Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Noise and Vibration Studies

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Environmental Noise Control Study

Proposed 3-Storey Apartment
Building Addition
314 Bell Street South, Ottawa

Prepared For

Hamel Design and Planning

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Report: PG5906-1

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Hamel Design and Planning to conduct an environmental noise control study for the proposed 3-storey apartment building addition to be located at 314 Bell Street South, in the City of Ottawa.

The objective of the current study is to:

- Determine the primary noise sources impacting the site and compare the projected sound levels to guidelines set out by the Ministry of Environment and Climate Change (MOECC) and the City of Ottawa.

- Review the projected noise levels and offer recommendations regarding warning classes, construction materials or alternative sound barriers.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes acoustical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

This study has been conducted according to City of Ottawa document - Engineering Noise Control Guidelines (ENCG), dated January 2016, and the Ontario Ministry of the Environment Guideline NPC-300.

2.0 Proposed Development

It is understood that the proposed residential development will consist of three (3) storey residential apartment building addition and rise approximately 11 metres above grade. One basement level is anticipated at the building addition. A total of four (4) units are anticipated within the building addition. Associated at-grade landscaped area, walkway, bicycle parking and covered garbage are also anticipated. A rooftop terrace that will serve as an Outdoor Living Area (OLA) is further anticipated on the building addition.

3.0 Methodology and Noise Assessment Criteria

The City of Ottawa outlines three (3) sources of environmental noise that must be analyzed separately:

- Surface Transportation Noise
- Stationary Noise
  - new noise-sensitive development applications (noise receptors) in proximity to existing or approved stationary sources of noise, and
  - new stationary sources of noise (noise generating) in proximity to existing or approved noise-sensitive developments
- Aircraft Noise

Surface Transportation Noise

The City of Ottawa's Official Plan, in addition to the ENCG dictate that the influence area must contain any of following conditions to classify as a surface transportation noise source for a subject site:

- Within 100 m of the right-of-way of an existing or proposed arterial, collector or major collector road; a light rail transit corridor; bus rapid transit, or transit priority corridor
- Within 250 m of the right-of-way for an existing or proposed highway or secondary rail line
- Within 300 m from the right of way of a proposed or existing rail corridor or a secondary main railway line
- Within 500 m of an existing 400 series provincial highway, freeway or principle main railway line.

The NPC-300 outlines the limitations of the stationary and environmental noise levels in relation to the location of the receptors. These can be found in the following tables:

Table 1 – Noise Level Limit for Outdoor Living Areas	
Time Period	**Noise Level (dBA)**
Daytime, 7:00-23:00	55
➢ Standard taken from Table 2.2a; Noise Level Limit for Outdoor Living Areas – Road and Rail	

Table 2 – Noise Level Limits for Indoor Living Areas			
Type of Space	**Time Period**	**Noise Level (dBA)**	
		Road	**Rail**
Living/dining/den areas of **residences**, hospitals, nursing/retirement homes, schools, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	Daytime 7:00-23:00	45	40
	Nighttime 23:00-7:00	45	40
Sleeping quarters of hotels/motels	Nighttime 23:00-7:00	45	40
Sleeping quarters of **residences**, hospitals, nursing/retirement homes, etc.	Nighttime 23:00-7:00	40	35
➢ Standards taken from Table 2.2b, Noise Level Limit for Indoor Living Areas – Road and Rail			

It is noted in ENCG that the limits outlined in Table 2 are for the noise levels on the interior of the glass pane. The ENCG further goes on to state that the noise level limit for the exterior of the pane of glass will be 55 dBA.

If the sound level limits are exceeded at the window panes for the indoor living areas, the following Warning Clauses may be referenced:

Table 3 – Warning Clauses for Sound Level Exceedances	
Warning Clause	**Description**
Warning Clause Type A	"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."
Warning Clause 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 road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."
Warning Clause Type C	"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
Warning Clause 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 sound level limits of the Municipality and the Ministry of the Environment."
➢ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines - NPC-300	

Stationary Noise

Stationary noise sources include sources or facilities that are fixed or mobile and can cause a combination of sound and vibration levels emitted beyond the property line. These sources may include commercial air conditioner units, generators and fans. Facilities that may contribute to stationary noise may include car washes, snow disposal sites, transit stations and manufacturing facilities.

The subject site is not in proximity to existing or approved stationary sources of noise. Therefore, a stationary noise analysis will not be required.

Aircraft / Airport Noise

The subject site is not located within the Airport Vicinity Development Zone. Therefore this project will not require an aircraft/airport noise analysis. No warning clauses regarding aircraft or airport noise will be required.

4.0 Analysis

Surface Transportation Noise

The subject building addition is bordered to the north by residential dwellings followed by Plymouth Street, to the east by Bell Street South followed by residential dwellings and commercial buildings, to the west by residential dwellings, institutional building, commercial building and Lebreton Street South, to the south by residential dwellings, commercial building, Dalhousie Park and Henry Street. Plymouth Street, Bell Street South, Lebreton Street South and Henry Street are identified within the 100 m radius of proposed development.

Based on the City of Ottawa Official Plan, Schedule F, the roads within the 100 m radius of the proposed development are not classified as either arterial, collector or major collector roads and therefore are not included in this study. The major sources of traffic noise are due to the 4 lane Highway 417 Westbound and the 4 lane Highway 417 Eastbound to the north of the proposed building addition.

All noise sources are presented in Drawing PG5906-3 - Site Geometry located in Appendix 1.

The noise levels from road traffic are provided by the City of Ottawa, taking into consideration the right-of-way width and the implied roadway classification. It is understood that these values represent the maximum allowable capacity of the proposed roadways. The parameters to be used for sound level predictions can be found below.

Table 4 – Traffic and Road Parameters

Segment	Roadway Classification	Traffic Volumes	Speed Limit (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Highway 417 Westbound	4-Queensway	73,332	100	92/8	7	5
Highway 417 Eastbound	4-Queensway	73,332	100	92/8	7	5

- Data obtained from the City of Ottawa document ENCG or calculated from OC Transpo online schedules

Three (3) levels of reception points were selected for this analysis. The following elevations were selected from the heights provided on the survey plan for the subject building addition.

Table 5 – Elevations of Reception Points			
Floor Number	**Elevation at Centre of Window (m)**	**Floor Use**	**Daytime / Nighttime Analysis**
Raised Main Floor	2.5	Living Area/Bedroom	Daytime / Nighttime
Third Floor	8.5	Living Area/Bedroom	Daytime / Nighttime
Rooftop Terrace	12.5	Outdoor Living Area	Daytime / Nighttime

For this analysis, a reception point was taken at the centre of each floor, at the first floor and top floor. An Outdoor Living Area - rooftop terrace is anticipated at the proposed building addition. A reception point in the centre of rooftop terrace, 12.5 m high, was selected for the analysis of this area. Reception points are detailed on Drawing PG5906-2 - Receptor Locations presented in Appendix 1.

All horizontal distances have been measured from the reception point to the edge of the right-of-way. The highway was analyzed where it intersected the 500 m buffer zone, which is reflected in the local angles described in Paterson Drawings PG5906-3A to 3C - Site Geometry in Appendix 1.

Table 7 - Summary of Reception Points and Geometry, located in Appendix 1, provides a summary of the points of reception and their geometry with respect to the noise sources. The analysis is completed so that no effects of sound reflection off of the building facade are considered, as stipulated by the ENGC.

The subject site is relatively level and at grade with the neighbouring roads within 500 m radius.

The analysis was completed using STAMSON version 5.04, a computer program which uses the road and rail traffic noise prediction methods using ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environment Analysis Method), publications from the Ontario Ministry of Environment and Energy.

5.0 Results

Surface Transportation Noise

The primary descriptors are the 16-hour daytime (7:00-23:00) and the 8-hour nighttime (23:00-7:00) equivalent sound levels, $L_{eq(16)}$ and $L_{eq(8)}$ for City roads.

The proposed traffic noise levels were analyzed with the STAMSON version 5.04 software at all reception points. The input and output data of the STAMSON modeling can be found in Appendix 2, and the summary of the results can be found in Table 6.

Table 6 – Proposed Noise Levels

Reception Point	Description	OLA (dBA)	Daytime $L_{eq(16)}$ (dBA)	Nighttime $L_{eq(8)}$ (dBA)
REC 1-1	Eastern Elevation, Raised Main Floor	--	54.84	47.24
REC 1-3	Eastern Elevation, 3rd Floor	--	57.09	49.50
REC 2-1	Western Elevation, Raised Main Floor	--	52.96	45.36
REC 2-3	Western Elevation, 3rd Floor	--	55.33	47.73
REC 3	Rooftop Terrace	60.02	--	--

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

There is a rooftop terrace that will serve as an Outdoor Living Area (OLA). One (1) receptor point (REC 3) was selected in the centre of the proposed building addition. It is assumed that the rooftop terrace will only be utilized as an Outdoor Living Area (OLA) provided that the proposed building addition is constructed. It is noted that the proposed building addition is connected to the existing building, so the existing building can be included in the setback distance. The noise levels at the rooftop terrace were calculated to be 60 dBA during the daytime period (7:00-23:00), which exceed the 55 dBA threshold value specified by the ENCG.

Noise mitigation measures, which include use of the existing building as a noise barrier as well as proposing a 1 m high solid railing around the exterior of the patio were investigated as a possible solution to reduce the noise levels at the OLA. While these measures would typically offer some noise relief to the rooftop terrace, due to the configuration of the roof top patio in combination of the proposed building height and distance from the noise sources, the noise levels were not reduced following analysis of all the proposed noise mitigation measures. The results of STAMSON modeling indicated that the application of exterior cladding could not reduce the anticipated noise levels at the rooftop terrace. At this time, noise levels cannot be technically or economically reduced to 55 dBA and since the noise levels marginally exceed 60 dBA, this particular exceedance in noise levels is considered acceptable provided that a Warning Clause Type A is provided on all deeds of sale.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicate that the noise levels will range between 53 dBA and 57 dBA during the daytime period (07:00-23:00) and between 45 dBA and 50 dBA during the nighttime period (23:00-7:00). The noise levels on the eastern and western elevations will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. Therefore, the proposed building addition should be designed with the provision for a central air conditioning unit, along with the warning clause Type C, as outlined in Table 3. It is also noted that the results of STAMSON modeling indicate that the noise levels will be below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

7.0 Summary of Findings

The subject site is located at 314 Bell Street South, in the City of Ottawa. It is understood that the proposed development will consist of three (3) storey residential apartment building addition and rise approximately 11 metres above grade. There are two major sources of surface transportation noise to the north of the proposed building addition: the 4 lane Highway 417 Westbound and the 4 lane Highway 417 Eastbound.

Several reception points were selected for the surface transportation noise analysis, consisting of the centre of first level and third level. The results of STAMSON modeling indicate that the eastern and western elevations of the proposed building addition are expected to exceed the 55 dBA threshold specified by the ENCG. Therefore, the installation of a central air conditioning unit, along with a warning clause Type C, will be required for the proposed building addition.

The surface transportation noise analysis was completed at the Outdoor Living Area - rooftop terrace as well. The results of STAMSON modeling indicate that the noise levels at the rooftop terrace is expected to exceed 55 dBA and marginally exceeds 60 dBA during the daytime period. According to ENCG, noise control measures (barriers) are required to reduce the Leq to 55 dBA where technically and economically feasible. Investigation into application of the exterior cladding, including a 1 m solid railing around the perimeter of the rooftop terrace, found that the noise levels cannot be reduced to 55 dBA without the application of an excessively tall barrier. Therefore, since noise levels cannot be technically or economically be reduced to 55 dBA, this exceedance is considered acceptable provided that the warning clause Type A is included on all deeds of sale.

The following warning clause is to be included on all Offers of Purchase and Sale and/or lease agreements:

> "This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
>
> "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Our recommendations should be reviewed when the project drawings and specifications are complete.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than HD&P or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Yolanda Tang, M.Sc.Eng

Stephanie A. Boisvenue, P.Eng.

Report Distribution:

- ❑ HD&P (email copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

TABLE 7 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG5906-1 - SITE PLAN

DRAWING PG5906-2 - RECEPTOR LOCATION PLAN

DRAWING PG5906-3 – SITE GEOMETRY

DRAWING PG5906-3A - SITE GEOMETRY (REC 1-1 and REC 1-3)

DRAWING PG5906-3B - SITE GEOMETRY (REC 2-1 and REC 2-3)

DRAWING PG5906-3C - SITE GEOMETRY (REC 3)

Table 7 - Summary of Reception Points and Geometry
314 Bell Street South

Point of Reception	Location	Leq Day (dBA)	Highway 417 Eastbound						Highway 417 Westbound					
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)	Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)
REC 1-1	Eastern Elevation, Raised Main Floor	54.84	200	2.5	200.0	0, 73	3	60	210	2.5	210.0	0, 70	3	60
REC 1-3	Eastern Elevation, 3rd Floor	57.09	200	8.5	200.2	0, 73	3	60	210	8.5	210.2	0, 70	3	60
REC 2-1	Western Elevation, Raised Main Floor	52.96	250	2.5	250.0	-63, 0	3	60	260	2.5	260.0	-61, 0	3	60
REC 2-3	Western Elevation, 3rd Floor	55.33	250	8.5	250.1	-63, 0	3	60	260	8.5	260.1	-61, 0	3	60
REC 3	Rooftop Terrace	60.02	260	12.5	260.3	-64, 74	3	60	270	12.5	270.3	-62, 71	3	60

310 BELL STREET SOUTH

312 BELL STREET SOUTH

311 LEBRETON STREET SOUTH

313 LEBRETON STREET SOUTH

317 LEBRETON STREET SOUTH

316A BELL STREET SOUTH

316B BELL STREET SOUTH

COVERED GARBAGE

ASPHALTIC CONCRETE PARKING LOT

LANDSCAPED

EXISTING 3-STOREY+ BASEMENT
LOW RISE APARTMENT BUILDING

WOODEN PORCH

STEPS

314 BELL STREET SOUTH

PROPOSED 3-STOREY+ BASEMENT
LOW RISE APARTMENT BUILDING ADDITION

SIDEWALK

BELL STREET SOUTH

SCALE: 1:150

0 1 2 3 4 5 10m

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NO.	REVISIONS	DATE	INITIAL

HAMEL DESIGN & PLANNING
NOISE ATTENUATION STUDY
PROPOSED 3-STOREY APARTMENT BUILDING ADDITION
314 BELL STREET SOUTH
OTTAWA, ONTARIO

Title:
SITE PLAN

Scale: 1:150	Date: 07/2021
Drawn by: YA	Report No.: PG5906-1
Checked by: YT	Dwg. No.: PG5906-1
Approved by: SB	Revision No.:

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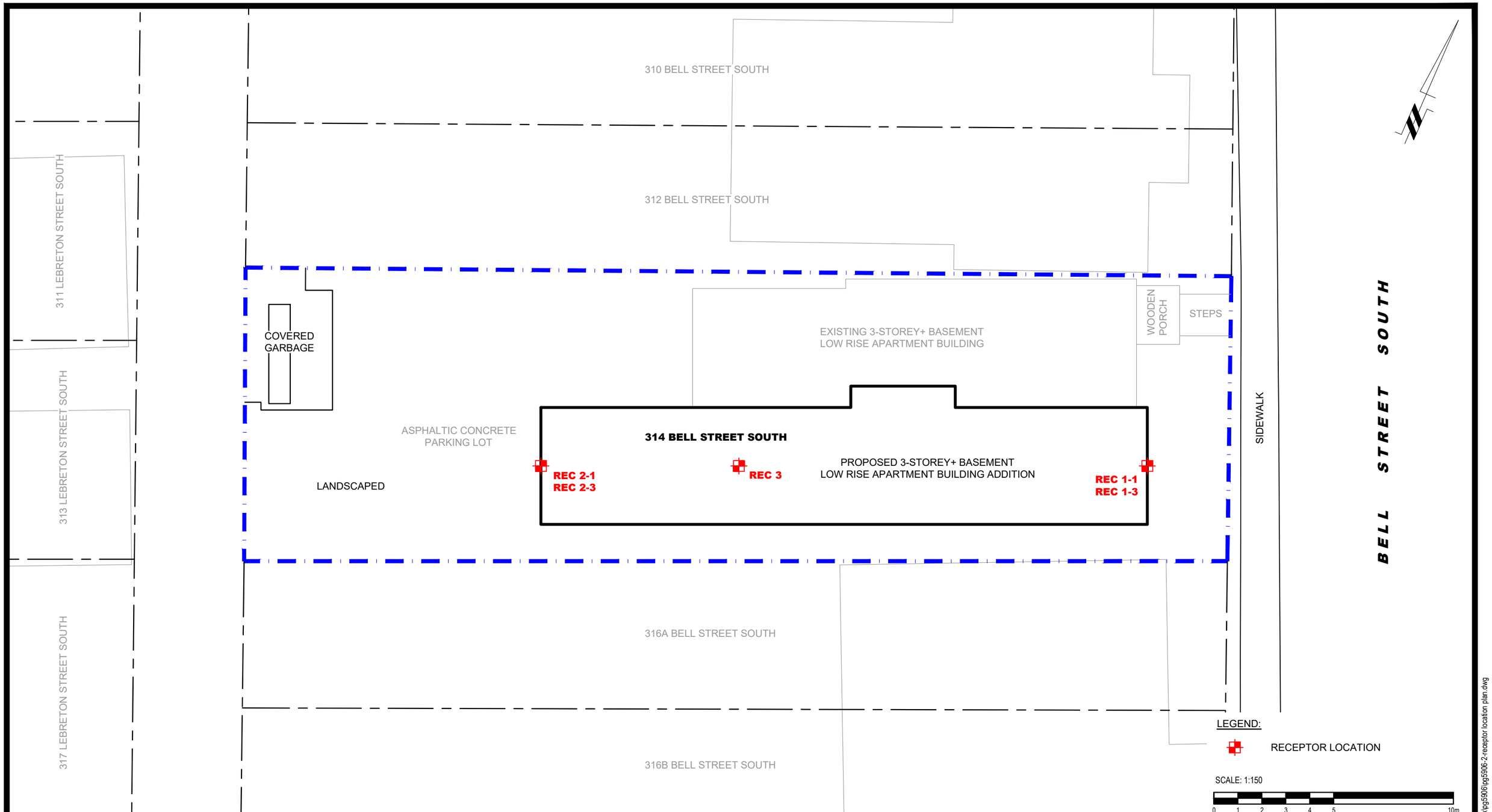

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NOISE ATTENUATION STUDY
PROPOSED 3-STOREY APARTMENT BUILDING ADDITION
314 BELL STREET SOUTH
OTTAWA, ONTARIO

Title:
RECEPTOR LOCATION PLAN

Scale: 1:150	Date: 07/2021
Drawn by: YA	Report No.: PG5906-1
Checked by: YT	Dwg. No.: PG5906-2
Approved by: SB	Revision No.:

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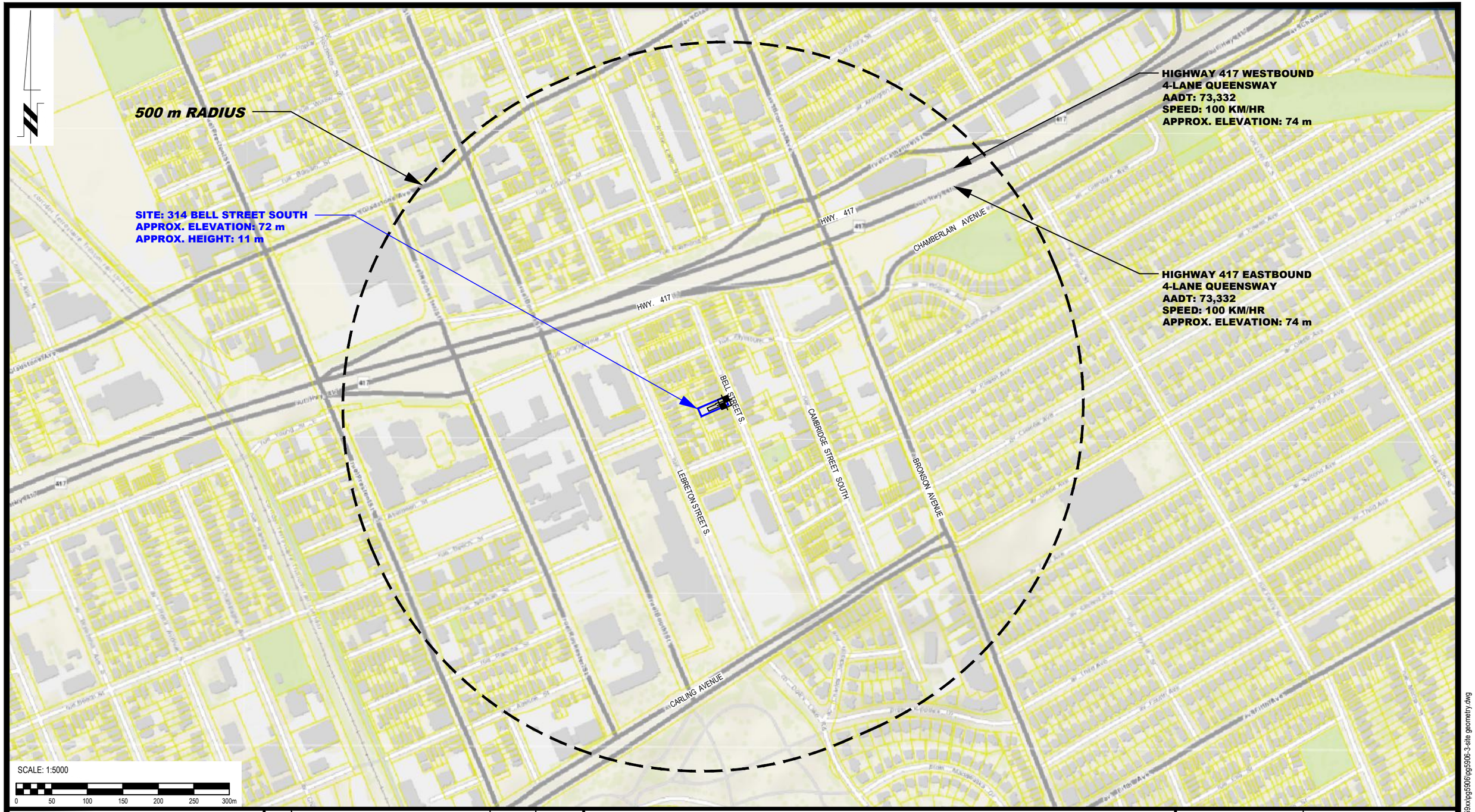

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NO.	REVISIONS	DATE	INITIAL

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NOISE ATTENUATION STUDY
PROPOSED 3-STOREY APARTMENT BUILDING ADDITION
314 BELL STREET SOUTH
OTTAWA, ONTARIO

Title:

SITE GEOMETRY

Scale: 1:5000	Date: 07/2021
Drawn by: YA	Report No.: PG5906-1
Checked by: YT	Dwg. No.: PG5906-3
Approved by: SB	Revision No.:

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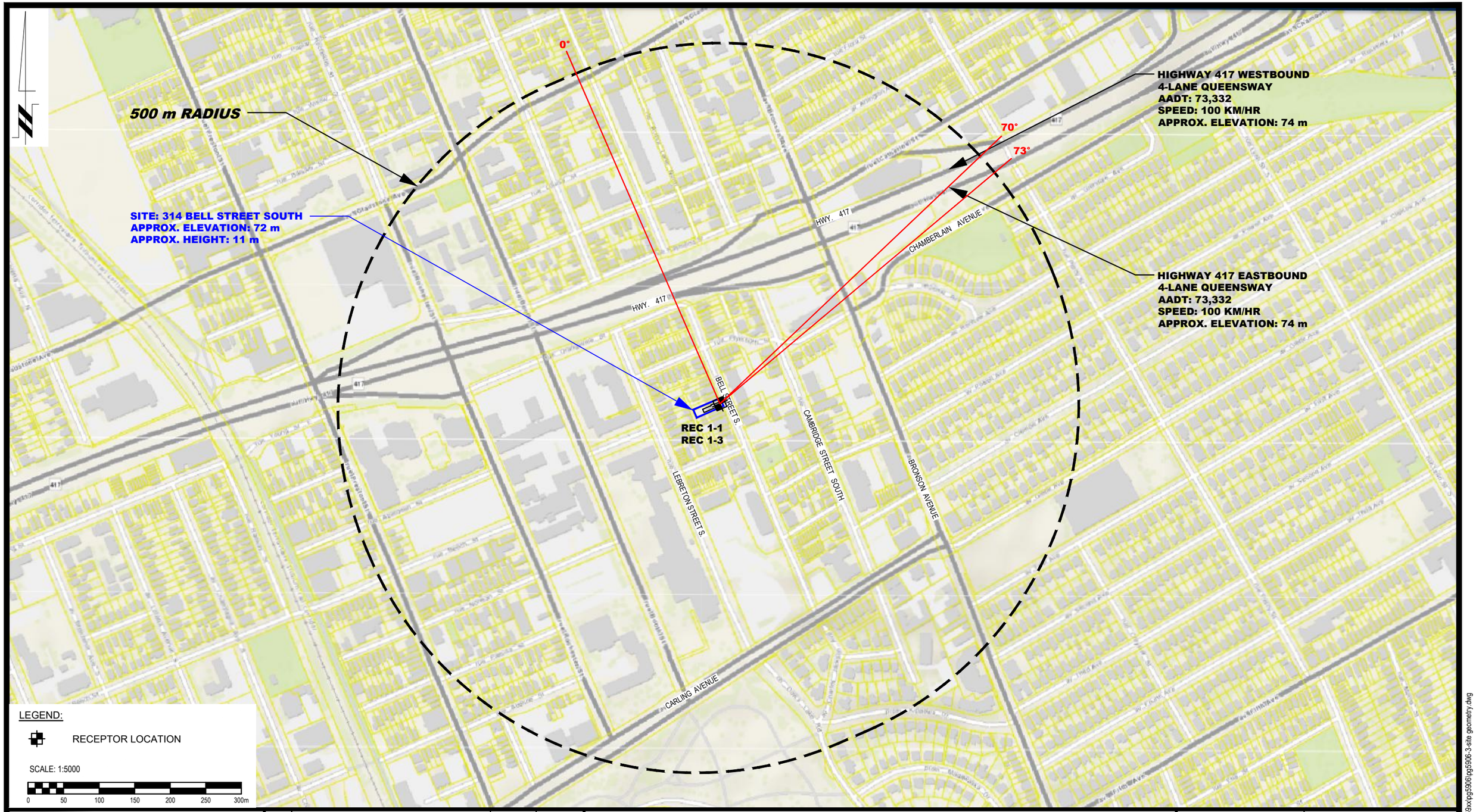

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HAMEL DESIGN & PLANNING
NOISE ATTENUATION STUDY
PROPOSED 3-STOREY APARTMENT BUILDING ADDITION
314 BELL STREET SOUTH
OTTAWA, ONTARIO

Title:
SITE GEOMETRY - REC 1-1 AND REC 1-3

Scale: 1:5000	Date: 07/2021
Drawn by: YA	Report No.: PG5906-1
Checked by: YT	Dwg. No.: PG5906-3A
Approved by: SB	Revision No.:

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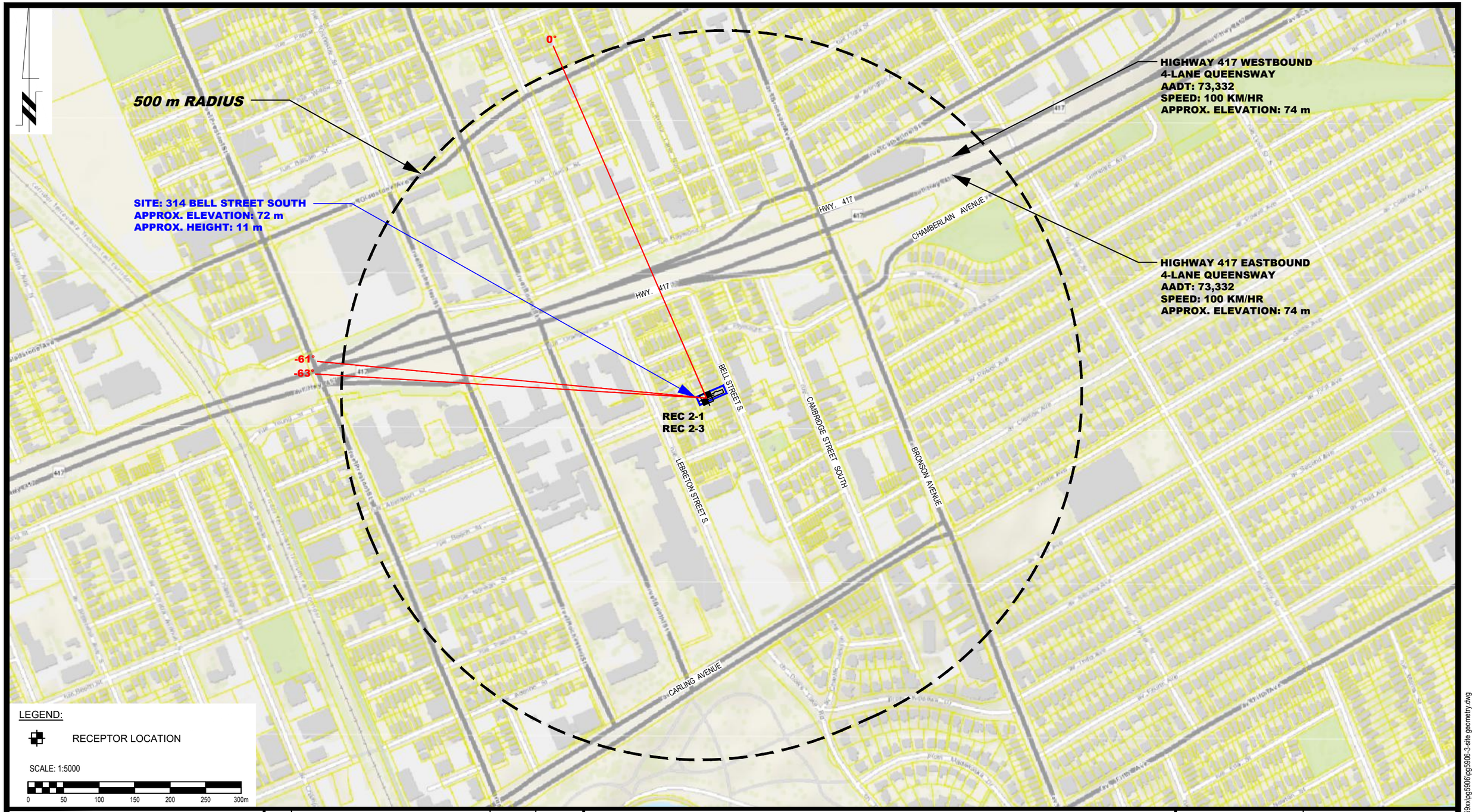

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NOISE ATTENUATION STUDY
PROPOSED 3-STOREY APARTMENT BUILDING ADDITION
314 BELL STREET SOUTH
OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 2-1 AND REC 2-3

Scale: 1:5000	Date: 07/2021
Drawn by: YA	Report No.: PG5906-1
Checked by: YT	Dwg. No.: PG5906-3B
Approved by: SB	Revision No.:

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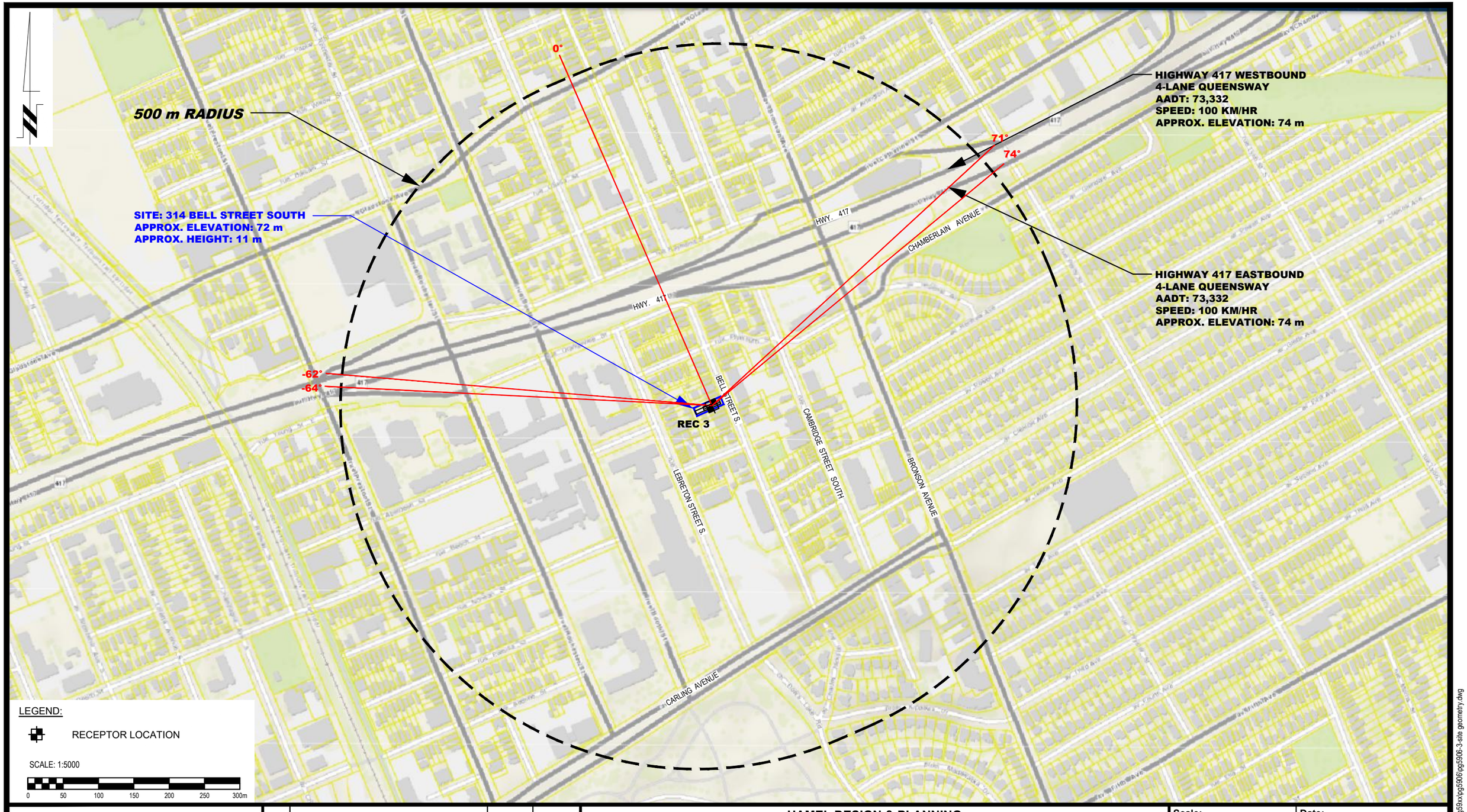

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314 BELL STREET SOUTH
OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 3

Scale: 1:5000	Date: 07/2021
Drawn by: YA	Report No.: PG5906-1
Checked by: YT	Dwg. No.: PG5906-3C
Approved by: SB	Revision No.:

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APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 19-07-2021 13:12:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Time Period: Day/Night 16/8 hours
Description: Receptor Point 1-1

Road data, segment # 1: Hwy 417 East (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332
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: Hwy 417 East (day/night)

Angle1 Angle2 : 0.00 deg 73.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 200.00 / 200.00 m
Receiver height : 2.50 / 2.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 73.00 deg
Barrier height : 1.00 m
Barrier receiver distance : 198.00 / 198.00 m
Source elevation : 74.00 m
Receiver elevation : 72.00 m
Barrier elevation : 74.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h

```
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  73332
    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: Hwy 417 West (day/night)
--------------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 210.00 / 210.00 m
Receiver height           :   2.50 / 2.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 70.00 deg
Barrier height            :   1.00 m
Barrier receiver distance : 208.00 / 208.00 m
Source elevation          :  74.00 m
Receiver elevation        :  72.00 m
Barrier elevation         :  74.00 m
Reference angle           :   0.00

↟
Results segment # 1: Hwy 417 East (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 !        2.50 !        1.49 !        75.49

ROAD (0.00 + 52.04 + 0.00) = 52.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     73   0.63  81.40   0.00 -18.34  -4.75   0.00  -6.27   0.00  52.04
     0     73   0.57  81.40   0.00 -17.66  -4.68   0.00   0.00  -1.90  57.15*
     0     73   0.63  81.40   0.00 -18.34  -4.75   0.00   0.00   0.00  58.31
-------------------------------------------------------------------------------
```

 * Bright Zone !

Segment Leq : 52.04 dBA

Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	2.50	1.49	75.49

ROAD (0.00 + 51.60 + 0.00) = 51.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.63	81.40	0.00	-18.68	-4.86	0.00	-6.25	0.00	51.60
0	70	0.57	81.40	0.00	-18.00	-4.79	0.00	0.00	-1.83	56.78*
0	70	0.63	81.40	0.00	-18.68	-4.86	0.00	0.00	0.00	57.85

 * Bright Zone !

Segment Leq : 51.60 dBA

Total Leq All Segments: 54.84 dBA

Results segment # 1: Hwy 417 East (night)

Source height = 1.49 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.49	2.50	1.48	75.48

ROAD (0.00 + 44.44 + 0.00) = 44.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	73	0.63	73.80	0.00	-18.34	-4.75	0.00	-6.27	0.00	44.44
0	73	0.57	73.80	0.00	-17.66	-4.68	0.00	0.00	-1.91	49.54*

```
     0     73   0.63  73.80   0.00 -18.34  -4.75   0.00   0.00   0.00  50.71
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 44.44 dBA

↟
Results segment # 2: Hwy 417 West (night)
----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !        2.50 !        1.49 !        75.49

ROAD (0.00 + 44.01 + 0.00) = 44.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     70   0.63  73.80   0.00 -18.68  -4.86   0.00  -6.25   0.00  44.01
     0     70   0.57  73.80   0.00 -18.00  -4.79   0.00   0.00  -1.84  49.18*
     0     70   0.63  73.80   0.00 -18.68  -4.86   0.00   0.00   0.00  50.26
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 44.01 dBA

Total Leq All Segments: 47.24 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 54.84
                           (NIGHT): 47.24
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 19-07-2021 13:50:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec13.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 1-3

Road data, segment # 1: Hwy 417 East (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332
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: Hwy 417 East (day/night)

Angle1 Angle2 : 0.00 deg 73.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 200.00 / 200.00 m
Receiver height : 8.50 / 8.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 73.00 deg
Barrier height : 1.00 m
Barrier receiver distance : 198.00 / 198.00 m
Source elevation : 74.00 m
Receiver elevation : 72.00 m
Barrier elevation : 74.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h

```
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  73332
    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: Hwy 417 West (day/night)
--------------------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 210.00 / 210.00 m
Receiver height           :   8.50 / 8.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 70.00 deg
Barrier height            :   1.00 m
Barrier receiver distance : 208.00 / 208.00 m
Source elevation          :  74.00 m
Receiver elevation        :  72.00 m
Barrier elevation         :  74.00 m
Reference angle           :   0.00

↟
Results segment # 1: Hwy 417 East (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 !        8.50 !        1.55 !        75.55

ROAD (0.00 + 54.28 + 0.00) = 54.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     73   0.45  81.40   0.00 -16.31  -4.53   0.00  -6.27   0.00  54.28
     0     73   0.39  81.40   0.00 -15.64  -4.46   0.00   0.00  -0.97  60.33*
     0     73   0.45  81.40   0.00 -16.31  -4.53   0.00   0.00   0.00  60.55
-------------------------------------------------------------------------------
```

 * Bright Zone !

Segment Leq : 54.28 dBA

↟
Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	8.50	1.54	75.54

ROAD (0.00 + 53.87 + 0.00) = 53.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.45	81.40	0.00	-16.62	-4.66	0.00	-6.25	0.00	53.87
0	70	0.39	81.40	0.00	-15.93	-4.59	0.00	0.00	-0.91	59.97*
0	70	0.45	81.40	0.00	-16.62	-4.66	0.00	0.00	0.00	60.12

 * Bright Zone !

Segment Leq : 53.87 dBA

Total Leq All Segments: 57.09 dBA

↟
Results segment # 1: Hwy 417 East (night)

Source height = 1.49 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.49	8.50	1.54	75.54

ROAD (0.00 + 46.69 + 0.00) = 46.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	73	0.45	73.80	0.00	-16.31	-4.53	0.00	-6.27	0.00	46.69
0	73	0.39	73.80	0.00	-15.64	-4.46	0.00	0.00	-0.97	52.73*

```
     0     73   0.45  73.80   0.00 -16.31  -4.53   0.00   0.00   0.00  52.95
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 46.69 dBA

↟
Results segment # 2: Hwy 417 West (night)
----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !        8.50 !        1.54 !        75.54

ROAD (0.00 + 46.27 + 0.00) = 46.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     70   0.45  73.80   0.00 -16.62  -4.66   0.00  -6.25   0.00  46.27
     0     70   0.39  73.80   0.00 -15.93  -4.59   0.00   0.00  -0.91  52.37*
     0     70   0.45  73.80   0.00 -16.62  -4.66   0.00   0.00   0.00  52.52
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 46.27 dBA

Total Leq All Segments: 49.50 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 57.09
                           (NIGHT): 49.50
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 19-07-2021 13:56:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec21.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 2-1

Road data, segment # 1: Hwy 417 East (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332
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: Hwy 417 East (day/night)

Angle1 Angle2 : -63.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 250.00 / 250.00 m
Receiver height : 2.50 / 2.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -63.00 deg Angle2 : 0.00 deg
Barrier height : 1.00 m
Barrier receiver distance : 248.00 / 248.00 m
Source elevation : 74.00 m
Receiver elevation : 72.00 m
Barrier elevation : 74.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h

```
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  73332
    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: Hwy 417 West (day/night)
--------------------------------------------
Angle1   Angle2           : -61.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 260.00 / 260.00 m
Receiver height           :   2.50 / 2.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -61.00 deg   Angle2 : 0.00 deg
Barrier height            :   1.00 m
Barrier receiver distance : 258.00 / 258.00 m
Source elevation          :  74.00 m
Receiver elevation        :  72.00 m
Barrier elevation         :  74.00 m
Reference angle           :   0.00

♠
Results segment # 1: Hwy 417 East (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 !        2.50 !        1.49 !        75.49

ROAD (0.00 + 50.13 + 0.00) = 50.13 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -63      0   0.63  81.40   0.00 -19.92  -5.16   0.00  -6.19   0.00  50.13
   -63      0   0.57  81.40   0.00 -19.18  -5.10   0.00   0.00  -1.65  55.46*
   -63      0   0.63  81.40   0.00 -19.92  -5.16   0.00   0.00   0.00  56.32
-------------------------------------------------------------------------------
```

```
 * Bright Zone !

Segment Leq : 50.13 dBA

↟
Results segment # 2: Hwy 417 West (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 !        2.50 !        1.49 !        75.49

ROAD (0.00 + 49.76 + 0.00) = 49.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -61      0   0.63  81.40   0.00 -20.20  -5.26   0.00  -6.18   0.00  49.76
   -61      0   0.57  81.40   0.00 -19.45  -5.21   0.00   0.00  -1.60  55.14*
   -61      0   0.63  81.40   0.00 -20.20  -5.26   0.00   0.00   0.00  55.94
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.76 dBA

Total Leq All Segments: 52.96 dBA

↟
Results segment # 1: Hwy 417 East (night)
-----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !        2.50 !        1.49 !        75.49

ROAD (0.00 + 42.53 + 0.00) = 42.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -63      0   0.63  73.80   0.00 -19.92  -5.16   0.00  -6.19   0.00  42.53
   -63      0   0.57  73.80   0.00 -19.18  -5.10   0.00   0.00  -1.66  47.85*
```

```
   -63      0   0.63  73.80   0.00 -19.92  -5.16   0.00   0.00   0.00  48.72
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 42.53 dBA

↟
Results segment # 2: Hwy 417 West (night)
----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !        2.50 !        1.49 !        75.49

ROAD (0.00 + 42.16 + 0.00) = 42.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -61      0   0.63  73.80   0.00 -20.20  -5.26   0.00  -6.18   0.00  42.16
   -61      0   0.57  73.80   0.00 -19.45  -5.21   0.00   0.00  -1.60  47.54*
   -61      0   0.63  73.80   0.00 -20.20  -5.26   0.00   0.00   0.00  48.35
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 42.16 dBA

Total Leq All Segments: 45.36 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 52.96
                           (NIGHT): 45.36
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 19-07-2021 14:15:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec23.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 2-3

Road data, segment # 1: Hwy 417 East (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332
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: Hwy 417 East (day/night)

Angle1 Angle2 : -63.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 250.00 / 250.00 m
Receiver height : 8.50 / 8.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -63.00 deg Angle2 : 0.00 deg
Barrier height : 1.00 m
Barrier receiver distance : 248.00 / 248.00 m
Source elevation : 74.00 m
Receiver elevation : 72.00 m
Barrier elevation : 74.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h

```
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  73332
    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: Hwy 417 West (day/night)
--------------------------------------------
Angle1   Angle2           : -61.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 260.00 / 260.00 m
Receiver height           :   8.50 / 8.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -61.00 deg   Angle2 : 0.00 deg
Barrier height            :   1.00 m
Barrier receiver distance : 258.00 / 258.00 m
Source elevation          :  74.00 m
Receiver elevation        :  72.00 m
Barrier elevation         :  74.00 m
Reference angle           :   0.00

♠
Results segment # 1: Hwy 417 East (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 !        8.50 !        1.54 !        75.54

ROAD (0.00 + 52.49 + 0.00) = 52.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -63      0   0.45  81.40   0.00 -17.72  -5.00   0.00  -6.19   0.00  52.49
   -63      0   0.39  81.40   0.00 -16.99  -4.94   0.00   0.00  -0.80  58.67*
   -63      0   0.45  81.40   0.00 -17.72  -5.00   0.00   0.00   0.00  58.68
-------------------------------------------------------------------------------
```

```
 * Bright Zone !

Segment Leq : 52.49 dBA

↟
Results segment # 2: Hwy 417 West (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 !        8.50 !        1.53 !        75.53

ROAD (0.00 + 52.14 + 0.00) = 52.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -61      0   0.45  81.40   0.00 -17.97  -5.10   0.00  -6.18   0.00  52.14
   -61      0   0.39  81.40   0.00 -17.22  -5.05   0.00   0.00  -0.76  58.36*
   -61      0   0.45  81.40   0.00 -17.97  -5.10   0.00   0.00   0.00  58.33
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 52.14 dBA

Total Leq All Segments: 55.33 dBA

↟
Results segment # 1: Hwy 417 East (night)
-----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !        8.50 !        1.53 !        75.53

ROAD (0.00 + 44.89 + 0.00) = 44.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -63      0   0.45  73.80   0.00 -17.72  -5.00   0.00  -6.19   0.00  44.89
   -63      0   0.39  73.80   0.00 -16.99  -4.94   0.00   0.00  -0.80  51.07*
```

```
   -63      0   0.45  73.80   0.00 -17.72  -5.00   0.00   0.00   0.00  51.09
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 44.89 dBA

↟
Results segment # 2: Hwy 417 West (night)
----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !        8.50 !        1.53 !        75.53

ROAD (0.00 + 44.55 + 0.00) = 44.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -61      0   0.45  73.80   0.00 -17.97  -5.10   0.00  -6.18   0.00  44.55
   -61      0   0.39  73.80   0.00 -17.22  -5.05   0.00   0.00  -0.76  50.76*
   -61      0   0.45  73.80   0.00 -17.97  -5.10   0.00   0.00   0.00  50.73
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 44.55 dBA

Total Leq All Segments: 47.73 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 55.33
                           (NIGHT): 47.73
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 19-07-2021 17:13:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec3.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 3

Road data, segment # 1: Hwy 417 East (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332
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: Hwy 417 East (day/night)

Angle1 Angle2 : -64.00 deg 74.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 260.00 / 260.00 m
Receiver height : 12.50 / 12.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -64.00 deg Angle2 : 74.00 deg
Barrier height : 11.00 m
Barrier receiver distance : 13.00 / 13.00 m
Source elevation : 74.00 m
Receiver elevation : 72.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h

```
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  73332
    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: Hwy 417 West (day/night)
-----------------------------------------------
Angle1   Angle2           : -62.00 deg   71.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 270.00 / 270.00 m
Receiver height           :  12.50 / 12.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -62.00 deg   Angle2 : 71.00 deg
Barrier height            :  11.00 m
Barrier receiver distance :  13.00 / 13.00  m
Source elevation          :  74.00 m
Receiver elevation        :  72.00 m
Barrier elevation         :  72.00 m
Reference angle           :   0.00

♠
Results segment # 1: Hwy 417 East (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 !       12.50 !       12.05 !        84.05

ROAD (0.00 + 57.17 + 0.00) = 57.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -64     74   0.33  81.40   0.00 -16.48  -1.56   0.00  -6.18   0.00  57.17
   -64     74   0.00  81.40   0.00 -12.39  -1.15   0.00   0.00  -2.78  65.07*
   -64     74   0.33  81.40   0.00 -16.48  -1.56   0.00   0.00   0.00  63.35
-------------------------------------------------------------------------------
```

 * Bright Zone !

Segment Leq : 57.17 dBA

↟
Results segment # 2: Hwy 417 West (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	12.50	12.07	84.07

ROAD (0.00 + 56.84 + 0.00) = 56.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-62	71	0.33	81.40	0.00	-16.70	-1.69	0.00	-6.18	0.00	56.84
-62	71	0.00	81.40	0.00	-12.55	-1.31	0.00	0.00	-2.65	64.88*
-62	71	0.33	81.40	0.00	-16.70	-1.69	0.00	0.00	0.00	63.01

 * Bright Zone !

Segment Leq : 56.84 dBA

Total Leq All Segments: 60.02 dBA

↟
Results segment # 1: Hwy 417 East (night)

Source height = 1.49 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.49	12.50	12.05	84.05

ROAD (0.00 + 49.57 + 0.00) = 49.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-64	74	0.33	73.80	0.00	-16.48	-1.56	0.00	-6.18	0.00	49.57
-64	74	0.00	73.80	0.00	-12.39	-1.15	0.00	0.00	-2.78	57.48*

```
   -64     74   0.33  73.80   0.00 -16.48  -1.56   0.00   0.00   0.00  55.76
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.57 dBA

↑
Results segment # 2: Hwy 417 West (night)
----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !       12.50 !       12.07 !        84.07

ROAD (0.00 + 49.24 + 0.00) = 49.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -62     71   0.33  73.80   0.00 -16.70  -1.69   0.00  -6.18   0.00  49.24
   -62     71   0.00  73.80   0.00 -12.55  -1.31   0.00   0.00  -2.65  57.28*
   -62     71   0.33  73.80   0.00 -16.70  -1.69   0.00   0.00   0.00  55.41
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.24 dBA

Total Leq All Segments: 52.42 dBA

↑



TOTAL Leq FROM ALL SOURCES (DAY): 60.02
                           (NIGHT): 52.42
↑
↑
```

STAMSON 5.0 NORMAL REPORT Date: 19-07-2021 17:12:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec3tr.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 3tr

Road data, segment # 1: Hwy 417 East (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 73332
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: Hwy 417 East (day/night)

Angle1 Angle2 : -64.00 deg 74.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 260.00 / 260.00 m
Receiver height : 12.50 / 12.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -64.00 deg Angle2 : 74.00 deg
Barrier height : 12.00 m
Barrier receiver distance : 13.00 / 13.00 m
Source elevation : 74.00 m
Receiver elevation : 72.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Hwy 417 West (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 km/h

```
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  73332
    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: Hwy 417 West (day/night)
-----------------------------------------------
Angle1   Angle2           : -62.00 deg   71.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      3 / 3
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 270.00 / 270.00 m
Receiver height           :  12.50 / 12.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -62.00 deg   Angle2 : 71.00 deg
Barrier height            :  12.00 m
Barrier receiver distance :  13.00 / 13.00  m
Source elevation          :  74.00 m
Receiver elevation        :  72.00 m
Barrier elevation         :  72.00 m
Reference angle           :   0.00

♠
Results segment # 1: Hwy 417 East (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 !       12.50 !       12.05 !        84.05

ROAD (0.00 + 57.17 + 0.00) = 57.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -64     74   0.33  81.40   0.00 -16.48  -1.56   0.00  -6.18   0.00  57.17
   -64     74   0.00  81.40   0.00 -12.39  -1.15   0.00   0.00  -5.00  62.86*
   -64     74   0.33  81.40   0.00 -16.48  -1.56   0.00   0.00   0.00  63.35
-------------------------------------------------------------------------------
```

```
 * Bright Zone !

Segment Leq : 57.17 dBA

↟
Results segment # 2: Hwy 417 West (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 !       12.50 !       12.07 !        84.07

ROAD (0.00 + 56.84 + 0.00) = 56.84 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -62     71   0.33  81.40   0.00 -16.70  -1.69   0.00  -6.18   0.00  56.84
   -62     71   0.00  81.40   0.00 -12.55  -1.31   0.00   0.00  -4.99  62.54*
   -62     71   0.33  81.40   0.00 -16.70  -1.69   0.00   0.00   0.00  63.01
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 56.84 dBA

Total Leq All Segments: 60.02 dBA

↟
Results segment # 1: Hwy 417 East (night)
-----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !       12.50 !       12.05 !        84.05

ROAD (0.00 + 49.57 + 0.00) = 49.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -64     74   0.33  73.80   0.00 -16.48  -1.56   0.00  -6.18   0.00  49.57
   -64     74   0.00  73.80   0.00 -12.39  -1.15   0.00   0.00  -5.00  55.26*
```

```
   -64     74   0.33  73.80   0.00 -16.48  -1.56   0.00   0.00   0.00  55.76
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.57 dBA

↑
Results segment # 2: Hwy 417 West (night)
----------------------------------------

Source height = 1.49 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.49 !       12.50 !       12.07 !        84.07

ROAD (0.00 + 49.24 + 0.00) = 49.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
   -62     71   0.33  73.80   0.00 -16.70  -1.69   0.00  -6.18   0.00  49.24
   -62     71   0.00  73.80   0.00 -12.55  -1.31   0.00   0.00  -4.99  54.94*
   -62     71   0.33  73.80   0.00 -16.70  -1.69   0.00   0.00   0.00  55.41
--------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 49.24 dBA

Total Leq All Segments: 52.42 dBA

↑



TOTAL Leq FROM ALL SOURCES (DAY): 60.02
                           (NIGHT): 52.42
↑
↑
```