & 340 Queen Street in Ottawa, Ontario. The study site is situated on a parcel of land bounded by Queen Street to the north, Lyon Street to the east, and Albert Street to the South. The Confederation Line LRT will run underground along Queen street, just north of the site, which is a source of ground vibration. Major sources of transportation noise include roadway traffic along Lyon Street and Albert Street. Figure 1 illustrates a site plan with surrounding context.

The proposed development comprises three building components, referred to as Tower A Condo (26 storeys), Tower B Hotel (9 storeys), and Tower C Rental (26 storeys), which are connected by an 'L'- shaped 2-storey podium. Towers A, B, and C are situated clockwise beginning at the northeast corner of the site, respectively. Retail space is located at grade with hotel and residential amenity space and suites located on the remaining floors. Outdoor amenity space is provided atop the common podium, as well a atop Tower B as common terraces. Private balconies are not considered to be noise sensitive unless they are greater than 4 metres in depth according to provincial noise guidelines.

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

3. OBJECTIVES

The main goals of this work are to: (i) calculate the future noise and vibration levels on the study building produced by local roadway and railway traffic, and (ii) determine whether noise and vibration levels exceed the allowable limits specified by the MOECP Noise Control Guidelines – NPC-300 as outlined in Section 4 of this report.

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, 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 NPC-300 guidelines specify that the recommended indoor noise limit range (that is relevant to this study) is 50, 45 and 40 dBA for office space, residence living rooms/hotel sleeping quarters, and residence sleeping quarters respectively, as listed in Table 1. To account for deficiencies in building construction, theses levels should be targeted toward 47, 42 and 37 dBA.

TABLE 1: INDOOR SOUND LEVEL CRITERIA[3]

Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50	45
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	40
Sleeping quarters of hotels/motels	23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40	35

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction[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 normally triggers the need for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, building components will require higher levels of sound attenuation[6].

For designated Outdoor Living Areas the sound level limit is 55 dBA during the daytime period. Only in cases were the required noise control measures are not feasible for technical, economic, or administrative reasons should an excess above the limit be acceptable.

[3] Adapted from Table C-2, Part C, Section 3.2.3 of NPC-300
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECC, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECC, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 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 Class	Speed Limit (km/h)	ENCG AADT Count
Lyon Street	2-UAU	50	**15,000**
Albert Street	2-UAU	50	**15,000**

4.2.3 Theoretical Roadway Traffic Noise Predictions

Noise predictions were performed with the aid of the MOECC computerized noise assessment program, STAMSON 5.04, for road and rail analysis. Roadway noise calculations were performed by treating each road segment as separate line sources of noise, and by using existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 2 below, 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.
- Reflective intermediate ground surfaces used.
- Receptor heights placed at 1.5, 16, 32.5, 42.5 and 79.5 m for ground floor, 3rd Floor, 9th Floor, 13th Floor and 26th Floor respectively.
- Surrounding buildings used as noise barriers.
- The study site was treated as having flat/gently slopping topography.
- Noise receptors were strategically placed at 20 locations around the study area as illustrated in Figure 2.

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

4.3 Ground Vibrations

4.3.1 Ground Vibrations Background

Rail lines and transit systems can produce perceptible levels of ground vibrations, especially when they are in close proximity to residential neighbourhoods. Similar to sound waves in air, ground vibrations are generated at a source, propagated through a medium, and intercepted by a receiver. In the case of ground vibrations, the medium can be uniform, or more often, a complex layering of soils and rock strata.

Also, similar to sound waves in air, ground vibrations produce perceptible motions and regenerated noise known as 'ground-borne noise' when the vibrations encounter a hollow structure such as a building. Ground-borne noise and vibrations are generated when there is excitation of the ground (from a train for instance). Repetitive motion of steel wheels on uneven rail cause vibrations to propagate through the soil until they encounter a building. The vibrations travel along the structure of the building, beginning at the foundation, and propagate to all floor levels. Air inside the building is also excited by the vibrating walls and floors and creates regenerated airborne noise. Characteristics of the soil and the building dictate the tone and intensity of the noise, thereby creating a noise signature that is unique to that structure and soil combination.

Human response to ground vibrations is dependent on the magnitude of the vibrations, which is measured by the root mean square (RMS) of the movement of a particle on a surface. Typical units of ground vibration measures are millimetres per second (mm/s), or inches per second (in/s). The threshold level of human perception to vibrations is approximately 0.10 mm/s RMS. Although somewhat variable among humans, the threshold of annoyance for continuous vibrations is 1.0 mm/s RMS; this is ten times higher than the perception threshold. The threshold for cosmetic building damage is greater than 30 mm/s, at least three hundred times higher than the perception threshold level[8].

4.3.2 Ground Vibrations Criteria

In the United States, the Federal Transportation Authority (FTA) has set vibration criteria for sensitive land use next to Transit corridors. Similar standards have been developed by a partnership between the

[8] C.H. Dowding, Blast Vibration Monitoring & Control, Prentice Hall, 1985

MOECP and the Toronto Transit Commission[9]. These standards indicate that the appropriate criteria for residential buildings is 0.10 mm/s RMS for vibrations. For main line railways, a document titled Guidelines for New Development in Proximity to Railway Operations[10] indicates that vibration conditions should not exceed 0.14 mm/s RMS averaged over a one second time-period at the first floor and above of the proposed building. As the main vibration source is due to the LRT lines, which will have frequent events, the 0.10 mm/s RMS (72 dBV) vibration criteria and 35 dBA ground borne noise criteria were adopted for this study.

4.3.3 Theoretical Ground Vibration Predictions

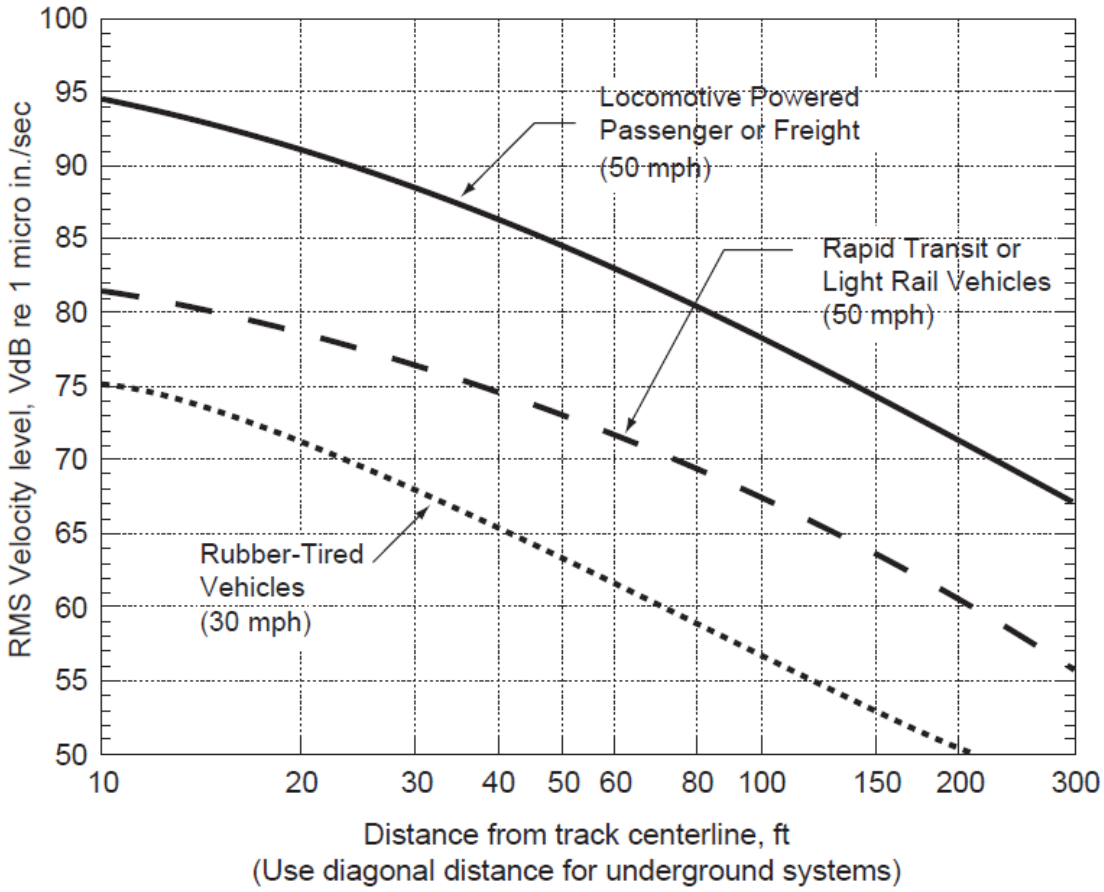
Potential vibration impacts of trains were predicted using the FTA's *Transit Noise and Vibration Impact Assessment*[11] protocol. The FTA general vibration assessment is based on an upper bound generic set of curves that show vibration level attenuation with distance. These curves, illustrated in the figure on page 11, are based on ground vibration measurements at various transit systems throughout North America. Vibration levels at points of reception are adjusted by various factors to incorporate known characteristics of the system being analyzed, such as operating speed of vehicle, conditions of the track, construction of the track and/or tunnel; depth and geology; as well as the structural type of the impacted building structures. The vibration impact on the building was determined using a set of curves for LRT at a speed of 70 km/h. Adjustment factors were considered based on the following information:

- The maximum operating speed of the LRT near the study area is 70 km/h (43 mph)
- The distance between the development and the closest track is 13 m
- The vehicles are assumed to have soft primary suspensions
- Tracks are not welded though in otherwise good condition
- Soil conditions do not efficiently propagate vibrations
- The building's foundation is large masonry on piles

[9] MOECC/TTC Protocol for Noise and Vibration Assessment for the Proposed Yonge-Spadina Subway Loop, June 16, 1993

[10] Dialog and J.E. Coulter Associates Limited, prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada, May 2013

[11] C. E. Hanson; D. A. Towers; and L. D. Meister, Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.



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

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO TRANSPORTATION SOURCES

Receptor Number	Receptor Location	Roadway Noise Levels (dBA)	
		Day	Night
1	Ground Floor – Podium – East Façade	70	63
2	Ground Floor – Podium – South Façade	70	63
3	13th Floor – Tower A – North Façade	65	58
4	13th Floor – Tower A – East Façade	69	61
5	13th Floor – Tower A – South Façade	65	58
6	13th Floor – Tower A – West Façade	39	31
7	13th Floor – Tower C – North Façade	40	33
8	13th Floor – Tower C – East Façade	65	58
9	13th Floor – Tower C – South Façade	69	61
10	13th Floor – Tower C – West Façade	65	58
11	26th Floor – Tower A – North Façade	65	58
12	26th Floor – Tower A – East Façade	69	61
13	26th Floor – Tower A – South Façade	66	58
14	26th Floor – Tower A – West Façade	39	31
15	26th Floor – Tower C – North Façade	41	33
16	26th Floor – Tower C – East Façade	67	60
17	26th Floor – Tower C – South Façade	69	61
18	26th Floor – Tower C – West Façade	65	58
19	3rd Floor – Podium – Rooftop Terrace	48	40
20	9th Floor – Tower B – Rooftop Terrace	54	47

The results of the current analysis indicate that noise levels will range between 39 and 70 dBA during the daytime period (07:00-23:00) and between 31 and 63 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 70 dBA) occur near the corner of Lyon Street and Albert Street.

The noise levels predicted due to roadway and railway traffic exceed the criteria listed in Section 4.2 for building components. Upgraded building components, including STC rated glazing elements and exterior walls, will be required where noise levels exceed 65 dBA, as discussed in Section 4.2.1. Results of the

calculations also indicate that the development will require air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements. Specific noise control measures can be developed once the design of the building has progressed sufficiently, these are typically identified at the time of site plan control.

5.2 Ground Vibrations & Ground-Borne Noise Levels

Estimated vibration levels at the nearest property line to the LRT corridor are expected to be 0.06 mm/s RMS (67 dBV), based on the FTA protocol and a conservative offset distance of 13 m to the nearest railway track centerline. Details of the calculation are provided in Appendix B. Since predicted vibration levels do not exceed the criterion of 0.1 mm/s RMS at the property line, vibration mitigation would not be required. As vibration levels are acceptable, correspondingly regenerated noise levels are also expected to be acceptable.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 39 and 70 dBA during the daytime period (07:00-23:00) and between 31 and 63 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 70 dBA) occur near the corner of Lyon Street and Albert Street.

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necessary to ensure noise levels at the proposed building and noise levels at the surrounding noise-sensitive buildings are below the City of Ottawa's Noise Guidelines. For this development potential equipment includes generators, roof top air-handling equipment, cooling towers or dry coolers, as well as refrigeration equipment for a possible grocery store tenant, located on the podium roof. Noise control for these units can be achieved by placing units away from noise-sensitive windows, judicious selection of quieter units, and introduction of silencers and noise screens.

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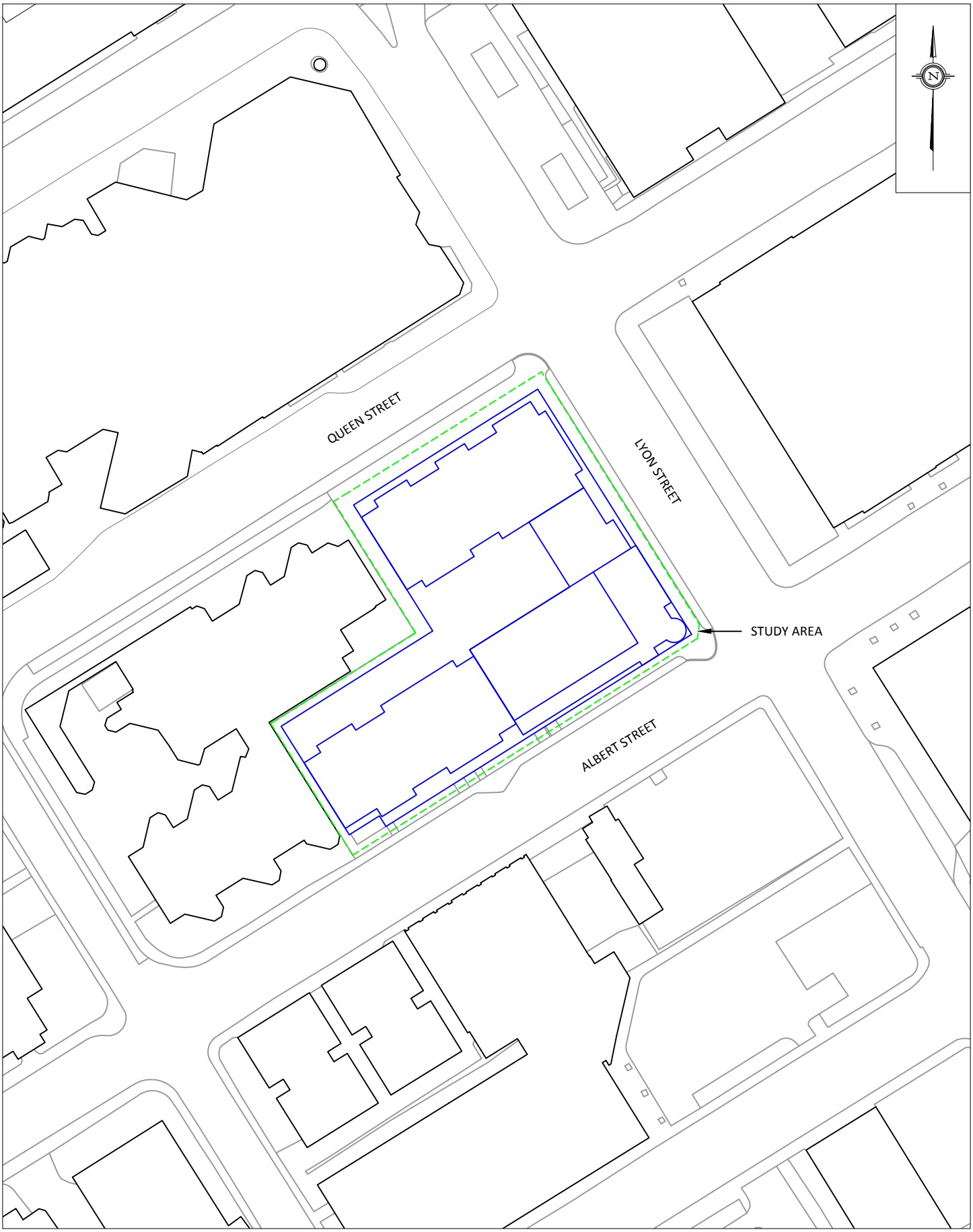
This concludes our assessment and report. If you have any questions or wish to discuss our findings please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

Michael Lafortune, C.E.T.
Environmental Scientist
GWE18-111 – Noise & Vibration

Joshua Foster, P.Eng.
Principal



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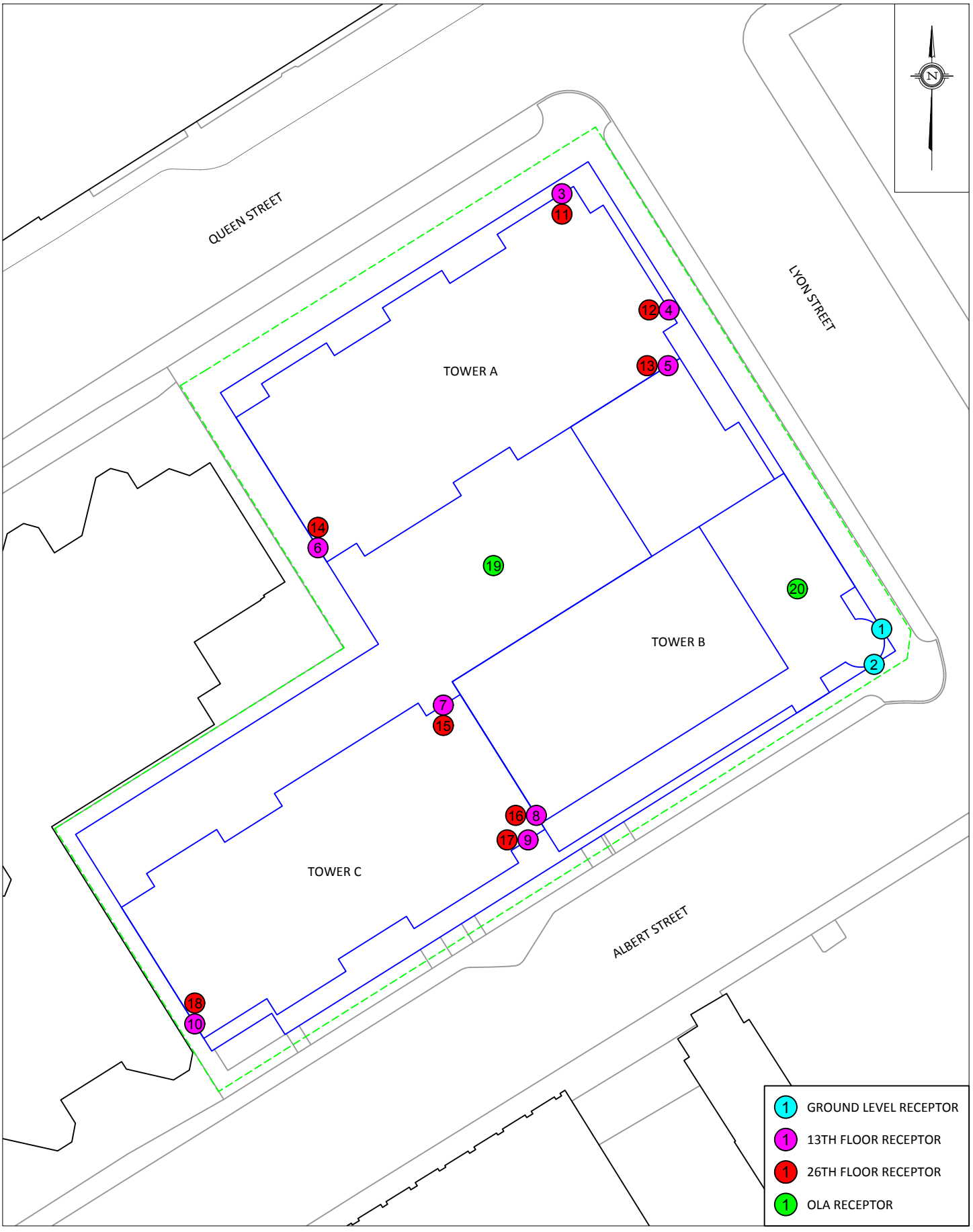
GRADIENT WIND ENGINEERING INC

PROJECT	383 ALBERT STREET & 340 QUEEN STREET TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE18-111-1
DATE	JULY 18, 2018	DRAWN BY	M.L.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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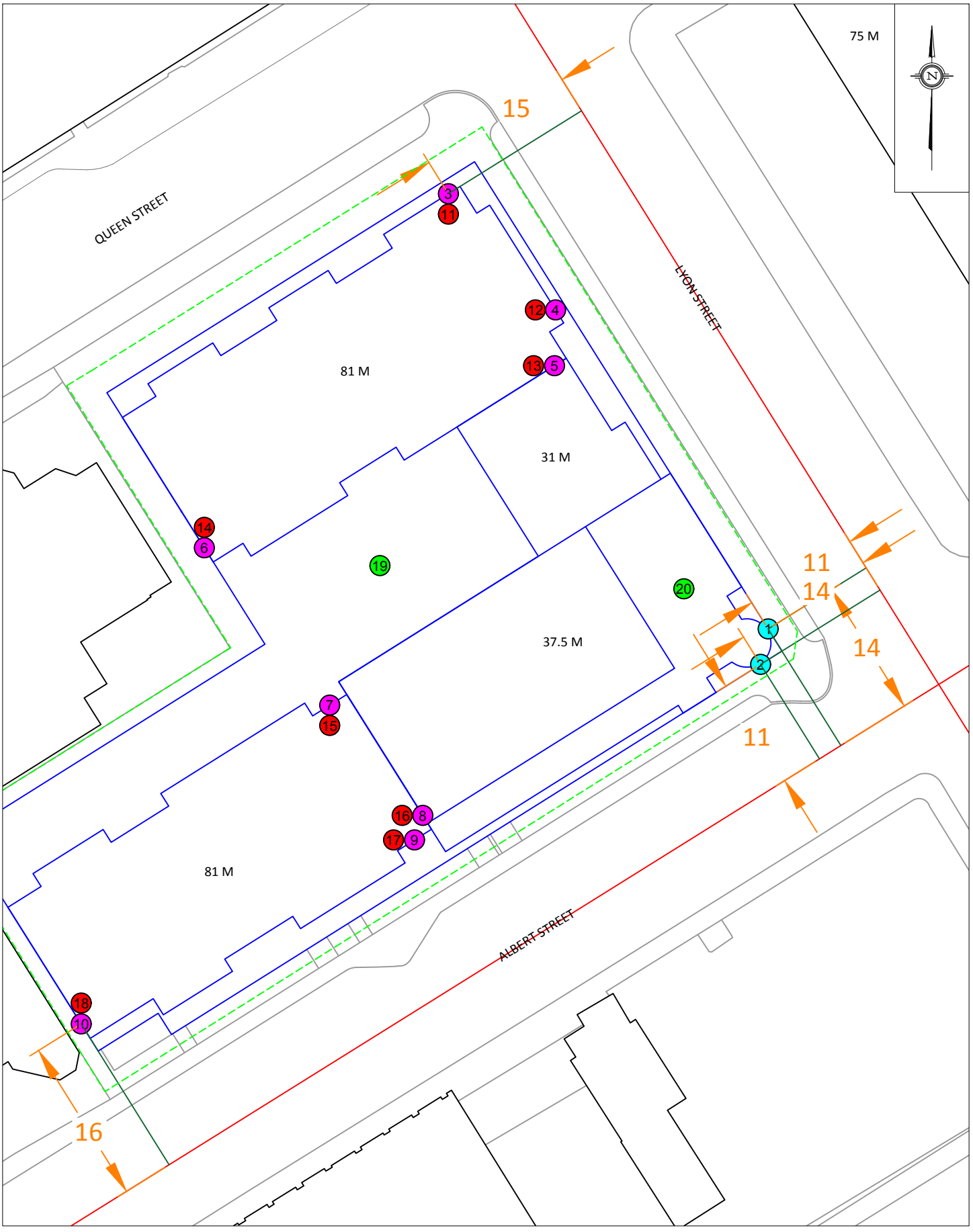
PROJECT	383 ALBERT STREET & 340 QUEEN STREET TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE18-111-2
DATE	JULY 18, 2018
DRAWN BY	M.L.
DESCRIPTION	FIGURE 2: RECEPTOR LOCATIONS



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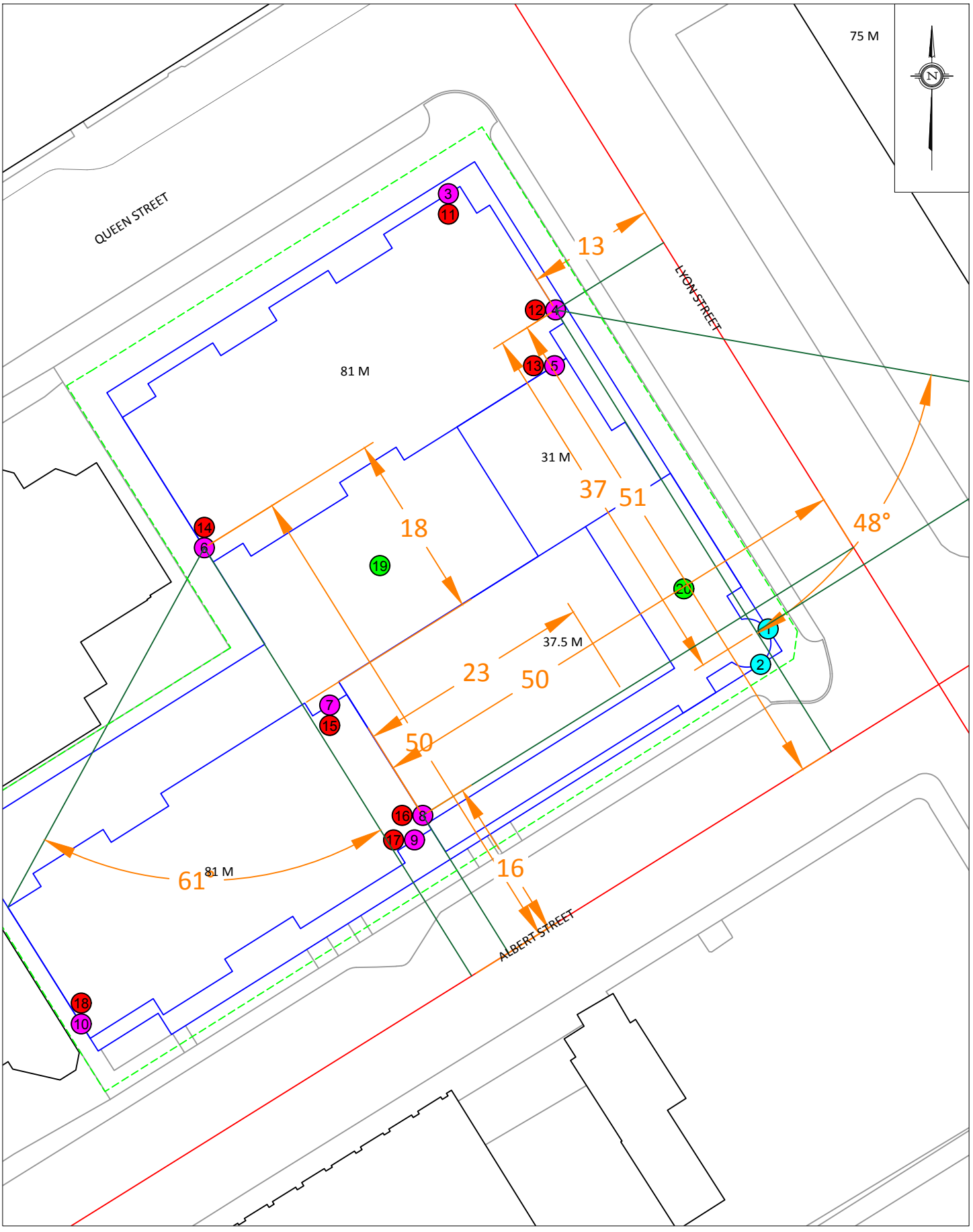
PROJECT	383 ALBERT STREET & 340 QUEEN STREET TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE18-111-3
DATE	JULY 18, 2018
DRAWN BY	M.L.
DESCRIPTION	FIGURE 3: STAMSON INPUT - RECEPTOR 1, 2, 3, 10, 11, 18



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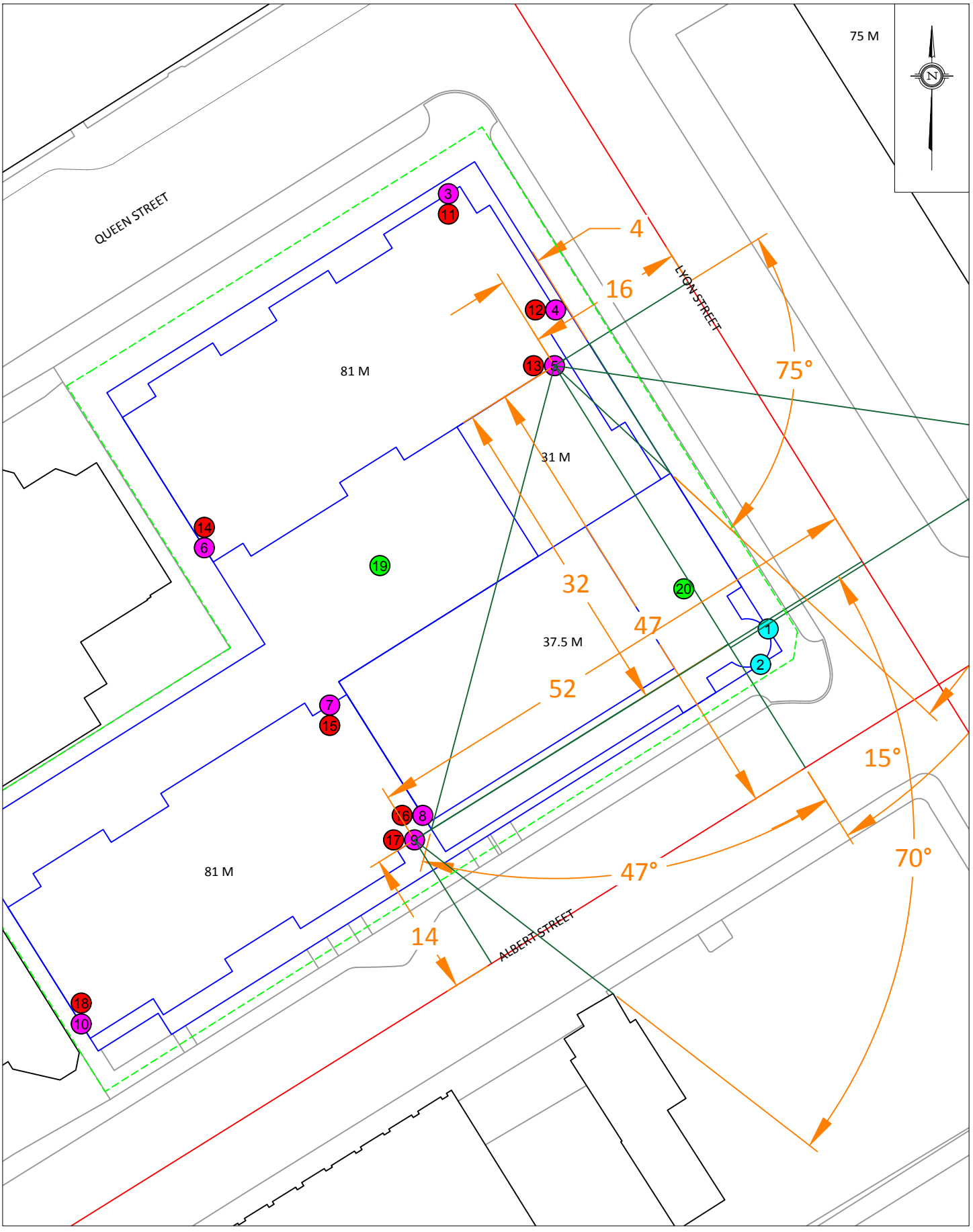
PROJECT	383 ALBERT STREET & 340 QUEEN STREET TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE18-111-4
DATE	JULY 18, 2018
DRAWN BY	M.L.
DESCRIPTION	FIGURE 4: STAMSON INPUT - RECEPTOR 4, 6, 8, 12, 14, 16



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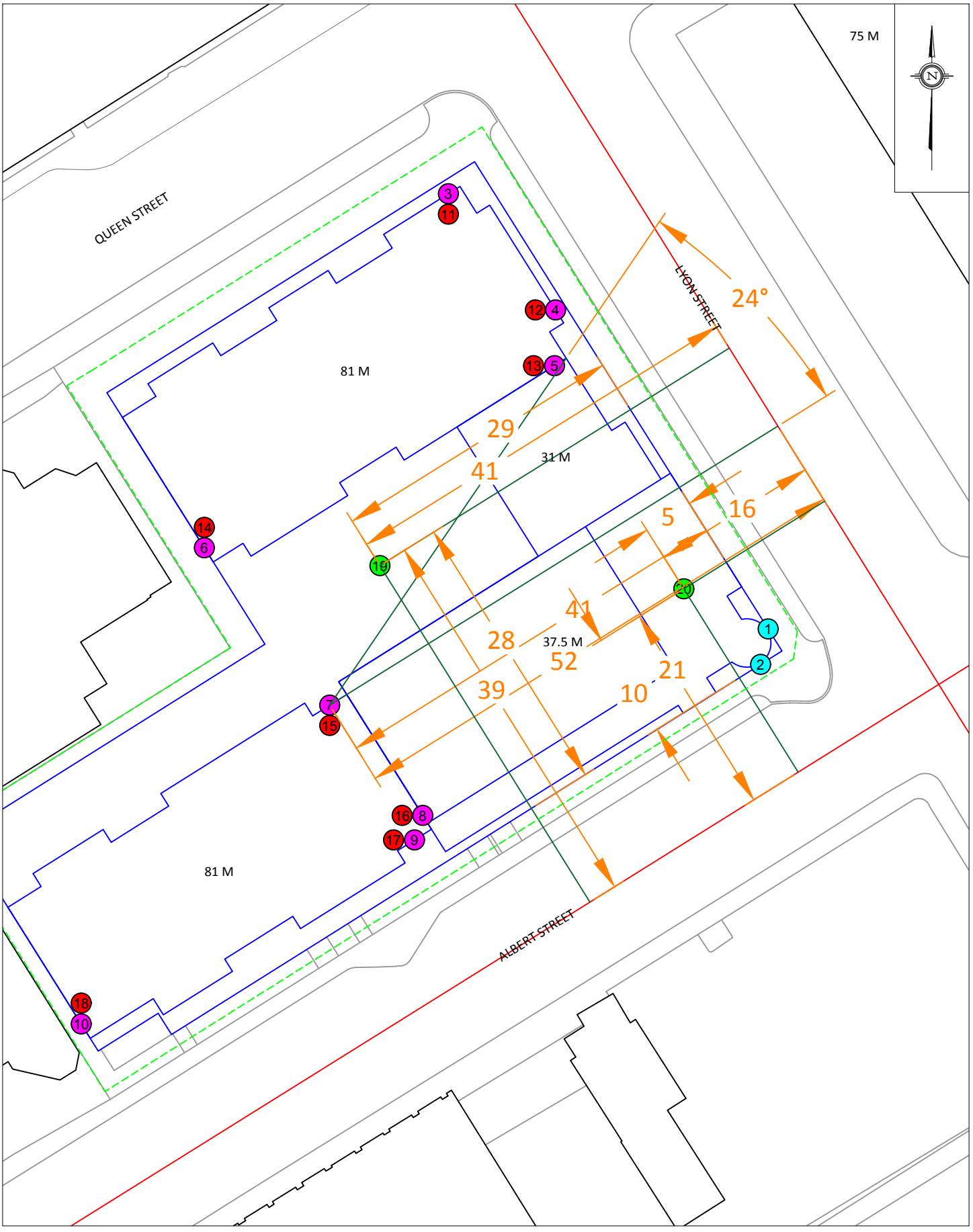
PROJECT	383 ALBERT STREET & 340 QUEEN STREET TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE18-111-5
DATE	JULY 18, 2018
DRAWN BY	M.L.
DESCRIPTION	FIGURE 5: STAMSON INPUT - RECEPTOR 5, 9, 13, 17



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GRADIENT WIND ENGINEERING INC

PROJECT	383 ALBERT STREET & 340 QUEEN STREET TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE18-111-6
DATE	JULY 18, 2018
DRAWN BY	M.L.
DESCRIPTION	FIGURE 6: STAMSON INPUT - RECEPTOR 7, 15, 19, 20

APPENDIX A

STAMSON 5.04 INPUT AND OUTPUT DATA

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 15:36:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (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  :  15.00 / 15.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

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

Segment Leq : 68.48 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.47 + 0.00) = 65.47 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   0.00  -3.01   0.00   0.00   0.00
65.47
-------------------------------------------------------------------------
--

Segment Leq : 65.47 dBA

Total Leq All Segments: 70.24 dBA
```

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

Source height = 1.50 m

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

Segment Leq : 60.88 dBA
```

```
Results segment # 2: Albert (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.87 + 0.00) = 57.87 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   0.00  -3.01   0.00   0.00   0.00
57.87
-------------------------------------------------------------------------
--

Segment Leq : 57.87 dBA

Total Leq All Segments: 62.64 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 70.24
                           (NIGHT): 62.64
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:09:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (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  :  15.00 / 15.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.47 + 0.00) = 65.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     90   0.00  68.48   0.00   0.00  -3.01   0.00   0.00   0.00
65.47
-------------------------------------------------------------------------------
--

Segment Leq : 65.47 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

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

Segment Leq : 68.48 dBA

Total Leq All Segments: 70.24 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 57.87 + 0.00) = 57.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  60.88   0.00   0.00  -3.01   0.00   0.00   0.00
57.87
-------------------------------------------------------------------------
--

Segment Leq : 57.87 dBA
```

```
Results segment # 2: Albert (night)
----------------------------------

Source height = 1.50 m

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

Segment Leq : 60.88 dBA

Total Leq All Segments: 62.64 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 70.24
                           (NIGHT): 62.64
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:09:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (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  :  15.00 / 15.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.47 + 0.00) = 65.47 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   0.00  -3.01   0.00   0.00   0.00
65.47
-------------------------------------------------------------------------
--

Segment Leq : 65.47 dBA

Total Leq All Segments: 65.47 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 57.87 + 0.00) = 57.87 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   0.00  -3.01   0.00   0.00   0.00
57.87
-------------------------------------------------------------------------
--

Segment Leq : 57.87 dBA

Total Leq All Segments: 57.87 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.47
                           (NIGHT): 57.87
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:10:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (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  :  51.00 / 51.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -48.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  37.00 / 37.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

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

Source height = 1.50 m

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

Segment Leq : 68.48 dBA
```

```
Results segment # 2: Albert (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 !       42.50 !       12.75 !        12.75

ROAD (0.00 + 37.32 + 57.42) = 57.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -48   0.00  68.48   0.00  -5.31  -6.32   0.00   0.00 -19.53
37.32
-------------------------------------------------------------------------------
--
   -48      0   0.00  68.48   0.00  -5.31  -5.74   0.00   0.00   0.00
57.42
-------------------------------------------------------------------------------
--

Segment Leq : 57.47 dBA

Total Leq All Segments: 68.81 dBA
```

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

Source height = 1.50 m

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

Segment Leq : 60.88 dBA
```

```
Results segment # 2: Albert (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 !       42.50 !       12.75 !        12.75

ROAD (0.00 + 29.72 + 49.83) = 49.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -48   0.00  60.88   0.00  -5.31  -6.32   0.00   0.00 -19.53
29.72
-------------------------------------------------------------------------------
--
   -48      0   0.00  60.88   0.00  -5.31  -5.74   0.00   0.00   0.00
49.83
-------------------------------------------------------------------------------
--

Segment Leq : 49.87 dBA

Total Leq All Segments: 61.21 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 68.81
                           (NIGHT): 61.21
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:10:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (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  :  16.00 / 16.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  75.00 deg   Angle2 : 90.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert1 (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 # 2: Albert1 (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   -15.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -50.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  32.00 / 32.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: Albert2 (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: Albert2 (day/night)
-----------------------------------------
Angle1   Angle2           : -15.00 deg   47.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -15.00 deg   Angle2 : 47.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :  32.00 / 32.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: Albert3 (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: Albert3 (day/night)
-----------------------------------------
Angle1   Angle2           :  47.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  47.00 deg   Angle2 : 90.00 deg
Barrier height            :  81.00 m
Barrier receiver distance :  32.00 / 32.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Lyon (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 !       42.50 !       32.25 !        32.25

ROAD (64.40 + 50.62 + 0.00) = 64.58 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     75   0.00  68.48   0.00  -0.28  -3.80   0.00   0.00   0.00
64.40
-------------------------------------------------------------------------------
--
    75     90   0.00  68.48   0.00  -0.28 -10.79   0.00   0.00  -6.78
50.62
-------------------------------------------------------------------------------
--

Segment Leq : 64.58 dBA
```

```
Results segment # 2: Albert1 (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 !       42.50 !       14.58 !        14.58

ROAD (0.00 + 37.49 + 56.41) = 56.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -50   0.00  68.48   0.00  -4.96  -6.53   0.00   0.00 -19.50
37.49
-------------------------------------------------------------------------------
--
   -50    -15   0.00  68.48   0.00  -4.96  -7.11   0.00   0.00   0.00
56.41
-------------------------------------------------------------------------------
--

Segment Leq : 56.46 dBA
```

```
Results segment # 3: Albert2 (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 !       42.50 !       14.58 !        14.58

ROAD (0.00 + 38.89 + 0.00) = 38.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -15     47   0.00  68.48   0.00  -4.96  -4.63   0.00   0.00 -20.00
38.89
-------------------------------------------------------------------------------
--

Segment Leq : 38.89 dBA
```

```
Results segment # 4: Albert3 (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 !       42.50 !       14.58 !        14.58

ROAD (0.00 + 37.70 + 0.00) = 37.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    47     90   0.00  68.48   0.00  -4.96  -6.22   0.00   0.00 -19.60
37.70
-------------------------------------------------------------------------------
--

Segment Leq : 37.70 dBA

Total Leq All Segments: 65.22 dBA
```

```
Results segment # 1: Lyon (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 !       42.50 !       32.25 !        32.25

ROAD (56.80 + 43.03 + 0.00) = 56.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     75   0.00  60.88   0.00  -0.28  -3.80   0.00   0.00   0.00
56.80
-------------------------------------------------------------------------------
--
    75     90   0.00  60.88   0.00  -0.28 -10.79   0.00   0.00  -6.78
43.03
-------------------------------------------------------------------------------
--

Segment Leq : 56.98 dBA
```

```
Results segment # 2: Albert1 (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 !       42.50 !       14.58 !        14.58

ROAD (0.00 + 29.89 + 48.81) = 48.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -50   0.00  60.88   0.00  -4.96  -6.53   0.00   0.00 -19.50
29.89
-------------------------------------------------------------------------------
--
   -50    -15   0.00  60.88   0.00  -4.96  -7.11   0.00   0.00   0.00
48.81
-------------------------------------------------------------------------------
--

Segment Leq : 48.87 dBA
```

```
Results segment # 3: Albert2 (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 !       42.50 !       14.58 !        14.58

ROAD (0.00 + 31.29 + 0.00) = 31.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -15     47   0.00  60.88   0.00  -4.96  -4.63   0.00   0.00 -20.00
31.29
-------------------------------------------------------------------------------
--

Segment Leq : 31.29 dBA
```

```
Results segment # 4: Albert3 (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 !       42.50 !       14.58 !        14.58

ROAD (0.00 + 30.10 + 0.00) = 30.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    47     90   0.00  60.88   0.00  -4.96  -6.22   0.00   0.00 -19.60
30.10
-------------------------------------------------------------------------------
--

Segment Leq : 30.10 dBA

Total Leq All Segments: 57.62 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.22
                           (NIGHT): 57.62
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:10:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albert (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: Albert (day/night)
-----------------------------------------
Angle1   Angle2           :   0.00 deg   61.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 61.00 deg
Barrier height            :  81.00 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Albert (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 !       42.50 !       27.74 !        27.74

ROAD (0.00 + 38.55 + 0.00) = 38.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     61   0.00  68.48   0.00  -5.23  -4.70   0.00   0.00 -20.00
38.55
-------------------------------------------------------------------------------
--

Segment Leq : 38.55 dBA

Total Leq All Segments: 38.55 dBA
```

```
Results segment # 1: Albert (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 !       42.50 !       27.74 !        27.74

ROAD (0.00 + 30.96 + 0.00) = 30.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     61   0.00  60.88   0.00  -5.23  -4.70   0.00   0.00 -20.00
30.96
-------------------------------------------------------------------------------
--

Segment Leq : 30.96 dBA

Total Leq All Segments: 30.96 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 38.55
                           (NIGHT): 30.96
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:10:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon1 (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: Lyon1 (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   -24.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  52.00 / 52.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -24.00 deg
Barrier height            :  81.00 m
Barrier receiver distance :  41.00 / 41.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Lyon1 (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 # 2: Lyon1 (day/night)
---------------------------------------
Angle1   Angle2           : -24.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  52.00 / 52.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -24.00 deg   Angle2 : 0.00 deg
Barrier height            :  31.00 m
Barrier receiver distance :  41.00 / 41.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Lyon1 (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 !       42.50 !       10.17 !        10.17

ROAD (0.00 + 38.98 + 0.00) = 38.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -24   0.00  68.48   0.00  -5.40  -4.36   0.00   0.00 -19.74
38.98
-------------------------------------------------------------------------------
--

Segment Leq : 38.98 dBA
```

```
Results segment # 2: Lyon1 (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 !       42.50 !       10.17 !        10.17

ROAD (0.00 + 34.33 + 0.00) = 34.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -24      0   0.00  68.48   0.00  -5.40  -8.75   0.00   0.00 -20.00
34.33
-------------------------------------------------------------------------------
--

Segment Leq : 34.33 dBA

Total Leq All Segments: 40.26 dBA
```

```
Results segment # 1: Lyon1 (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 !       42.50 !       10.17 !        10.17

ROAD (0.00 + 31.38 + 0.00) = 31.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -24   0.00  60.88   0.00  -5.40  -4.36   0.00   0.00 -19.74
31.38
-------------------------------------------------------------------------------
--

Segment Leq : 31.38 dBA
```

```
Results segment # 2: Lyon1 (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 !       42.50 !       10.17 !        10.17

ROAD (0.00 + 26.73 + 0.00) = 26.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -24      0   0.00  60.88   0.00  -5.40  -8.75   0.00   0.00 -20.00
26.73
-------------------------------------------------------------------------------
--

Segment Leq : 26.73 dBA

Total Leq All Segments: 32.66 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 40.26
                           (NIGHT): 32.66
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:10:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :  23.00 / 23.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (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  :  16.00 / 16.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Lyon (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 !       42.50 !       23.64 !        23.64

ROAD (0.00 + 45.85 + 0.00) = 45.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -5.23   0.00   0.00   0.00 -17.40
45.85
-------------------------------------------------------------------------------
--

Segment Leq : 45.85 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.19 + 0.00) = 65.19 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  -0.28  -3.01   0.00   0.00   0.00
65.19
-------------------------------------------------------------------------
--

Segment Leq : 65.19 dBA

Total Leq All Segments: 65.24 dBA
```

```
Results segment # 1: Lyon (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 !       42.50 !       23.64 !        23.64

ROAD (0.00 + 38.25 + 0.00) = 38.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -5.23   0.00   0.00   0.00 -17.40
38.25
-------------------------------------------------------------------------------
--

Segment Leq : 38.25 dBA
```

```
Results segment # 2: Albert (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.59 + 0.00) = 57.59 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  -0.28  -3.01   0.00   0.00   0.00
57.59
-------------------------------------------------------------------------
--

Segment Leq : 57.59 dBA

Total Leq All Segments: 57.64 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.24
                           (NIGHT): 57.64
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:10:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  52.00 / 52.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 58.98 + 0.00) = 58.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     70   0.00  68.48   0.00  -5.40  -4.10   0.00   0.00   0.00
58.98
-------------------------------------------------------------------------
--

Segment Leq : 58.98 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

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

Segment Leq : 68.48 dBA

Total Leq All Segments: 68.94 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 51.38 + 0.00) = 51.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     70   0.00  60.88   0.00  -5.40  -4.10   0.00   0.00   0.00
51.38
-------------------------------------------------------------------------
--

Segment Leq : 51.38 dBA
```

```
Results segment # 2: Albert (night)
----------------------------------

Source height = 1.50 m

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

Segment Leq : 60.88 dBA

Total Leq All Segments: 61.34 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 68.94
                           (NIGHT): 61.34
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 15:36:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albert (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: Albert (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  :  16.00 / 16.00  m
Receiver height           :  42.50 / 42.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.19 + 0.00) = 65.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  68.48   0.00  -0.28  -3.01   0.00   0.00   0.00
65.19
-------------------------------------------------------------------------
--

Segment Leq : 65.19 dBA

Total Leq All Segments: 65.19 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 57.59 + 0.00) = 57.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  60.88   0.00  -0.28  -3.01   0.00   0.00   0.00
57.59
-------------------------------------------------------------------------
--

Segment Leq : 57.59 dBA

Total Leq All Segments: 57.59 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.19
                           (NIGHT): 57.59
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 16:48:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (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  :  15.00 / 15.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.47 + 0.00) = 65.47 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   0.00  -3.01   0.00   0.00   0.00
65.47
-------------------------------------------------------------------------
--

Segment Leq : 65.47 dBA

Total Leq All Segments: 65.47 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 57.87 + 0.00) = 57.87 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   0.00  -3.01   0.00   0.00   0.00
57.87
-------------------------------------------------------------------------
--

Segment Leq : 57.87 dBA

Total Leq All Segments: 57.87 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.47
                           (NIGHT): 57.87
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 16:48:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (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  :  51.00 / 51.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -48.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  37.00 / 37.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

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

Source height = 1.50 m

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

Segment Leq : 68.48 dBA
```

```
Results segment # 2: Albert (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 !       79.50 !       22.91 !        22.91

ROAD (0.00 + 38.17 + 57.42) = 57.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -48   0.00  68.48   0.00  -5.31  -6.32   0.00   0.00 -18.67
38.17
-------------------------------------------------------------------------------
--
   -48      0   0.00  68.48   0.00  -5.31  -5.74   0.00   0.00   0.00
57.42
-------------------------------------------------------------------------------
--

Segment Leq : 57.48 dBA

Total Leq All Segments: 68.81 dBA
```

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

Source height = 1.50 m

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

Segment Leq : 60.88 dBA
```

```
Results segment # 2: Albert (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 !       79.50 !       22.91 !        22.91

ROAD (0.00 + 30.58 + 49.83) = 49.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -48   0.00  60.88   0.00  -5.31  -6.32   0.00   0.00 -18.67
30.58
-------------------------------------------------------------------------------
--
   -48      0   0.00  60.88   0.00  -5.31  -5.74   0.00   0.00   0.00
49.83
-------------------------------------------------------------------------------
--

Segment Leq : 49.88 dBA

Total Leq All Segments: 61.21 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 68.81
                           (NIGHT): 61.21
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 16:48:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (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  :  16.00 / 16.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  75.00 deg   Angle2 : 90.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert1 (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 # 2: Albert1 (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   -15.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -50.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  32.00 / 32.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: Albert2 (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: Albert2 (day/night)
-----------------------------------------
Angle1   Angle2           : -15.00 deg   47.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -15.00 deg   Angle2 : 47.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :  32.00 / 32.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: Albert3 (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: Albert3 (day/night)
-----------------------------------------
Angle1   Angle2           :  47.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  47.00 / 47.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  47.00 deg   Angle2 : 90.00 deg
Barrier height            :  81.00 m
Barrier receiver distance :  32.00 / 32.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Lyon (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 !       79.50 !       60.00 !        60.00

ROAD (64.40 + 57.41 + 0.00) = 65.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     75   0.00  68.48   0.00  -0.28  -3.80   0.00   0.00   0.00
64.40
-------------------------------------------------------------------------------
--
    75     90   0.00  68.48   0.00  -0.28 -10.79   0.00   0.00  -1.07
56.33*
    75     90   0.00  68.48   0.00  -0.28 -10.79   0.00   0.00   0.00
57.41
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 65.19 dBA
```

```
Results segment # 2: Albert1 (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 !       79.50 !       26.39 !        26.39

ROAD (0.00 + 38.56 + 56.41) = 56.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -50   0.00  68.48   0.00  -4.96  -6.53   0.00   0.00 -18.43
38.56
-------------------------------------------------------------------------------
--
   -50    -15   0.00  68.48   0.00  -4.96  -7.11   0.00   0.00   0.00
56.41
-------------------------------------------------------------------------------
--

Segment Leq : 56.48 dBA
```

```
Results segment # 3: Albert2 (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 !       79.50 !       26.39 !        26.39

ROAD (0.00 + 43.01 + 0.00) = 43.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -15     47   0.00  68.48   0.00  -4.96  -4.63   0.00   0.00 -15.88
43.01
-------------------------------------------------------------------------------
--

Segment Leq : 43.01 dBA
```

```
Results segment # 4: Albert3 (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 !       79.50 !       26.39 !        26.39

ROAD (0.00 + 38.45 + 0.00) = 38.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    47     90   0.00  68.48   0.00  -4.96  -6.22   0.00   0.00 -18.85
38.45
-------------------------------------------------------------------------------
--

Segment Leq : 38.45 dBA

Total Leq All Segments: 65.77 dBA
```

```
Results segment # 1: Lyon (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 !       79.50 !       60.00 !        60.00

ROAD (56.80 + 49.81 + 0.00) = 57.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     75   0.00  60.88   0.00  -0.28  -3.80   0.00   0.00   0.00
56.80
-------------------------------------------------------------------------------
--
    75     90   0.00  60.88   0.00  -0.28 -10.79   0.00   0.00  -1.07
48.74*
    75     90   0.00  60.88   0.00  -0.28 -10.79   0.00   0.00   0.00
49.81
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 57.59 dBA
```

```
Results segment # 2: Albert1 (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 !       79.50 !       26.39 !        26.39

ROAD (0.00 + 30.96 + 48.81) = 48.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -50   0.00  60.88   0.00  -4.96  -6.53   0.00   0.00 -18.43
30.96
-------------------------------------------------------------------------------
--
   -50    -15   0.00  60.88   0.00  -4.96  -7.11   0.00   0.00   0.00
48.81
-------------------------------------------------------------------------------
--

Segment Leq : 48.88 dBA
```

```
Results segment # 3: Albert2 (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 !       79.50 !       26.39 !        26.39

ROAD (0.00 + 35.42 + 0.00) = 35.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -15     47   0.00  60.88   0.00  -4.96  -4.63   0.00   0.00 -15.88
35.42
-------------------------------------------------------------------------------
--

Segment Leq : 35.42 dBA
```

```
Results segment # 4: Albert3 (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 !       79.50 !       26.39 !        26.39

ROAD (0.00 + 30.85 + 0.00) = 30.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    47     90   0.00  60.88   0.00  -4.96  -6.22   0.00   0.00 -18.85
30.85
-------------------------------------------------------------------------------
--

Segment Leq : 30.85 dBA

Total Leq All Segments: 58.17 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.77
                           (NIGHT): 58.17
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:08:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albert (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: Albert (day/night)
-----------------------------------------
Angle1   Angle2           :   0.00 deg   61.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 61.00 deg
Barrier height            :  81.00 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Albert (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 !       79.50 !       51.42 !        51.42

ROAD (0.00 + 38.55 + 0.00) = 38.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     61   0.00  68.48   0.00  -5.23  -4.70   0.00   0.00 -20.00
38.55
-------------------------------------------------------------------------------
--

Segment Leq : 38.55 dBA

Total Leq All Segments: 38.55 dBA
```

```
Results segment # 1: Albert (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 !       79.50 !       51.42 !        51.42

ROAD (0.00 + 30.96 + 0.00) = 30.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     61   0.00  60.88   0.00  -5.23  -4.70   0.00   0.00 -20.00
30.96
-------------------------------------------------------------------------------
--

Segment Leq : 30.96 dBA

Total Leq All Segments: 30.96 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 38.55
                           (NIGHT): 30.96
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:08:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon1 (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: Lyon1 (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   -24.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  52.00 / 52.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -24.00 deg
Barrier height            :  81.00 m
Barrier receiver distance :  41.00 / 41.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Lyon1 (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 # 2: Lyon1 (day/night)
---------------------------------------
Angle1   Angle2           : -24.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  52.00 / 52.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -24.00 deg   Angle2 : 0.00 deg
Barrier height            :  31.00 m
Barrier receiver distance :  41.00 / 41.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Lyon1 (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 !       79.50 !       18.00 !        18.00

ROAD (0.00 + 39.35 + 0.00) = 39.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -24   0.00  68.48   0.00  -5.40  -4.36   0.00   0.00 -19.37
39.35
-------------------------------------------------------------------------------
--

Segment Leq : 39.35 dBA
```

```
Results segment # 2: Lyon1 (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 !       79.50 !       18.00 !        18.00

ROAD (0.00 + 35.87 + 0.00) = 35.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -24      0   0.00  68.48   0.00  -5.40  -8.75   0.00   0.00 -18.46
35.87
-------------------------------------------------------------------------------
--

Segment Leq : 35.87 dBA

Total Leq All Segments: 40.96 dBA
```

```
Results segment # 1: Lyon1 (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 !       79.50 !       18.00 !        18.00

ROAD (0.00 + 31.76 + 0.00) = 31.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -24   0.00  60.88   0.00  -5.40  -4.36   0.00   0.00 -19.37
31.76
-------------------------------------------------------------------------------
--

Segment Leq : 31.76 dBA
```

```
Results segment # 2: Lyon1 (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 !       79.50 !       18.00 !        18.00

ROAD (0.00 + 28.27 + 0.00) = 28.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -24      0   0.00  60.88   0.00  -5.40  -8.75   0.00   0.00 -18.46
28.27
-------------------------------------------------------------------------------
--

Segment Leq : 28.27 dBA

Total Leq All Segments: 33.37 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 40.96
                           (NIGHT): 33.37
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:08:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :  23.00 / 23.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (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  :  16.00 / 16.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Lyon (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 !       79.50 !       43.62 !        43.62

ROAD (0.00 + 63.25 + 0.00) = 63.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -5.23   0.00   0.00   0.00  -0.36
62.89*
   -90     90   0.00  68.48   0.00  -5.23   0.00   0.00   0.00   0.00
63.25
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 63.25 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.19 + 0.00) = 65.19 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  -0.28  -3.01   0.00   0.00   0.00
65.19
-------------------------------------------------------------------------
--

Segment Leq : 65.19 dBA

Total Leq All Segments: 67.34 dBA
```

```
Results segment # 1: Lyon (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 !       79.50 !       43.62 !        43.62

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -5.23   0.00   0.00   0.00  -0.36
55.29*
   -90     90   0.00  60.88   0.00  -5.23   0.00   0.00   0.00   0.00
55.65
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 55.65 dBA
```

```
Results segment # 2: Albert (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.59 + 0.00) = 57.59 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  -0.28  -3.01   0.00   0.00   0.00
57.59
-------------------------------------------------------------------------
--

Segment Leq : 57.59 dBA

Total Leq All Segments: 59.74 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 67.34
                           (NIGHT): 59.74
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:09:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  52.00 / 52.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 58.98 + 0.00) = 58.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     70   0.00  68.48   0.00  -5.40  -4.10   0.00   0.00   0.00
58.98
-------------------------------------------------------------------------
--

Segment Leq : 58.98 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

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

Segment Leq : 68.48 dBA

Total Leq All Segments: 68.94 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 51.38 + 0.00) = 51.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     70   0.00  60.88   0.00  -5.40  -4.10   0.00   0.00   0.00
51.38
-------------------------------------------------------------------------
--

Segment Leq : 51.38 dBA
```

```
Results segment # 2: Albert (night)
----------------------------------

Source height = 1.50 m

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

Segment Leq : 60.88 dBA

Total Leq All Segments: 61.34 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 68.94
                           (NIGHT): 61.34
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:09:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Albert (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: Albert (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  :  16.00 / 16.00  m
Receiver height           :  79.50 / 79.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Source height = 1.50 m

ROAD (0.00 + 65.19 + 0.00) = 65.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  68.48   0.00  -0.28  -3.01   0.00   0.00   0.00
65.19
-------------------------------------------------------------------------
--

Segment Leq : 65.19 dBA

Total Leq All Segments: 65.19 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 57.59 + 0.00) = 57.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  60.88   0.00  -0.28  -3.01   0.00   0.00   0.00
57.59
-------------------------------------------------------------------------
--

Segment Leq : 57.59 dBA

Total Leq All Segments: 57.59 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 65.19
                           (NIGHT): 57.59
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:09:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  41.00 / 41.00  m
Receiver height           :  16.00 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  31.00 m
Barrier receiver distance :  29.00 / 29.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.00 / 39.00  m
Receiver height           :  16.00 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  37.50 m
Barrier receiver distance :  28.00 / 28.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.00 !        5.74 !         5.74

ROAD (0.00 + 44.72 + 0.00) = 44.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -4.37   0.00   0.00   0.00 -19.39
44.72
-------------------------------------------------------------------------------
--

Segment Leq : 44.72 dBA
```

```
Results segment # 2: Albert (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.00 !        5.59 !         5.59

ROAD (0.00 + 44.75 + 0.00) = 44.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -4.15   0.00   0.00   0.00 -19.58
44.75
-------------------------------------------------------------------------------
--

Segment Leq : 44.75 dBA

Total Leq All Segments: 47.75 dBA
```

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

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.00 !        5.74 !         5.74

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     90   0.00  60.88   0.00  -4.37   0.00   0.00   0.00 -19.39
37.12
-------------------------------------------------------------------------------
--

Segment Leq : 37.12 dBA
```

```
Results segment # 2: Albert (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.00 !        5.59 !         5.59

ROAD (0.00 + 37.15 + 0.00) = 37.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -4.15   0.00   0.00   0.00 -19.58
37.15
-------------------------------------------------------------------------------
--

Segment Leq : 37.15 dBA

Total Leq All Segments: 40.15 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 47.75
                           (NIGHT): 40.15
```

```
STAMSON 5.0        NORMAL REPORT        Date: 18-07-2018 33:09:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Lyon (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: Lyon (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  16.00 / 16.00  m
Receiver height           :  32.50 / 32.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  31.00 m
Barrier receiver distance :   5.00 / 5.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Albert (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 # 2: Albert (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  21.00 / 21.00  m
Receiver height           :  32.50 / 32.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  31.00 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
```

```
Results segment # 1: Lyon (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 !       32.50 !       22.81 !        22.81

ROAD (0.00 + 52.66 + 0.00) = 52.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -0.28   0.00   0.00   0.00 -15.54
52.66
-------------------------------------------------------------------------------
--

Segment Leq : 52.66 dBA
```

```
Results segment # 2: Albert (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 !       32.50 !       17.74 !        17.74

ROAD (0.00 + 49.48 + 0.00) = 49.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -1.46   0.00   0.00   0.00 -17.54
49.48
-------------------------------------------------------------------------------
--

Segment Leq : 49.48 dBA

Total Leq All Segments: 54.37 dBA
```

```
Results segment # 1: Lyon (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 !       32.50 !       22.81 !        22.81

ROAD (0.00 + 45.06 + 0.00) = 45.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -0.28   0.00   0.00   0.00 -15.54
45.06
-------------------------------------------------------------------------------
--

Segment Leq : 45.06 dBA
```

```
Results segment # 2: Albert (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 !       32.50 !       17.74 !        17.74

ROAD (0.00 + 41.88 + 0.00) = 41.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -1.46   0.00   0.00   0.00 -17.54
41.88
-------------------------------------------------------------------------------
--

Segment Leq : 41.88 dBA

Total Leq All Segments: 46.77 dBA
```

```
TOTAL Leq FROM ALL SOURCES (DAY): 54.37
                           (NIGHT): 46.77
```

APPENDIX B

FTA VIBRATION CALCULATIONS

Possible Vibration Impacts on 383 Albert Street & 340 Queen Street
Perdicted using FTA General Assesment

Train Speed 70 km/h 43.4 mph

	Distance from C/L	
	(m)	(ft)
Confederation	13.0	42.7

Vibration

From FTA Manual Fig 10-1

Vibration Levels at distance from track	74	dBV re 1 micro in/sec	
Adjustment Factors FTA Table 10-1			
Speed reference 50 mph	-1	Speed Limit of 70 km/h (43.4 mph)	
Vehicle Parameters	0	Assume Soft primary suspension, Weels run true	
Track Condition	0	None	
Track Treatments	0	None	
Type of Transit Structure	0	None	
Efficient vibration Propagation	0	Propagation through rock	
Vibration Levels at Fdn	73		0.111
Coupling to Building Foundation	-10	Large Massonry on Piles	
Floor to Floor Attenuation	-2.0	Ground Floor Ocupied	
Amplification of Floor and Walls	6		
Total Vibration Level	66.8	dBV or	0.056 mm/s
Noise Level in dBA	31.8	dBA	

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

Factors Affecting Vibration Source

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

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