



REPORT
Project: 105202-5.2.2

ENVIRONMENTAL NOISE IMPACT ASSESSMENT MCGANN 9a LANDS - 4747 BANK STREET LEITRIM DEVELOPMENT AREA



Prepared for Claridge Homes
by IBI GROUP

NOVEMBER 2017

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1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential lands of the McGann 9a Lands in the Leitrim Development Area. The report deals with the expected noise levels in the development and any required noise control measures.

The subject property is bounded by Bank Street to the west, existing residential lands to the north, future residential land to the south and undeveloped lands to the west.

2 BACKGROUND

2.1 Noise Sources

The study area is primarily subject to roadway noise from existing Bank Street and internal Streets No. 1 and 11 through the site. Aircraft noise from the Ottawa International Airport is not a factor as the airport is not in close proximity to the study area; there are no rail lines within 500 meters of the site.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the City of Ottawa Environmental Noise Control Guidelines and from the Ministry of the Environment Environmental Noise Guideline Publication NPC-300. Noise levels are expressed in the form $L_{eq}(T)$ which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Indoor Sound Level Criterion

Similar to outdoor noise levels, the recommended indoor sound level criteria from Table 2.2b of the guidelines are:

- Bedrooms – 23:00 to 07:00 – 40 dBA L_{eq} (8)
- Other areas – 07:00 to 23:00 – 45 dBA L_{eq} (16)

The sound levels are based on the windows and doors to an indoor space being closed.

For the purpose of assessing indoor sound levels, the outdoor sound levels are observed at the plane of the living room window at 1.5 meters above the ground for daytime noise and at the plane of the bedroom window 4.5 meters above the ground for nighttime noise as per the guidelines.

As per NPC-300 C7.1.3 when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

As per NPC-300 C7.1.2.1 and C7.1.2.2 when the outdoor noise levels at the living room are greater than 55 dBA and less than or equal to 65 dBA and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window then a warning clause is required and forced air heating with provision for central air conditioning is required. Should the outdoor sound levels exceed the criteria central air conditioning is mandatory and a warning clause is required.

2.2.2 Outdoor Sound Level Criterion

As per Table 2.2a of the guidelines the sound level criterion for the outdoor living area (OLA) for the daytime period between 07:00 and 23:00 hours is 55 dBA L_{eq} (16). Sound levels for the OLA are calculated 3 meters from the building face at the center of the unit or within the center of the OLA at a height of 1.5 meters above the ground.

If the L_{eq} sound level is less than or equal to the above criteria then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may either provide a warning clause to prospective purchasers or install physical attenuation. For sound levels greater than 5 dBA above the criteria, control measures are required to reduce the noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA a warning clause is also required.

3 ROADWAY NOISE

3.1 Road Traffic Data

The major source of road noise impacting the site is the traffic moving along Bank Street and internal Street No. 2.

Bank Street is currently a two lane undivided rural roadway with a posted speed limit of 80 km/hr. adjacent to the site which will be widened to four lanes. Street 2 will be a two lane urban collector with an assumed posted speed limit of 50 km/hr. Table 3.1 summarizes the traffic and road parameters used to assess the noise. Traffic volume parameters are taken from Table B.1 of the guidelines for a 4-UAD for future Bank Street and 2-ULU for Street No. 2.

TABLE 3.1 – TRAFFIC AND ROAD DATA SUMMARY

| | BANK STREET | STREET NO. 2 |
|-------------------------------------|-------------|--------------|
| Annual Average Daily Traffic (AADT) | 35,000 | 8,000 |
| Posted Speed Limit (km/hr) | 80 | 50 |
| % Medium Trucks | 7% | 7% |
| % Heavy Trucks | 5% | 5% |
| % Daytime Traffic | 92% | 92% |

3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

This study will identify the noise contours generated by the traffic for various scenarios. To determine the indoor noise level requirements for ventilation and noise clauses, the contours for the 55 dBA daytime and 50 dBA nighttime levels are determined. For the requirement to evaluate building components, the 65 dBA daytime and 60 dBA night time contours are used. To determine the requirements for noise barriers, the 55 dBA and 60 dBA daytime noise contours are used. The following table provides the offset from centerline of the roadway to the noise contours. Noise levels for Bank Street are calculated separately for the north bound and south bound lanes and combined. The distances in Table 3.2 are from the centerline of the right-of-way.

TABLE 3.2 – NOISE CONTOUR OFFSETS

| NOISE CRITERIA | | DISTANCE FROM CENTERLINE (M) | |
|---------------------|--------|------------------------------|--------------|
| | | BANK STREET | STREET NO. 2 |
| Indoor Daytime | 65 dBA | 60.5 | 15.0 |
| | 55 dBA | 244.5 | 61.3 |
| Indoor Nighttime | 60 dBA | 44.7 | 3.6 |
| | 50 dBA | 189.0 | 44.9 |
| Outdoor Living Area | 60 dBA | 115.9 | 29.7 |
| | 55 dBA | 231.3 | 59.4 |

Based on the above table for indoor noise evaluation, the daytime contours are further from centerline than the nighttime levels for each criterion; therefore, only the daytime levels will be used in the evaluation. Noise contours for both indoor and outdoor noise evaluation are shown on **Figure 1**. The noise contours have not been adjusted to reflect screening from proposed buildings. For clarity purposes, the noise contours have not been extended where they intersect with the noise contours from the larger roadway.

4 RESULTS

4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour shown on **Figure 1** represents the limit in which a Type 'C' Warning Clause and forced air heating with provision for central air conditioning are required for the residential units. The 65 dBA daytime contour is the limit in which a Type 'D' warning clause, central air conditioning and an acoustical review/design of the building components are required. As noted in Section 3.2, the noise contours have not been adjusted to account for screening by the proposed buildings. A summary of the results of each roadway is as follows:

Bank Street – The 65 dBA indoor contour from Bank Street falls onto the proposed mixed use block. As per the guidelines, commercial areas are not considered a noise sensitive land use. Should residential land uses be placed within the 65 dBA contour, a Type "D" warning clause would be required. Street No. 1, which runs adjacent to Bank Street, will be impacted by the Bank Street 55 dBA contour, the noise levels can be reduced depending on any screening by future and existing buildings. The location of units on Street No. 1 requiring a Type "C" warning clause can be determined during detailed design.

Street No. 2 – The 65 dBA indoor contour for the internal Collector Roads is located 15 meters from the roadway centreline. If any building is located within this offset a Type "D" warning clause would be required. Based on the location of the 55 dBA indoor contour, all units fronting or flanking Street No. 2 will require a Type "C" warning clause.

Warning clauses from Section C8.1 of NPC-300 for indoor noise are as follows:

Type 'C':

"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."

Type 'D':

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria."

4.2 Outdoor Sound Levels

The outdoor 60 dBA contour on **Figure 1** represents the limit in which physical attenuation is required in the outdoor living areas of residential units. For units between the 60 dBA and 55 dBA contours, physical attenuation may not be required but should be considered. A summary of the results for each roadway is as follows:

Bank Street – The 60 dBA outdoor contour impacts the proposed mixed use block. Should any outdoor living areas be located in the mixed use block, a noise barrier would likely be required. Noise from Bank Street may impact the outdoor living areas for units on Street No. 1 depending on the screening from future and existing buildings and the orientation of buildings on Street No. 2. As the unscreened noise levels are between 55 dBA and 60 dBA and Street No. 1 with the outdoor living area exposed to roadway noise, a noise barrier can be built to reduce the noise below 55 dBA or a Type "A" warning clause could be used in lieu of a barrier.

Street No. 2 – The 60 dBA outdoor contour for the Collector Roads, assuming a posted speed limit of 50 km/hr. is located approximately 30 meters from the centre of the roadway. Any lot or townhouse block that flanks Street No. 2 will likely have the noise levels in the outdoor living areas above 60 dBA requiring a noise barrier. Potential locations of noise barriers are shown on **Figure 1**. Due to easement and overland flow rates, it may not be practical to construct a continuous barrier in these locations. The partial barriers would reduce the noise levels below 60 dBA but above 55 dBA requiring a Type “B” warning clause. At locations where the noise levels in the outdoor living areas are above 55 dBA but below 60 dBA, a Type “A” warning clause could be considered in lieu of a barrier.

Warning clauses from Section C8.1 of NPC-300 for outdoor noise are as follows:

Type ‘A’

“Purchasers/tenants are advised that sound levels due to increasing Bank Street/Street No. 2 traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

Type ‘B’

“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing Bank Street/Street No. 2 traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

5 CONCLUSION

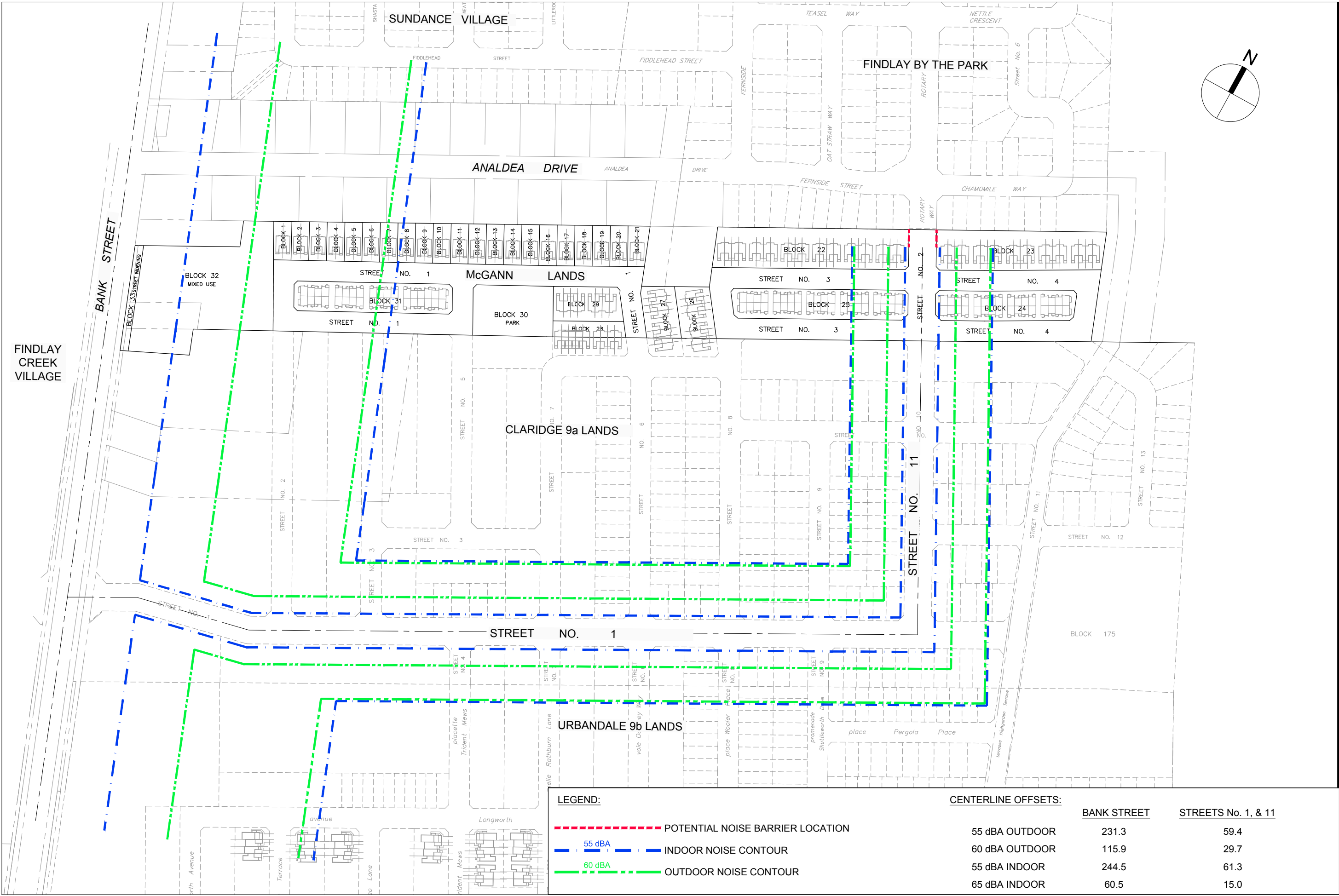
This report outlines the impact of roadway noise on the McGann 9a Lands development. The exact location of residential units requiring noise warning clauses, ventilation, air conditioning requirements, acoustical review/design of building components, and the location and size of noise barriers will be determined during the detailed design phase when site plans and grading plans are finalized.

Prepared by:



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Associate

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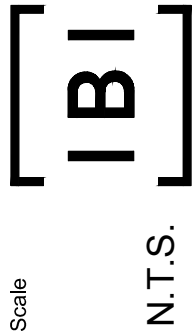
Project Title

Scale

FIGURE 1

NOISE
PLAN

McGANN 9a LANDS - 4747 BANK STREET
LEITRIM DEVELOPMENT AREA
CITY OF OTTAWA



APPENDIX

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 13:07:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank65in.te Time Period: Day/Night 16/8 hours
Description: Bank Street 65 dBA indoor day time

Road data, segment # 1: Bank Street1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 54.20 / 54.20 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank Street2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street2 (day/night)

```

-----
Angle1   Angle2       : -90.00 deg   90.00 deg
Wood depth      :           0       (No woods.)
No of house rows :           0 / 0
Surface         :           1       (Absorptive ground surface)
Receiver source distance : 66.70 / 66.70 m
Receiver height  :    2.50 / 4.50 m
Topography      :           1       (Flat/gentle slope; no barrier)
Reference angle  :           0.00
  
```

Results segment # 1: Bank Street1 (day)

Source height = 1.50 m

ROAD (0.00 + 62.66 + 0.00) = 62.66 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -9.09 | -1.41 | 0.00 | 0.00 | 0.00 | 62.66 |

Segment Leq : 62.66 dBA

Results segment # 2: Bank Street2 (day)

Source height = 1.50 m

ROAD (0.00 + 61.19 + 0.00) = 61.19 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -10.56 | -1.41 | 0.00 | 0.00 | 0.00 | 61.19 |

Segment Leq : 61.19 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: Bank Street1 (night)

Source height = 1.50 m

ROAD (0.00 + 55.50 + 0.00) = 55.50 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -8.76 | -1.30 | 0.00 | 0.00 | 0.00 | 55.50 |

Segment Leq : 55.50 dBA

Results segment # 2: Bank Street2 (night)

Source height = 1.50 m

ROAD (0.00 + 54.08 + 0.00) = 54.08 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -10.18 | -1.30 | 0.00 | 0.00 | 0.00 | 54.08 |

Segment Leq : 54.08 dBA

Total Leq All Segments: 57.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 57.86

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 12:54:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank55in.te Time Period: Day/Night 16/8 hours
Description: Bank Street 55 dBA indoor day time

Road data, segment # 1: Bank Street1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 238.25 / 238.25 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank Street2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street2 (day/night)

```

-----
Angle1   Angle2       : -90.00 deg   90.00 deg
Wood depth      :           0       (No woods.)
No of house rows :           0 / 0
Surface         :           1       (Absorptive ground surface)
Receiver source distance : 250.75 / 250.75 m
Receiver height :           2.50 / 4.50 m
Topography      :           1       (Flat/gentle slope; no barrier)
Reference angle :           0.00

```

Results segment # 1: Bank Street1 (day)

Source height = 1.50 m

ROAD (0.00 + 52.17 + 0.00) = 52.17 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -19.58 | -1.41 | 0.00 | 0.00 | 0.00 | 52.17 |

Segment Leq : 52.17 dBA

Results segment # 2: Bank Street2 (day)

Source height = 1.50 m

ROAD (0.00 + 51.81 + 0.00) = 51.81 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -19.94 | -1.41 | 0.00 | 0.00 | 0.00 | 51.81 |

Segment Leq : 51.81 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Bank Street1 (night)

Source height = 1.50 m

ROAD (0.00 + 45.40 + 0.00) = 45.40 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -18.86 | -1.30 | 0.00 | 0.00 | 0.00 | 45.40 |

Segment Leq : 45.40 dBA

Results segment # 2: Bank Street2 (night)

Source height = 1.50 m

ROAD (0.00 + 45.05 + 0.00) = 45.05 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -19.21 | -1.30 | 0.00 | 0.00 | 0.00 | 45.05 |

Segment Leq : 45.05 dBA

Total Leq All Segments: 48.24 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 48.24

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 12:52:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank50in.te Time Period: Day/Night 16/8 hours
Description: Bank Street 50 dBA indoor night time

Road data, segment # 1: Bank Street1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 182.75 / 182.75 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank Street2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street2 (day/night)

| | | | | |
|--------------------------|--------|-------------------|---------------------------------|-----------|
| Angle1 | Angle2 | : | -90.00 deg | 90.00 deg |
| Wood depth | : | 0 | (No woods.) | |
| No of house rows | : | 0 / 0 | | |
| Surface | : | 1 | (Absorptive ground surface) | |
| Receiver source distance | : | 195.25 / 195.25 m | | |
| Receiver height | : | 2.50 / 4.50 m | | |
| Topography | : | 1 | (Flat/gentle slope; no barrier) | |
| Reference angle | : | 0.00 | | |

Results segment # 1: Bank Street1 (day)

Source height = 1.50 m

ROAD (0.00 + 54.05 + 0.00) = 54.05 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -17.70 | -1.41 | 0.00 | 0.00 | 0.00 | 54.05 |

Segment Leq : 54.05 dBA

Results segment # 2: Bank Street2 (day)

Source height = 1.50 m

ROAD (0.00 + 53.58 + 0.00) = 53.58 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -18.17 | -1.41 | 0.00 | 0.00 | 0.00 | 53.58 |

Segment Leq : 53.58 dBA

Total Leq All Segments: 56.83 dBA

Results segment # 1: Bank Street1 (night)

Source height = 1.50 m

ROAD (0.00 + 47.21 + 0.00) = 47.21 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -17.05 | -1.30 | 0.00 | 0.00 | 0.00 | 47.21 |

Segment Leq : 47.21 dBA

Results segment # 2: Bank Street2 (night)

Source height = 1.50 m

ROAD (0.00 + 46.76 + 0.00) = 46.76 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -17.50 | -1.30 | 0.00 | 0.00 | 0.00 | 46.76 |

Segment Leq : 46.76 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.83
(NIGHT): 50.00

Filename: bank60in.te Time Period: Day/Night 16/8 hours
Description: Bank Street 60 dBA indoor night time

Road data, segment # 1: Bank Street1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 38.45 / 38.45 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank Street2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street2 (day/night)

```

-----
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth           :      0      (No woods.)
No of house rows     :      0 / 0
Surface              :      1      (Absorptive ground surface)
Receiver source distance : 50.95 / 50.95 m
Receiver height       :  2.50 / 4.50 m
Topography           :      1      (Flat/gentle slope; no barrier)
Reference angle       :      0.00

```

Results segment # 1: Bank Street1 (day)

Source height = 1.50 m

ROAD (0.00 + 65.09 + 0.00) = 65.09 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -6.66 | -1.41 | 0.00 | 0.00 | 0.00 | 65.09 |

Segment Leq : 65.09 dBA

Results segment # 2: Bank Street2 (day)

Source height = 1.50 m

ROAD (0.00 + 63.09 + 0.00) = 63.09 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 73.16 | 0.00 | -8.66 | -1.41 | 0.00 | 0.00 | 0.00 | 63.09 |

Segment Leq : 63.09 dBA

Total Leq All Segments: 67.21 dBA

Results segment # 1: Bank Street1 (night)

Source height = 1.50 m

ROAD (0.00 + 57.84 + 0.00) = 57.84 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -6.42 | -1.30 | 0.00 | 0.00 | 0.00 | 57.84 |

Segment Leq : 57.84 dBA

Results segment # 2: Bank Street2 (night)

Source height = 1.50 m

ROAD (0.00 + 55.92 + 0.00) = 55.92 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -8.34 | -1.30 | 0.00 | 0.00 | 0.00 | 55.92 |

Segment Leq : 55.92 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.21
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 16:00:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank65ol.te Time Period: Day/Night 16/8 hours
Description: Bank Street 60 dBA OLA

Road data, segment # 1: Bank Street1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 109.60 / 109.60 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank Street2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street2 (day/night)

```

-----
Angle1   Angle2       : -90.00 deg   90.00 deg
Wood depth      :           0       (No woods.)
No of house rows :           0 / 0
Surface         :           1       (Absorptive ground surface)
Receiver source distance : 122.10 / 122.10 m
Receiver height  :           1.50 / 4.50 m
Topography      :           1       (Flat/gentle slope; no barrier)
Reference angle  :           0.00

```

Results segment # 1: Bank Street1 (day)

Source height = 1.50 m

ROAD (0.00 + 57.36 + 0.00) = 57.36 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.66 | 73.16 | 0.00 | -14.34 | -1.46 | 0.00 | 0.00 | 0.00 | 57.36 |

Segment Leq : 57.36 dBA

Results segment # 2: Bank Street2 (day)

Source height = 1.50 m

ROAD (0.00 + 56.58 + 0.00) = 56.58 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.66 | 73.16 | 0.00 | -15.12 | -1.46 | 0.00 | 0.00 | 0.00 | 56.58 |

Segment Leq : 56.58 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Bank Street1 (night)

Source height = 1.50 m

ROAD (0.00 + 50.70 + 0.00) = 50.70 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -13.56 | -1.30 | 0.00 | 0.00 | 0.00 | 50.70 |

Segment Leq : 50.70 dBA

Results segment # 2: Bank Street2 (night)

Source height = 1.50 m

ROAD (0.00 + 49.96 + 0.00) = 49.96 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -14.30 | -1.30 | 0.00 | 0.00 | 0.00 | 49.96 |

Segment Leq : 49.96 dBA

Total Leq All Segments: 53.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 53.36

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 13:09:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank5501.te Time Period: Day/Night 16/8 hours
Description: Bank Street 55 dBA OLA

Road data, segment # 1: Bank Street1 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street1 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 225.00 / 225.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank Street2 (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank Street2 (day/night)

```

-----
Angle1   Angle2       : -90.00 deg   90.00 deg
Wood depth      :           0       (No woods.)
No of house rows :           0 / 0
Surface         :           1       (Absorptive ground surface)
Receiver source distance : 237.50 / 237.50 m
Receiver height  :     1.50 / 4.50   m
Topography      :           1       (Flat/gentle slope; no barrier)
Reference angle  :           0.00

```

Results segment # 1: Bank Street1 (day)

Source height = 1.50 m

ROAD (0.00 + 52.18 + 0.00) = 52.18 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.66 | 73.16 | 0.00 | -19.52 | -1.46 | 0.00 | 0.00 | 0.00 | 52.18 |

Segment Leq : 52.18 dBA

Results segment # 2: Bank Street2 (day)

Source height = 1.50 m

ROAD (0.00 + 51.79 + 0.00) = 51.79 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.66 | 73.16 | 0.00 | -19.91 | -1.46 | 0.00 | 0.00 | 0.00 | 51.79 |

Segment Leq : 51.79 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Bank Street1 (night)

Source height = 1.50 m

ROAD (0.00 + 45.79 + 0.00) = 45.79 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -18.47 | -1.30 | 0.00 | 0.00 | 0.00 | 45.79 |

Segment Leq : 45.79 dBA

Results segment # 2: Bank Street2 (night)

Source height = 1.50 m

ROAD (0.00 + 45.42 + 0.00) = 45.42 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 65.56 | 0.00 | -18.83 | -1.30 | 0.00 | 0.00 | 0.00 | 45.42 |

Segment Leq : 45.42 dBA

Total Leq All Segments: 48.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 48.62

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 15:06:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Loc65in.te Time Period: Day/Night 16/8 hours
Description: Street Nos. 1 & 11 65 dBA indoor day time

Road data, segment # 1: St. 1,6 & 14 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: St. 1,6 & 14 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: St. 1,6 & 14 (day)

Source height = 1.50 m

ROAD (0.00 + 64.97 + 0.00) = 64.97 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 66.38 | 0.00 | 0.00 | -1.41 | 0.00 | 0.00 | 0.00 | 64.97 |

Segment Leq : 64.97 dBA

Total Leq All Segments: 64.97 dBA

Results segment # 1: St. 1,6 & 14 (night)

Source height = 1.50 m

ROAD (0.00 + 57.48 + 0.00) = 57.48 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 58.78 | 0.00 | 0.00 | -1.30 | 0.00 | 0.00 | 0.00 | 57.48 |

Segment Leq : 57.48 dBA

Total Leq All Segments: 57.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.97
(NIGHT): 57.48

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 15:08:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Loc55in.te Time Period: Day/Night 16/8 hours
Description: Street Nos. 1 & 11 55 dBA indoor day time

Road data, segment # 1: St. 1,6 & 14 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT) : 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: St. 1,6 & 14 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.30 / 61.30 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: St. 1,6 & 14 (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 66.38 | 0.00 | -9.97 | -1.41 | 0.00 | 0.00 | 0.00 | 55.00 |

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: St. 1,6 & 14 (night)

Source height = 1.50 m

ROAD (0.00 + 47.88 + 0.00) = 47.88 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 58.78 | 0.00 | -9.60 | -1.30 | 0.00 | 0.00 | 0.00 | 47.88 |

Segment Leq : 47.88 dBA

Total Leq All Segments: 47.88 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 47.88

STAMSON 5.0

NORMAL REPORT

Date: 13-06-2016 11:09:04

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: locin.te

Time Period: Day/Night 16/8 hours

Description: Street No. 1 & 14 indoor 15 m night time

Road data, segment # 1: Str. 1,6,14 (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
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: Str. 1,6,14 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Str. 1,6,14 (day)

Source height = 1.50 m

ROAD (0.00 + 61.33 + 0.00) = 61.33 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 62.74 | 0.00 | 0.00 | -1.41 | 0.00 | 0.00 | 0.00 | 61.33 |

Segment Leq : 61.33 dBA

Total Leq All Segments: 61.33 dBA

Results segment # 1: Str. 1,6,14 (night)

Source height = 1.50 m

ROAD (0.00 + 53.83 + 0.00) = 53.83 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 55.13 | 0.00 | 0.00 | -1.30 | 0.00 | 0.00 | 0.00 | 53.83 |

Segment Leq : 53.83 dBA

Total Leq All Segments: 53.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.33
(NIGHT): 53.83

Divergence - Line Source Street No. 1 & 11 - 60 dBA indoor night time

| | | | | |
|----------------|----------|----|-------|-----|
| Origin | Distance | d1 | 15 | m |
| | Noise | n1 | 53.83 | dBA |
| Receiver | Noise | n2 | 60 | dBA |
| Distance (est) | | d2 | 3.62 | |

Note: Distance (est) = $d2 * (10^{((n2-n1)/10)})$

When $n2 < n1$

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 15:11:38
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Loc50in.te Time Period: Day/Night 16/8 hours
 Description: Street Nos. 1 & 11 50 dBA indoor night time

Road data, segment # 1: St. 1,6 & 14 (day/night)

| | | | | |
|---------------------|---|----------|-------------------------------|---|
| Car traffic volume | : | 6477/563 | veh/TimePeriod | * |
| Medium truck volume | : | 515/45 | veh/TimePeriod | * |
| Heavy truck volume | : | 368/32 | veh/TimePeriod | * |
| Posted speed limit | : | 50 km/h | | |
| Road gradient | : | 2 % | | |
| Road pavement | : | 1 | (Typical asphalt or concrete) | |

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

| | |
|--------------------------------------|---------|
| 24 hr Traffic Volume (AADT or SADT): | 8000 |
| Percentage of Annual Growth | : 0.00 |
| Number of Years of Growth | : 0.00 |
| Medium Truck % of Total Volume | : 7.00 |
| Heavy Truck % of Total Volume | : 5.00 |
| Day (16 hrs) % of Total Volume | : 92.00 |

Data for Segment # 1: St. 1,6 & 14 (day/night)

| | | | | |
|--------------------------|--------|---------------|---------------------------------|-----------|
| Angle1 | Angle2 | : | -90.00 deg | 90.00 deg |
| Wood depth | : | 0 | (No woods.) | |
| No of house rows | : | 0 / 0 | | |
| Surface | : | 1 | (Absorptive ground surface) | |
| Receiver source distance | : | 44.90 / 44.90 | m | |
| Receiver height | : | 2.50 / 4.50 | m | |
| Topography | : | 1 | (Flat/gentle slope; no barrier) | |
| Reference angle | : | 0.00 | | |

Results segment # 1: St. 1,6 & 14 (day)

Source height = 1.50 m

ROAD (0.00 + 57.21 + 0.00) = 57.21 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.63 | 66.38 | 0.00 | -7.76 | -1.41 | 0.00 | 0.00 | 0.00 | 57.21 |

Segment Leq : 57.21 dBA

Total Leq All Segments: 57.21 dBA

Results segment # 1: St. 1,6 & 14 (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 58.78 | 0.00 | -7.48 | -1.30 | 0.00 | 0.00 | 0.00 | 50.00 |

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.21
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 14:18:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Loc60ol.te Time Period: Day/Night 16/8 hours
Description: Street Nos. 1 & 11 60 dBA OLA

Road data, segment # 1: St. 1,6 & 14 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: St. 1,6 & 14 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 29.70 / 29.70 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: St. 1,6 & 14 (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.66 | 66.38 | 0.00 | -4.92 | -1.46 | 0.00 | 0.00 | 0.00 | 60.00 |

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: St. 1,6 & 14 (night)

Source height = 1.50 m

ROAD (0.00 + 52.82 + 0.00) = 52.82 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 58.78 | 0.00 | -4.66 | -1.30 | 0.00 | 0.00 | 0.00 | 52.82 |

Segment Leq : 52.82 dBA

Total Leq All Segments: 52.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 52.82

STAMSON 5.0 NORMAL REPORT Date: 15-12-2015 14:09:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Loc55ol.te Time Period: Day/Night 16/8 hours
Description: Street Nos. 1 & 11 55 dBA OLA

Road data, segment # 1: St. 1,6 & 14 (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: St. 1,6 & 14 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 59.40 / 59.40 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: St. 1,6 & 14 (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.66 | 66.38 | 0.00 | -9.92 | -1.46 | 0.00 | 0.00 | 0.00 | 55.00 |

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: St. 1,6 & 14 (night)

Source height = 1.50 m

ROAD (0.00 + 48.10 + 0.00) = 48.10 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.57 | 58.78 | 0.00 | -9.38 | -1.30 | 0.00 | 0.00 | 0.00 | 48.10 |

Segment Leq : 48.10 dBA

Total Leq All Segments: 48.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 48.10