Geotechnical Engineering

Environmental Engineering

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Noise and Vibration Studies

patersongroup

Environmental Noise Control Study

Proposed Multi-Storey Residential Building
817 Roseview Avenue, Ottawa

Prepared For

Ottawa General Contractors Limited

.

August 10, 2021

Report: PG5898-1

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1.0 Introduction

Paterson Group (Paterson) was commissioned by Ottawa General Contractors Limited to conduct an environmental noise control study for the proposed multi-storey residential building to be located at 817 Roseview Avenue, 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 Background

It is understood that the proposed project will consist of a four storey residential building. Associated at-grade parking areas and landscaped areas and a roof top patio are also anticipated.

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 - Sound Level Limits for Outdoor Living Areas

Time Period	Required $L_{eq(16)}$ (dBA)
16-hour, 7:00-23:00	55

- Standards taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas - Road and Rail

Table 2 - Sound Level Limits for Indoor Living Area			
Type of Space	**Time Period**	**Required L_{eq} (dBA)**	
		Road	**Rail**
Living/Dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc	7:00-23:00	45	40
Theaters, place of worship, libraries, individual or semi-private offices, conference rooms, reading rooms	23:00-7:00	45	40
Sleeping quarters	7:00-23:00	45	40
	23:00-7:00	40	35
❑ Standards taken from Table 2.2b; Sound Level Limit for Indoor Living Areas - Road and Rail			

It is noted in ENCG that the limits outlined in Table 2 are for the sound levels on the interior of the glass pane. The ENCG further goes on to state that the 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 is bordered to the north by a parking lot and a commercial building followed by Carling Avenue, to the east by Michele Park, to the west by Roseview Avenue followed by a parking lot and an institutional building and to the south by residential dwellings. Carling Avenue and Roseview Avenue are identified within the 100 m radius of proposed development.

Based on the City of Ottawa Official Plan, Schedule F, Carling Avenue is considered a 4 lane urban arterial road divided (4-UAD). Other 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.

All noise sources are presented in Drawing PG5898-3 - 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 class. 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

Road	Implied Roadway	AADT (Veh/day)	Posted Speed (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Carling Avenue	4-UAD	35000	60	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.

Table 5 - Elevation of Reception Points			
Floor Number	**Elevation at Centre of Window (m)**	**Floor Use**	**Daytime/Nighttime Analysis**
Ground Floor	1.5	Living Area/Bedroom	daytime/nighttime
Fourth Floor	10.5	Living Area/Bedroom	daytime/nighttime
Rooftop	13.5	--	Outdoor Living Area

For this analysis, a reception point was taken at the centre of each floor, at the ground floor and top floor. An outdoor living area (a rooftop patio) is anticipated for the proposed building. A reception point in the centre of rooftop, 13.5 m high, was selected for the analysis of this area. Reception points are detailed on Drawing PG5898-2 - 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 roadways were analyzed where they intersected the 100 m buffer zone, which is reflected in the local angles described in Paterson Drawings PG5898-3A to 3D - 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 100 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

The primary descriptors are the 16-hour daytime and the 8-hour night time equivalent sound levels, $L_{eq(16)}$ and the $L_{eq(8)}$ for City roads.

The proposed traffic noise levels were analyzed at all reception points. The results of the STAMSON software can be located in Appendix 2, and the summary of the results can be noted in Table 6.

Table 6 - Proposed Noise Levels

Reception Point	Description	OLA (dBA)	Daytime at Facade $L_{EQ(16)}$ (dBA)	Nighttime at Facade $L_{eq(8)}$ (dBA)
REC 1-1	Eastern Elevation, 1st Floor	--	53.77	46.18
REC 1-4	Eastern Elevation, 4th Floor	--	55.92	48.32
REC 2-1	Northern Elevation, 1st Floor	--	58.90	51.30
REC 2-4	Northern Elevation, 4th Floor	--	61.04	53.44
REC 3-1	Western Elevation, 1st Floor	--	56.66	49.07
REC 3-4	Western Elevation, 4th Floor	--	58.75	51.15
REC 4	Rooftop Patio	61.24	--	--

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

A roof top patio was identified in the centre of the proposed building. One (1) receptor point was selected for the analysis at outdoor living area (REC 4). It is assumed that the roof top patio will only be utilized as an outdoor living area provided that the proposed building is constructed. The proposed $L_{eq(16)}$ at the roof top patio will be 61.24 dBA, which exceeds the 55 dBA threshold value specified by the MOECC.

The outdoor living area was designed as a roof top patio, which will increase the total distance between the noise and receptor points. It is also noted that the exterior cladding of the building will act as a noise barrier, providing noise relief to the roof top patio. Utilizing the exterior of the building as a barrier, including a 1 m solid railing that will extend around the perimeter of the roof top patio, the proposed $L_{eq(16)}$ at the roof top patio will now be 58.69 dBA, which slightly exceeds the 55 dBA threshold value specified by the MOECC and the City of Ottawa. This exceedance 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 indicates that the daytime $L_{eq(16)}$ ranges between 53.77 dBA and 61.04 dBA. The ENCG states that the limits for the exterior of the pane of glass is 55 dBA. This value was exceeded on eastern, northern and western elevations. Therefore, units on the eastern, northern and western elevations should be designed with the provision for a central air conditioning unit. Additionally, warning clause Type C, as outlined in Table 3, is also recommended for all units on the eastern, northern and western elevations. It is also noted that the modeling indicates that the $L_{eq(16)}$ is 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 817 Roseview Avenue, in the City of Ottawa. It is understood that the proposed development will consist of four storey residential building. The associated analysis identified one surface transportation noise source: Carling Avenue.

Several reception points were selected for the analysis, consisting of pane of glass reception points on both the first and top level. The eastern, northern and western elevations of the proposed building exceeded the 55 dBA guideline specified by the ENCG. Therefore, a warning clause Type C will be required for this dwelling in addition to the installation of a central air conditioning unit.

A review of the outdoor living area (rooftop patio) was completed as well. It is assumed that the roof top patio will only be utilized as an outdoor living area provided that the proposed building is constructed. The anticipated noise levels at the outdoor living area would be a slight exceedance of the 55 dBA threshold, and 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 Ottawa General Contractors Limited 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:

- ❑ Ottawa General Contractors Limited (e-mail copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

TABLE 7 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG5898-1 - SITE PLAN

DRAWING PG5898-2 - RECEPTOR LOCATION PLAN

DRAWING PG5898-3 - SITE GEOMETRY

DRAWING PG5898-3A - SITE GEOMETRY (REC 1-1 and REC 1-4)

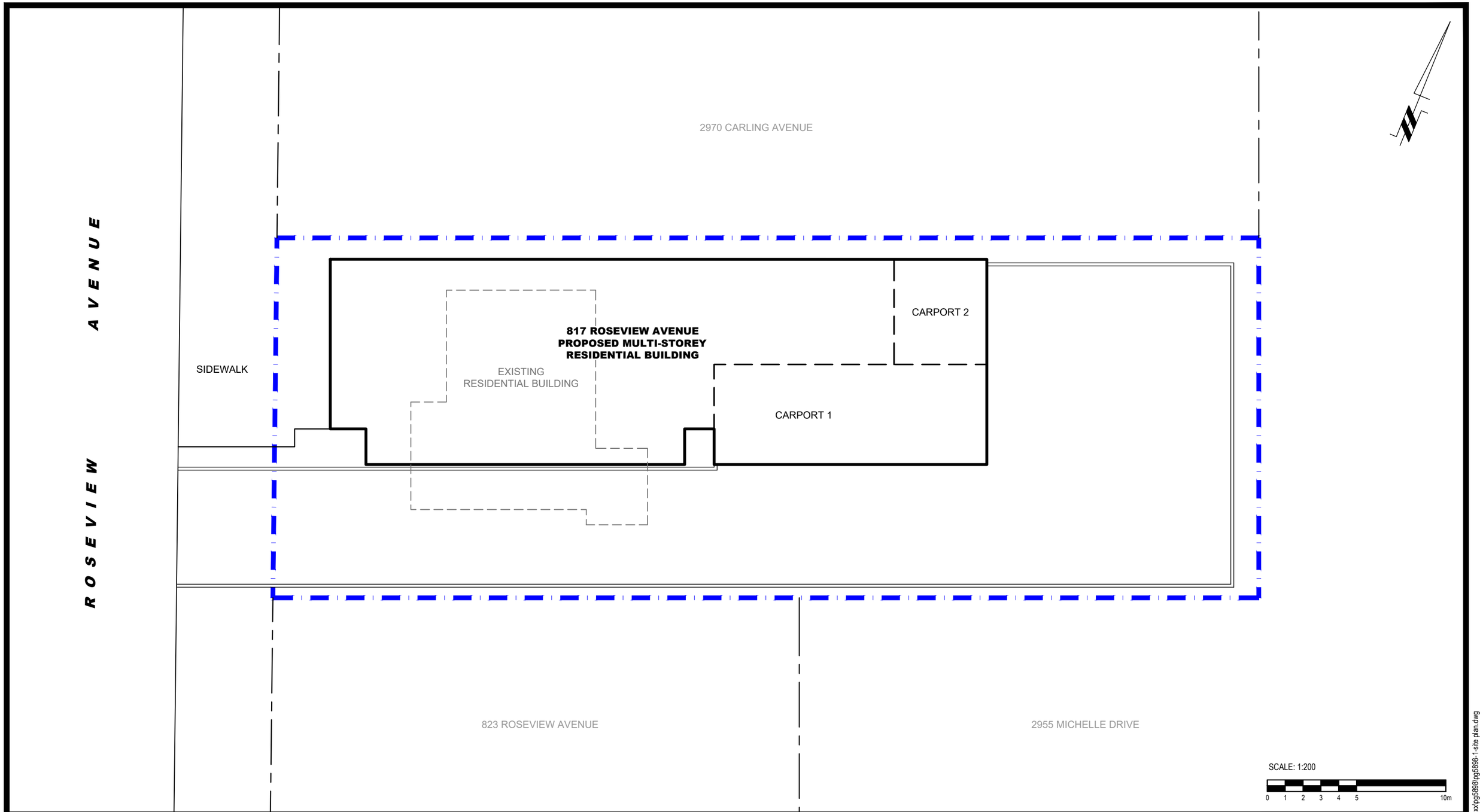
DRAWING PG5898-3B - SITE GEOMETRY (REC 2-1 and REC 2-4)

DRAWING PG5898-3C - SITE GEOMETRY (REC 3-1 and REC 3-4)

DRAWING PG5898-3D - SITE GEOMETRY (REC 4)

Table 7 - Summary of Reception Points and Geometry
817 Roseview Avenue

Point of Reception	Location	Leq Day (dBA)	Carling Avenue					
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)
REC 1-1	Eastern Elevation, 1st Floor	53.77	85	1.5	85.0	0, 43	1	20
REC 1-4	Eastern Elevation, 4th Floor	55.92	85	10.5	85.7	0, 43	1	20
REC 2-1	Northern Elevation, 1st Floor	58.90	75	1.5	75.0	-72, 52	1	20
REC 2-4	Northern Elevation, 4th Floor	61.04	75	10.5	75.7	-72, 52	1	20
REC 3-1	Western Elevation, 1st Floor	56.66	70	1.5	70.0	-67, 0	1	20
REC 3-4	Western Elevation, 4th Floor	58.75	70	10.5	70.8	-67, 0	1	20
REC 4	Rooftop Patio	61.24	80	13.5	81.1	-70, 49	1	20



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NO.	REVISIONS	DATE	INITIAL

OTTAWA GENERAL CONTRACTORS LIMITED
NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
817 ROSEVIEW AVENUE
OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:200	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-1
Approved by: SB	Revision No.:

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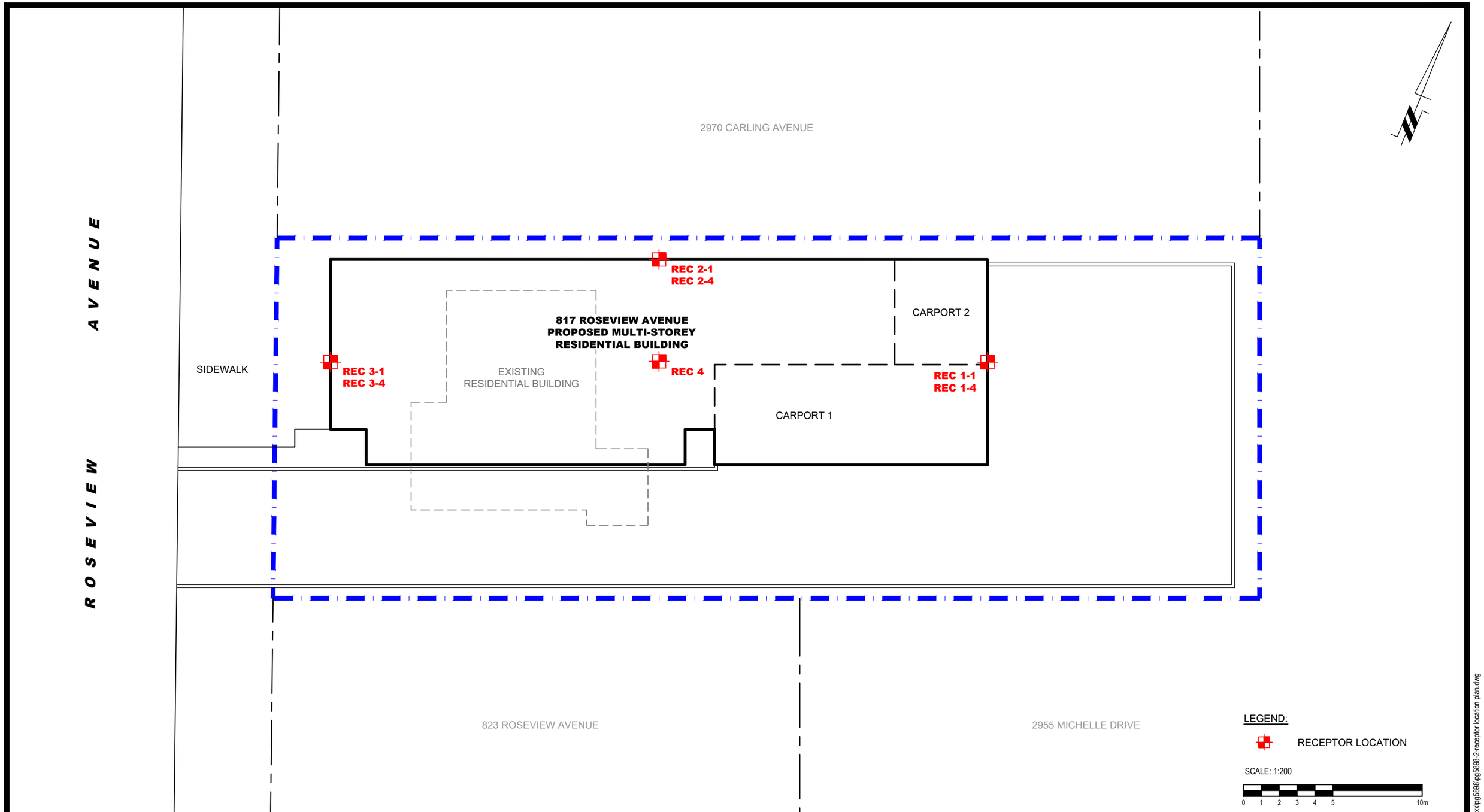

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NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
817 ROSEVIEW AVENUE
OTTAWA, ONTARIO

Title:
RECEPTOR LOCATION PLAN

Scale: 1:200	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-2
Approved by: SB	Revision No.:

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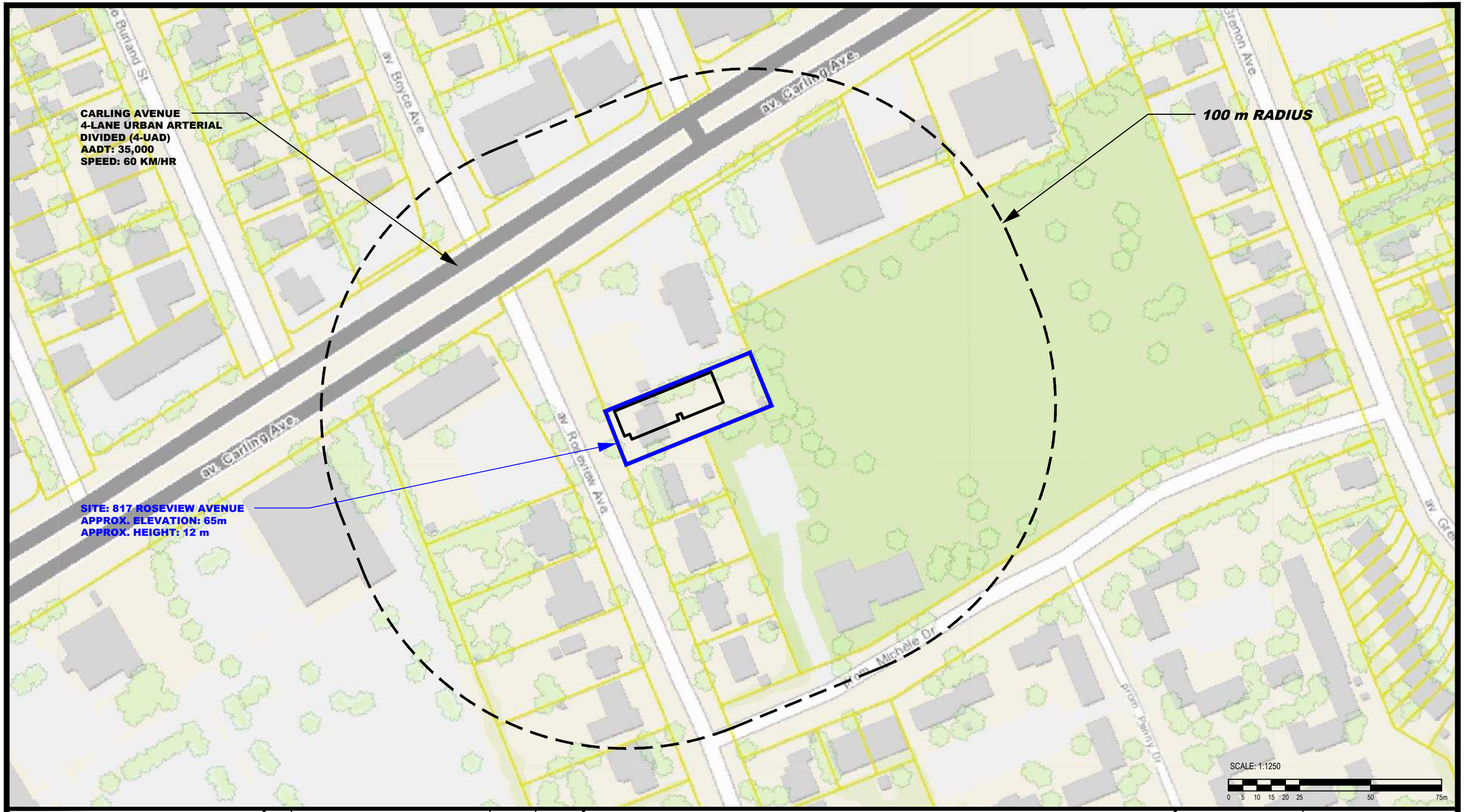

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NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
817 ROSEVIEW AVENUE
OTTAWA, ONTARIO

Title:

SITE GEOMETRY

Scale: 1:1250	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-3
Approved by: SB	Revision No.:

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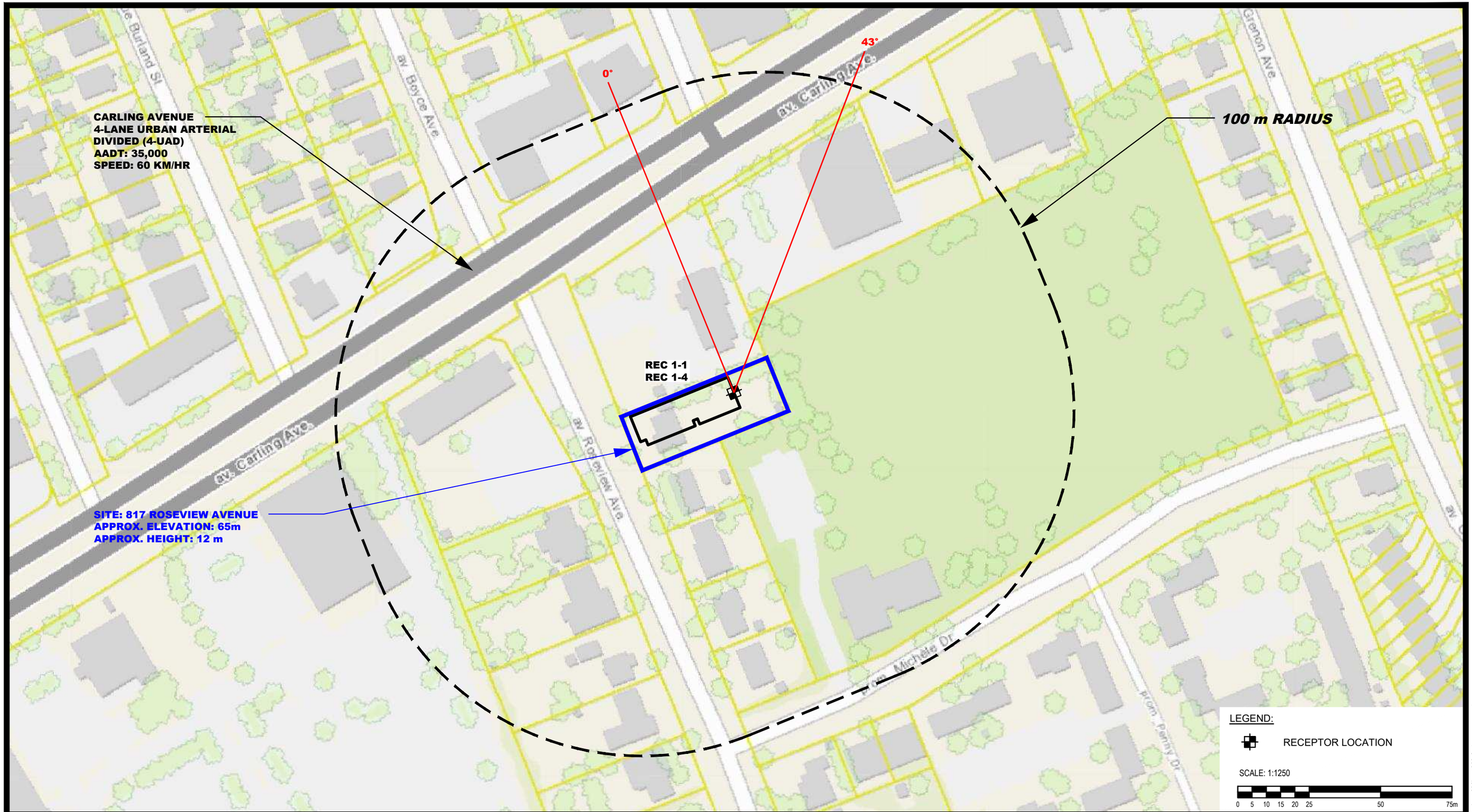

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NO.	REVISIONS	DATE	INITIAL

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NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
817 ROSEVIEW AVENUE
OTTAWA, ONTARIO

Title:
SITE GEOMETRY - REC 1-1 AND REC 1-4

Scale: 1:1250	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-3A
Approved by: SB	Revision No.:

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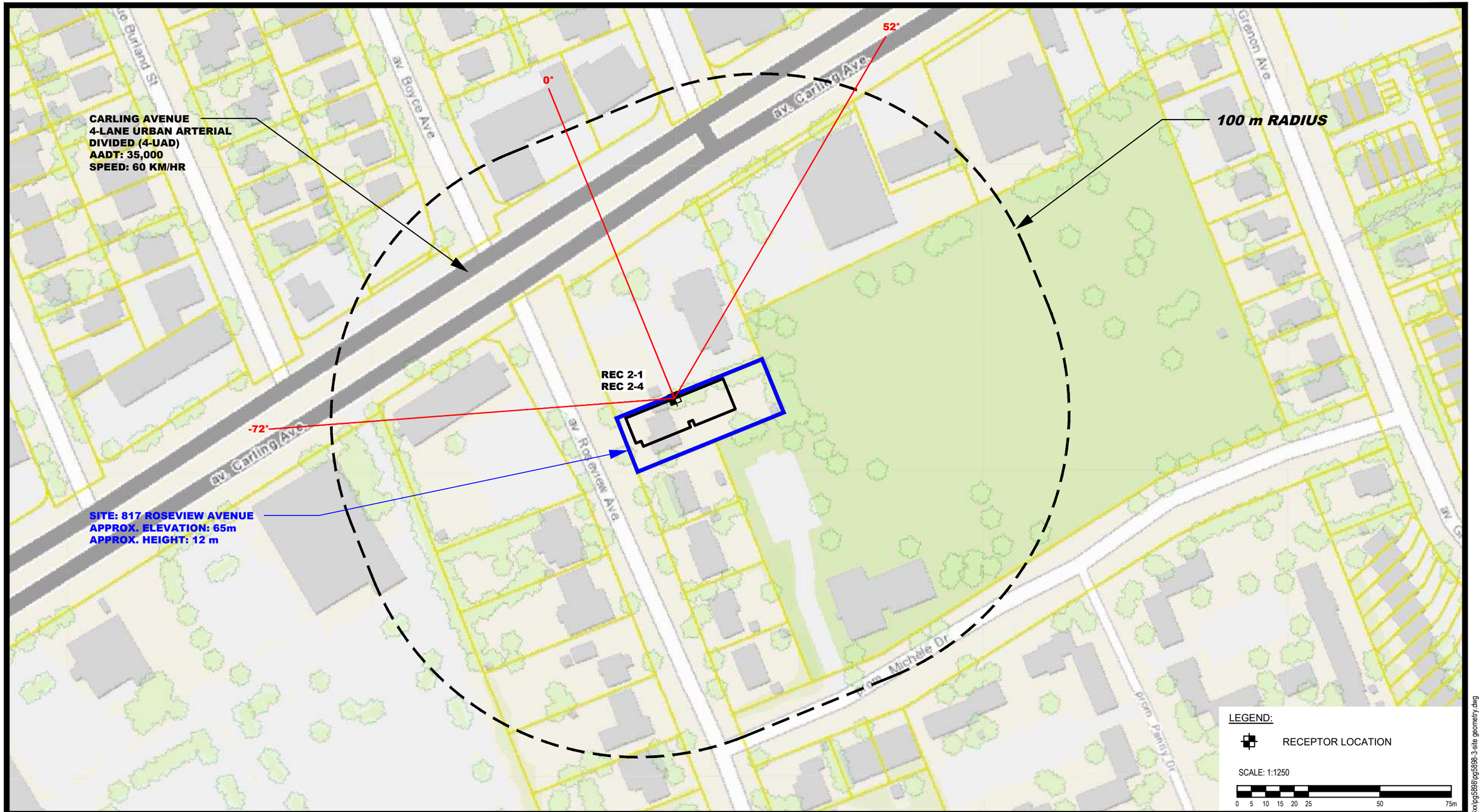

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OTTAWA GENERAL CONTRACTORS LIMITED
NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
817 ROSEVIEW AVENUE
OTTAWA, ONTARIO

Title:
SITE GEOMETRY - REC 2-1 AND REC 2-4

Scale: 1:1250	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-3B
Approved by: SB	Revision No.:

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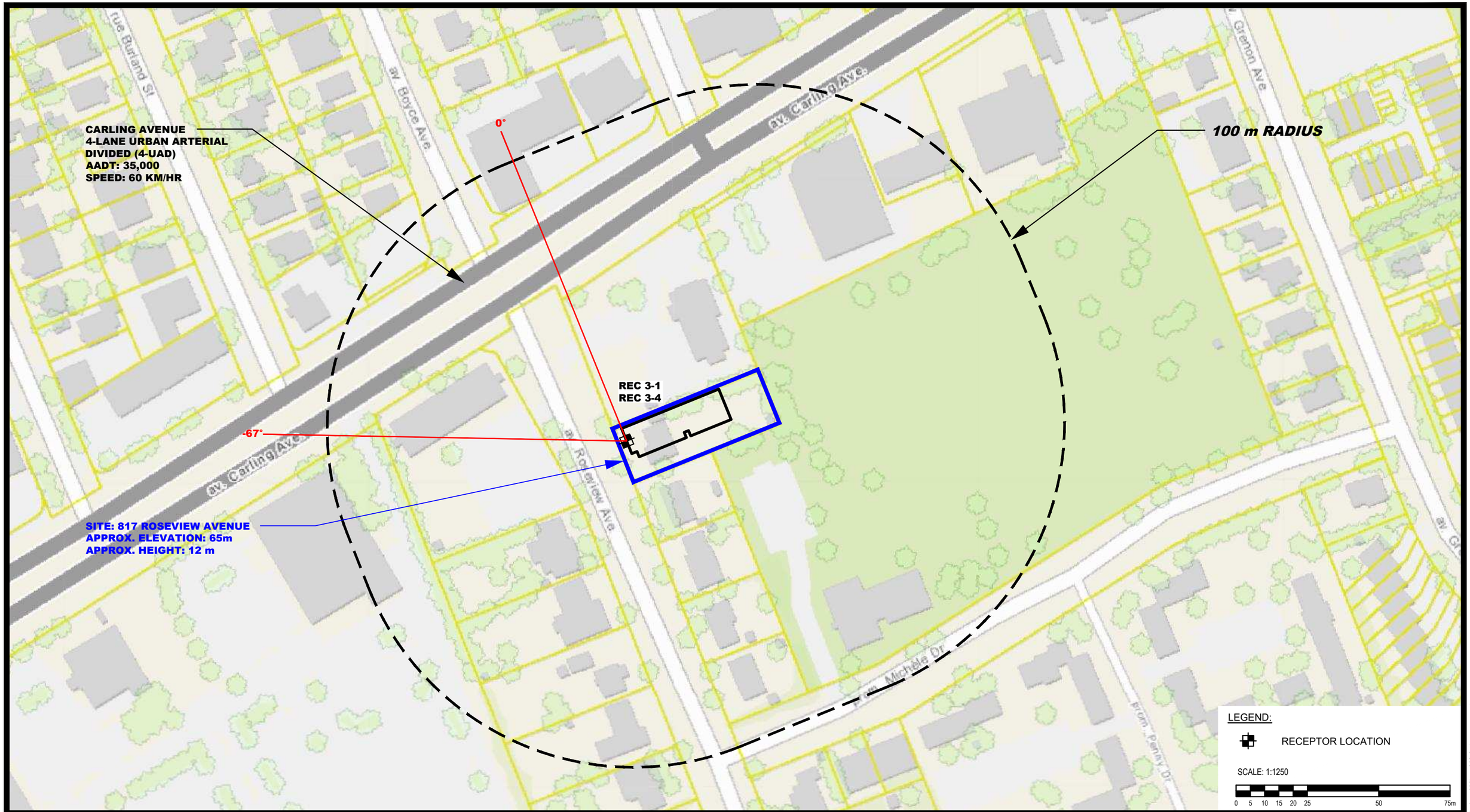

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OTTAWA GENERAL CONTRACTORS LIMITED
NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
817 ROSEVIEW AVENUE
OTTAWA, ONTARIO

Title:
SITE GEOMETRY - REC 3-1 AND REC 3-4

Scale: 1:1250	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-3C
Approved by: SB	Revision No.:

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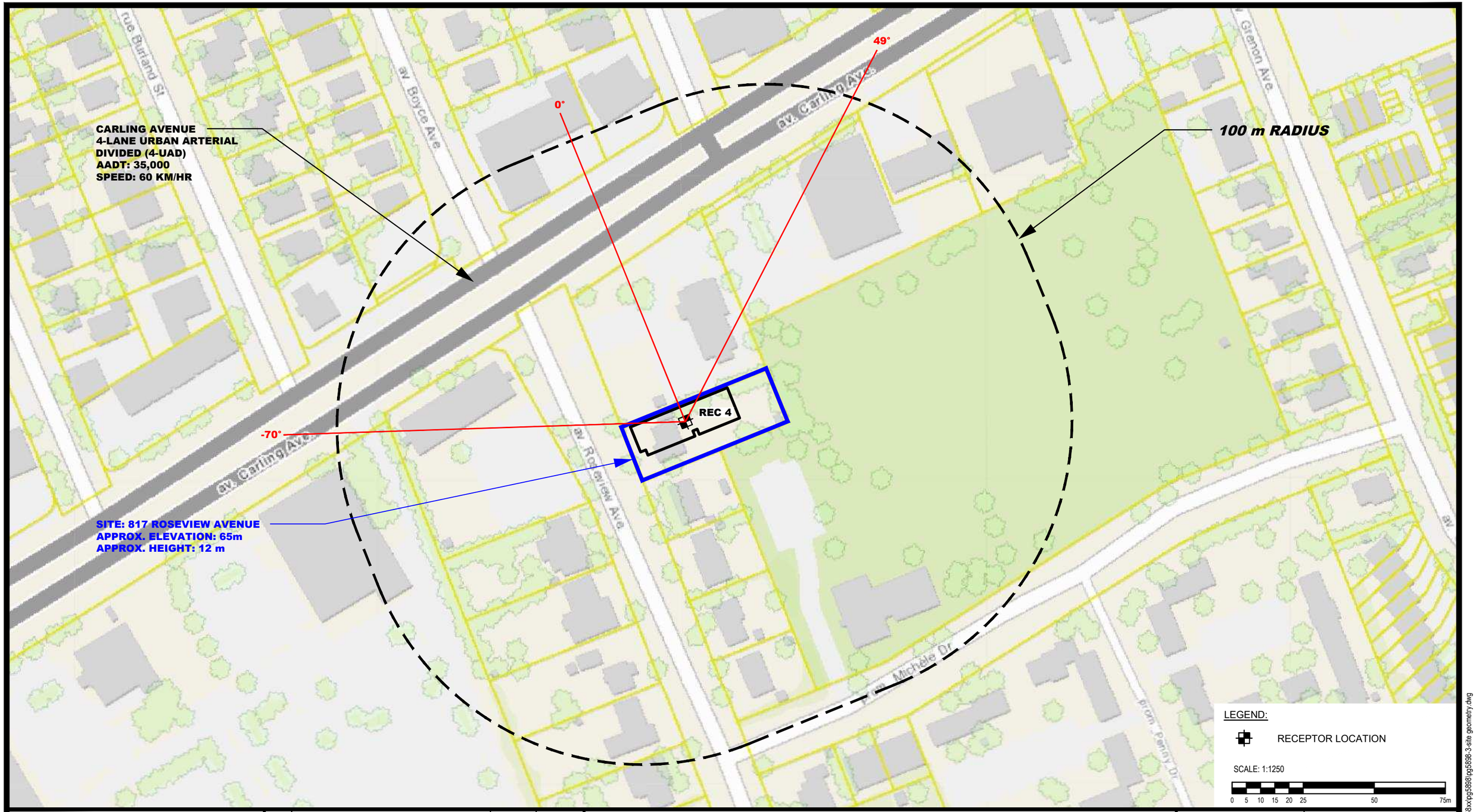

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PROPOSED MULTI-STOREY RESIDENTIAL BUILDING
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OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 4

Scale: 1:1250	Date: 06/2021
Drawn by: YA	Report No.: PG5898-1
Checked by: YT	Dwg. No.: PG5898-3D
Approved by: SB	Revision No.:

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APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:18:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec11.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 1-1

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : 0.00 deg 43.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 85.00 / 85.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Ave (day)

Source height = 1.50 m

ROAD (0.00 + 53.77 + 0.00) = 53.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	43	0.66	73.68	0.00	-12.51	-6.50	0.00	-0.90	0.00	53.77

Segment Leq : 53.77 dBA

Total Leq All Segments: 53.77 dBA

↟
Results segment # 1: Carling Ave (night)

Source height = 1.50 m

ROAD (0.00 + 46.18 + 0.00) = 46.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	43	0.66	66.08	0.00	-12.51	-6.50	0.00	-0.90	0.00	46.18

Segment Leq : 46.18 dBA

Total Leq All Segments: 46.18 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 53.77
(NIGHT): 46.18
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:22:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec14.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 1-4

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : 0.00 deg 43.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 85.00 / 85.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Ave (day)

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
0	43	0.39	73.68	0.00	-10.47	-6.38	0.00	-0.90	0.00	55.92

Segment Leq : 55.92 dBA

Total Leq All Segments: 55.92 dBA

↟
Results segment # 1: Carling Ave (night)

Source height = 1.50 m

ROAD (0.00 + 48.32 + 0.00) = 48.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	43	0.39	66.08	0.00	-10.47	-6.38	0.00	-0.90	0.00	48.32

Segment Leq : 48.32 dBA

Total Leq All Segments: 48.32 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 55.92
(NIGHT): 48.32

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:27:07
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: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : -72.00 deg 52.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 / 75.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Ave (day)

Source height = 1.50 m

ROAD (0.00 + 58.90 + 0.00) = 58.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-72	52	0.66	73.68	0.00	-11.60	-2.28	0.00	-0.90	0.00	58.90

Segment Leq : 58.90 dBA

Total Leq All Segments: 58.90 dBA

↟
Results segment # 1: Carling Ave (night)

Source height = 1.50 m

ROAD (0.00 + 51.30 + 0.00) = 51.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-72	52	0.66	66.08	0.00	-11.60	-2.28	0.00	-0.90	0.00	51.30

Segment Leq : 51.30 dBA

Total Leq All Segments: 51.30 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 58.90
(NIGHT): 51.30
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:33:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec24.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 2-4

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : -72.00 deg 52.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 / 75.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Ave (day)

Source height = 1.50 m

ROAD (0.00 + 61.04 + 0.00) = 61.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-72	52	0.39	73.68	0.00	-9.72	-2.02	0.00	-0.90	0.00	61.04

Segment Leq : 61.04 dBA

Total Leq All Segments: 61.04 dBA

↟
Results segment # 1: Carling Ave (night)

Source height = 1.50 m

ROAD (0.00 + 53.44 + 0.00) = 53.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-72	52	0.39	66.08	0.00	-9.72	-2.02	0.00	-0.90	0.00	53.44

Segment Leq : 53.44 dBA

Total Leq All Segments: 53.44 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 61.04
(NIGHT): 53.44

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:39:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec31.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 3-1

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : -67.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 / 70.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Ave (day)

Source height = 1.50 m

ROAD (0.00 + 56.66 + 0.00) = 56.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	0	0.66	73.68	0.00	-11.11	-5.01	0.00	-0.90	0.00	56.66

Segment Leq : 56.66 dBA

Total Leq All Segments: 56.66 dBA

↟
Results segment # 1: Carling Ave (night)

Source height = 1.50 m

ROAD (0.00 + 49.07 + 0.00) = 49.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	0	0.66	66.08	0.00	-11.11	-5.01	0.00	-0.90	0.00	49.07

Segment Leq : 49.07 dBA

Total Leq All Segments: 49.07 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 56.66
(NIGHT): 49.07

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:47:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec34.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 3-4

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : -67.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 / 70.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Carling Ave (day)

Source height = 1.50 m

ROAD (0.00 + 58.75 + 0.00) = 58.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	0	0.39	73.68	0.00	-9.30	-4.73	0.00	-0.90	0.00	58.75

Segment Leq : 58.75 dBA

Total Leq All Segments: 58.75 dBA

↟
Results segment # 1: Carling Ave (night)

Source height = 1.50 m

ROAD (0.00 + 51.15 + 0.00) = 51.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	0	0.39	66.08	0.00	-9.30	-4.73	0.00	-0.90	0.00	51.15

Segment Leq : 51.15 dBA

Total Leq All Segments: 51.15 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 58.75
(NIGHT): 51.15

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 12:06:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec4.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 4

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : -70.00 deg 49.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 13.50 / 13.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -70.00 deg Angle2 : 49.00 deg
Barrier height : 12.00 m
Barrier receiver distance : 7.00 / 7.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

↑
Results segment # 1: Carling Ave (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       13.50 !       12.45 !        12.45

ROAD (0.00 + 61.24 + 0.00) = 61.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -70     49   0.30  73.68   0.00  -9.45  -2.09   0.00  -0.90   0.00  61.24
   -70     49   0.00  73.68   0.00  -7.27  -1.80   0.00   0.00  -4.30  60.31*
   -70     49   0.30  73.68   0.00  -9.45  -2.09   0.00   0.00   0.00  62.14
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 61.24 dBA

Total Leq All Segments: 61.24 dBA

↟
Results segment # 1: Carling Ave (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       13.50 !       12.45 !        12.45

ROAD (0.00 + 53.64 + 0.00) = 53.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -70     49   0.30  66.08   0.00  -9.45  -2.09   0.00  -0.90   0.00  53.64
   -70     49   0.00  66.08   0.00  -7.27  -1.80   0.00   0.00  -4.30  52.71*
   -70     49   0.30  66.08   0.00  -9.45  -2.09   0.00   0.00   0.00  54.54
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 53.64 dBA

Total Leq All Segments: 53.64 dBA

↟
```

TOTAL Leq FROM ALL SOURCES (DAY): 61.24
(NIGHT): 53.64

STAMSON 5.0 NORMAL REPORT Date: 29-06-2021 11:59:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec4tr.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 4tr

Road data, segment # 1: Carling Ave (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Carling Ave (day/night)

Angle1 Angle2 : -70.00 deg 49.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 13.50 / 13.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -70.00 deg Angle2 : 49.00 deg
Barrier height : 13.00 m
Barrier receiver distance : 7.00 / 7.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

↑
Results segment # 1: Carling Ave (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       13.50 !       12.45 !        12.45

ROAD (0.00 + 58.69 + 0.00) = 58.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -70     49   0.30  73.68   0.00  -9.45  -2.09   0.00  -0.90   0.00  61.24
   -70     49   0.00  73.68   0.00  -7.27  -1.80   0.00   0.00  -5.92  58.69
-------------------------------------------------------------------------------

Segment Leq : 58.69 dBA

Total Leq All Segments: 58.69 dBA

↟
Results segment # 1: Carling Ave (night)
----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       13.50 !       12.45 !        12.45

ROAD (0.00 + 51.09 + 0.00) = 51.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -70     49   0.30  66.08   0.00  -9.45  -2.09   0.00  -0.90   0.00  53.64
   -70     49   0.00  66.08   0.00  -7.27  -1.80   0.00   0.00  -5.92  51.09
-------------------------------------------------------------------------------

Segment Leq : 51.09 dBA

Total Leq All Segments: 51.09 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 58.69
                           (NIGHT): 51.09
↟
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