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# Environmental Noise Control Study

Proposed Multi-Storey Residential Building
817 Roseview Avenue, Ottawa

Prepared For

Ottawa General Contractors Limited

March 24, 2022

Report: PG5898-1 Revision 1

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## Appendices

# 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 apartment 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 Proposed Development

It is understood that the proposed residential development will consist of a four (4) storey apartment building with one (1) basement level. An approximate elevation of 14.3 metres above grade is proposed for this development. A total of 20 units are expected at the building. Associated at-grade landscaped terraces, parking area, and driveway are also anticipated. An amenity area at the rooftop of proposed building that will serve as an Outdoor Living Area (OLA) is further 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**

Surface roadway traffic noise, equivalent to sound level energy $L_{eq}$, provides a measure of the time varying noise level over a period of time. For roadways, the $L_{eq}$ is commonly calculated on the basis of 16-hour ($L_{eq16}$) daytime (07:00-23:00) and 8-hour ($L_{eq8}$) nighttime (23:00-7:00) split to assess its impact on residential, commercial and institutional buildings.

The City of Ottawa's Official Plan dictates 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 Environmental Noise Guidelines for Stationary and Transportation Sources – NPC-300 outlines the limitations of 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 | $L_{eq}$ Level (dBA) |
|---|---|
| Daytime, 7:00-23:00 | 55 |

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

**Table 2 – Noise Level Limits for Indoor Living Areas**

| Type of Space | Time Period | $L_{eq}$ Level (dBA) | |
|---|---|---|---|
| | | Road | Rail |
| General offices, reception areas, retail stores, etc. | Daytime 7:00-23:00 | 50 | 45 |
| Theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc. | Daytime 7:00-23:00 | 45 | 40 |
| Living/dining/den areas of **residences**, hospitals, nursing/retirement homes, schools, day-care centres | Daytime 7:00-23:00 | 45 | 40 |
| Living/dining/den areas of **residences**, hospitals, nursing/retirement homes etc. (except schools or day-care centres) | 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, Sound Level Limit for Indoor Living Areas – Road and Rail and Table 2.2c, Supplementary Sound Level Limits for Indoor Spaces – Road and Rail

Predicted noise levels at the pane of window dictate the action required to achieve recommended noise levels. It is noted in ENCG that the limits outlined in Table 2 are for the noise levels on the interior of the window glass pane. An open window is considered to provide a 10 dBA noise reduction, while a standard closed window is capable to provide a minimum 20 dBA noise reduction. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, central air conditioning will be required, and the building components will require higher levels of sound attenuation.

If the noise level limits are exceeded, the following Warning Clauses should be included in related deeds of sale:

**Table 3 – Warning Clauses for Noise 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 for Stationary and Transportation Sources - 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 parking lot and commercial building followed by Carling Avenue, to the east by Michele Park, to the west by Roseview Avenue followed by parking lot and institutional building, 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's Official Plan, Schedule E, 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. The major source of traffic noise is due to the Carling Avenue to the north of the proposed building.

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 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 | AADT Veh/Day | Speed Limit (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 | | | | | | |

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 – Elevations of Reception Points**

| Floor Number | Elevation at Centre of Window (m) | Floor Use | Daytime / Nighttime Analysis |
|---|---|---|---|
| First Floor | 3.0 | Living Area/Bedroom | Daytime / Nighttime |
| Fourth Floor | 12.5 | Living Area/Bedroom | Daytime / Nighttime |
| Rooftop Amenity Area | 15.8 | -- | Outdoor Living Area |

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 – an amenity area is anticipated at the rooftop of proposed building. A reception point in the centre of rooftop amenity area, 15.8 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 roadway was analyzed where it 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 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 exterior noise levels due to roadway traffic sources 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: Exterior Noise Levels due to Roadway Traffic Sources**

| Reception Point | Height Above Grade (m) | Receptor Location | Daytime $L_{eq(16)}$ (dBA) | Nighttime $L_{eq(8)}$ (dBA) |
|---|---|---|---|---|
| REC 1-1 | 3.0 | Eastern Elevation, 1st Floor | 55 | 47 |
| REC 1-4 | 12.5 | Eastern Elevation, 4th Floor | 57 | 49 |
| REC 2-1 | 3.0 | Northern Elevation, 1st Floor | 61 | 53 |
| REC 2-4 | 12.5 | Northern Elevation, 4th Floor | 63 | 55 |
| REC 3-1 | 3.0 | Western Elevation, 1st Floor | 58 | 50 |
| REC 3-4 | 12.5 | Western Elevation, 4th Floor | 60 | 52 |
| REC 4 | 15.8 | Rooftop Amenity Area | 61 | -- |

# 6.0 Discussion and Recommendations

## 6.1 Outdoor Living Areas

An amenity area is anticipated at the rooftop of the proposed building. One (1) receptor point was selected for the analysis at outdoor living area (REC 4). It is assumed that the rooftop amenity area will only be utilized as an outdoor living area provided that the proposed building is constructed. The proposed $L_{eq(16)}$ at the rooftop amenity area will be 61 dBA, which exceeds the 55 dBA threshold value specified by the ENCG.

Upon review of the aforementioned result for the proposed development, a noise attenuation feature consisting of a solid glass railing surrounding the proposed rooftop amenity area was considered. This solid glass railing would be considered a noise barrier and is designed to be 1 m high. This glass railing, in addition to utilizing the exterior of the building as a noise barrier, was completed as REC 4TR and is included in Appendix 2. The results of STAMSON modeling indicate that the combination of the application of exterior cladding and the 1 m high noise barrier could reduce the anticipated noise levels at rooftop terrace to 58 dBA during the daytime period (7:00-23:00). Since noise levels cannot be economically reduced to 55 dBA, but having the inclusion of the noise barrier will reduce the noise levels by 3 dBA, this 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 55 dBA and 63 dBA during the daytime period (07:00-23:00) and between 47 dBA and 55 dBA during the nighttime period (23:00-7:00). The noise levels on the eastern, northern, and western elevations will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. Therefore, the units at the eastern, northern, and western elevations of this building 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 modeling indicates that the anticipated noise levels are 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 a four (4) storey apartment building and rise approximately 14.3 metres above grade. There is one major source of surface transportation noise to the proposed building: Carling Avenue.

The surface transportation noise analysis was completed at the Outdoor Living Area – rooftop amenity area. The results of STAMSON modeling indicate that the noise levels at the rooftop amenity area during the daytime period is expected to be 61 dBA, which exceeds the 55 dBA threshold value specified by the ENCG. According to ENCG, noise control measures (i.e. barriers) are required to reduce the $L_{eq}$ to 55 dBA where technically and economically feasible. An investigation including noise barriers, which included both the exterior cladding of the proposed building in addition to the installation of a 1 m solid railing around the perimeter of rooftop amenity area found that the noise levels can be reduce to 58 dBA, but cannot be reduced to 55 dBA without the application of an excessively tall barrier. Therefore, since noise levels cannot be economically reduced to 55 dBA, this exceedance in noise level is considered acceptable provided that the warning clause Type A is included on all deeds of sale.

Several reception points were selected for the surface transportation noise analysis, consisting of the centre of first level and top level. The results of STAMSON modeling indicate that the eastern, northern, and western elevations of the proposed building are expected to exceed the 55 dBA threshold specified by the ENCG. Therefore, the design with the provision for a central air conditioning unit, along with a warning clause Type C, will be required for the units at the eastern, northern, and western elevations of proposed building. It is also noted that the modeling indicates that the noise levels are below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

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

> "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."

"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."

# 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.

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- ❑ Ottawa General Contractors Limited (email 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)**

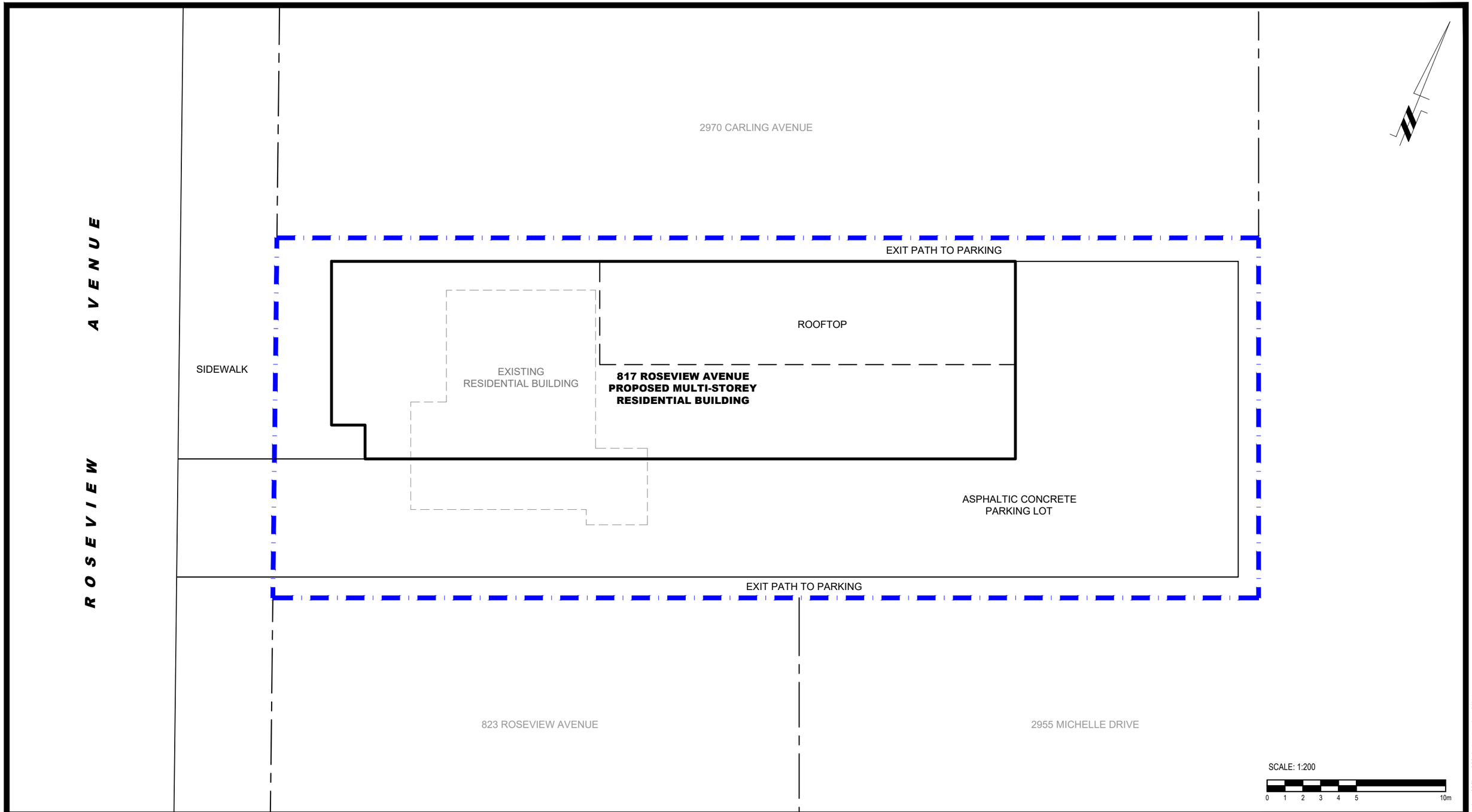
**DRAWING PG5898-3B - SITE GEOMETRY (REC 2-1 and REC 2-4)**

**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 | 55 | 80 | 3.0 | 80.1 | 0, 44 | 1 | 20 |
| REC 1-4 | Eastern Elevation, 4th Floor | 57 | 80 | 12.5 | 81.0 | 0, 44 | 1 | 20 |
| REC 2-1 | Northern Elevation, 1st Floor | 61 | 60 | 3.0 | 60.1 | -72, 52 | 1 | 20 |
| REC 2-4 | Northern Elevation, 4th Floor | 63 | 60 | 12.5 | 61.3 | -72, 52 | 1 | 20 |
| REC 3-1 | Western Elevation, 1st Floor | 58 | 65 | 3.0 | 65.1 | -67, 0 | 1 | 20 |
| REC 3-4 | Western Elevation, 4th Floor | 60 | 65 | 12.5 | 66.2 | -67, 0 | 1 | 20 |
| REC 4 | Rooftop Patio | 61 | 65 | 15.8 | 66.9 | -72, 48 | 1 | 20 |

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NOISE ATTENUATION STUDY
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817 ROSEVIEW AVENUE
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Title:
# SITE PLAN

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| 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.: 1 |

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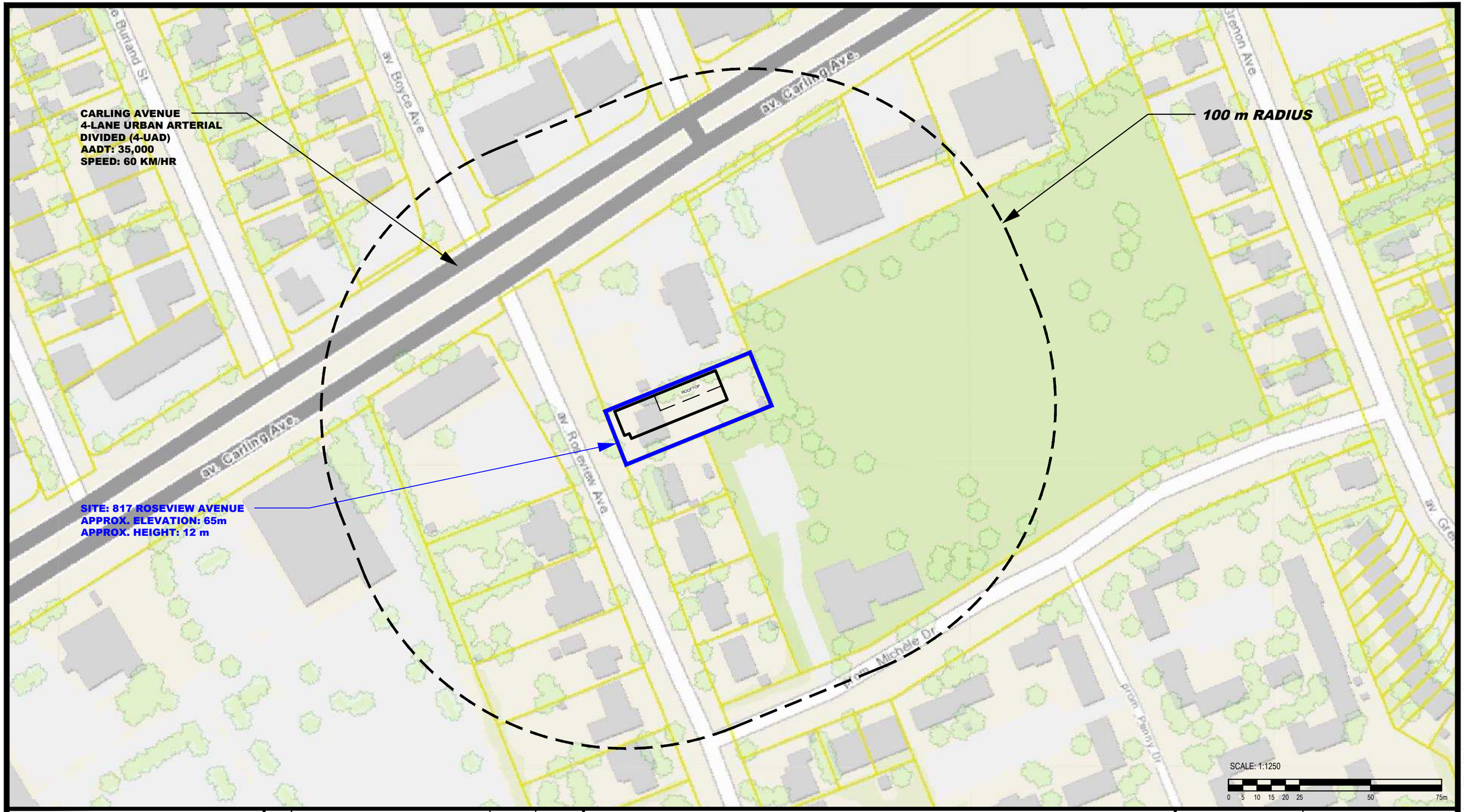


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# SITE GEOMETRY

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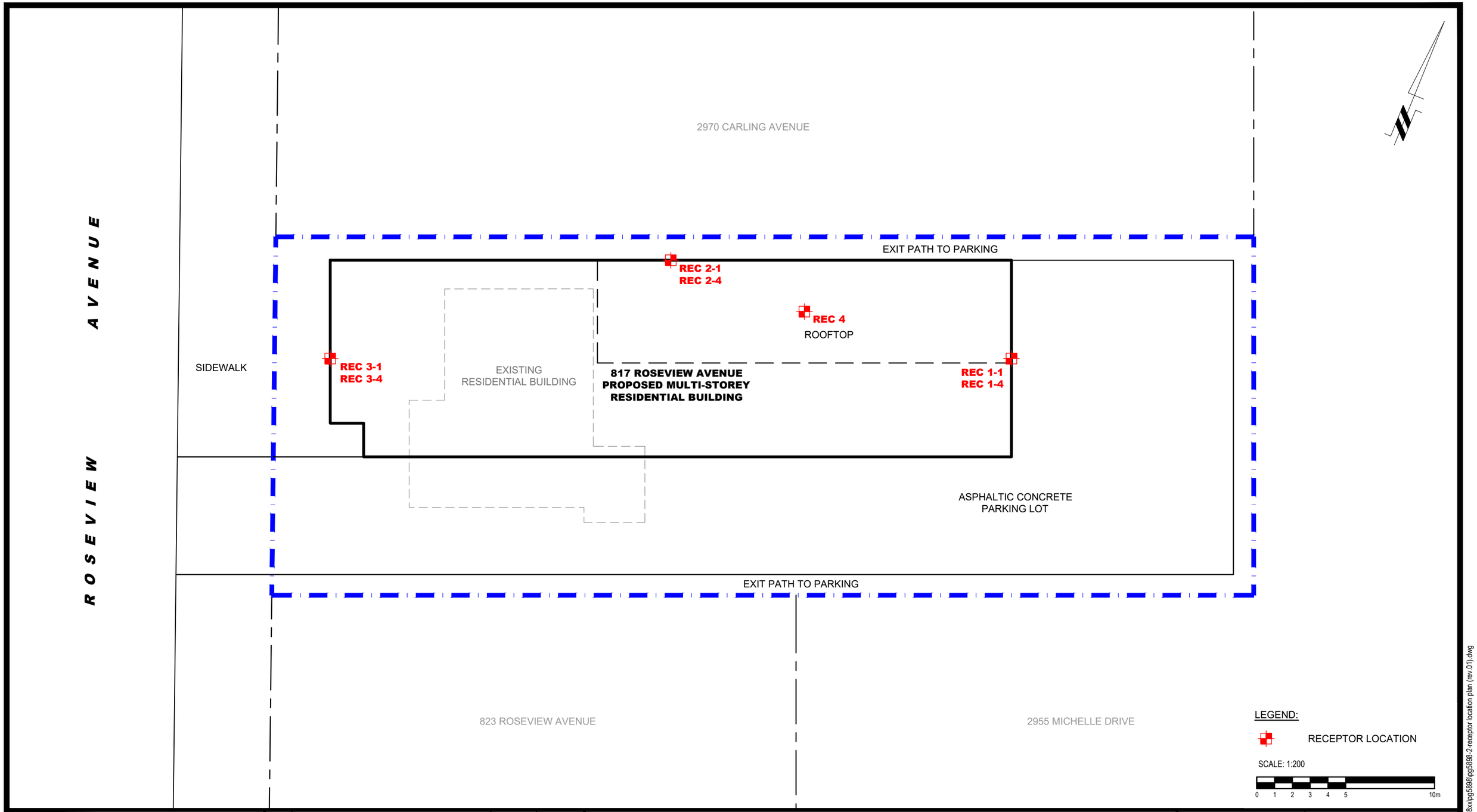


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**PROPOSED MULTI-STOREY RESIDENTIAL BUILDING**
**817 ROSEVIEW AVENUE**
**OTTAWA, ONTARIO**

**Title:**
# RECEPTOR LOCATION PLAN

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| **Checked by:** YT | **Dwg. No.:** PG5898-2 |
| **Approved by:** SB | **Revision No.:** 1 |

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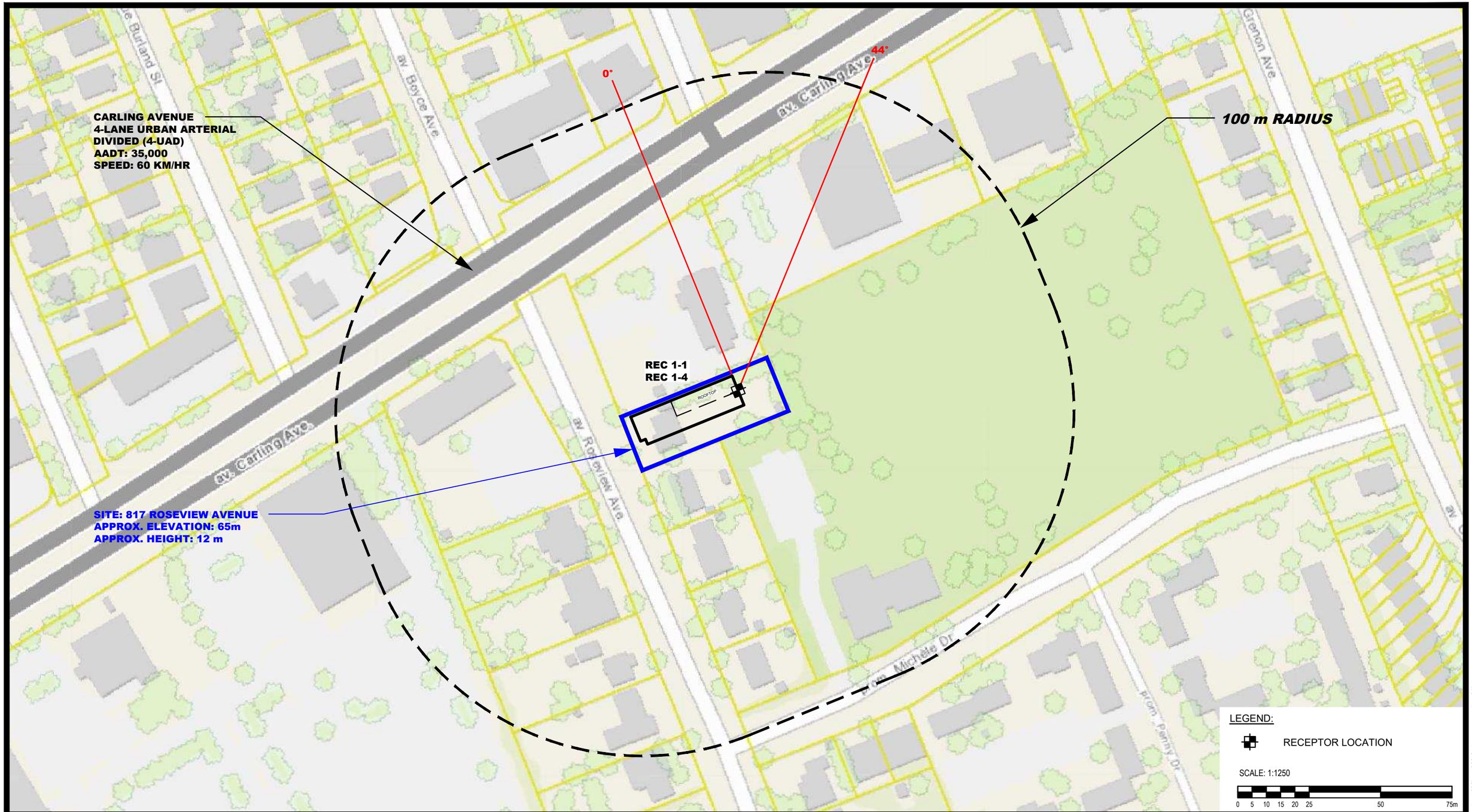



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817 ROSEVIEW AVENUE
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Title:
# SITE GEOMETRY - REC 1-1 AND REC 1-4

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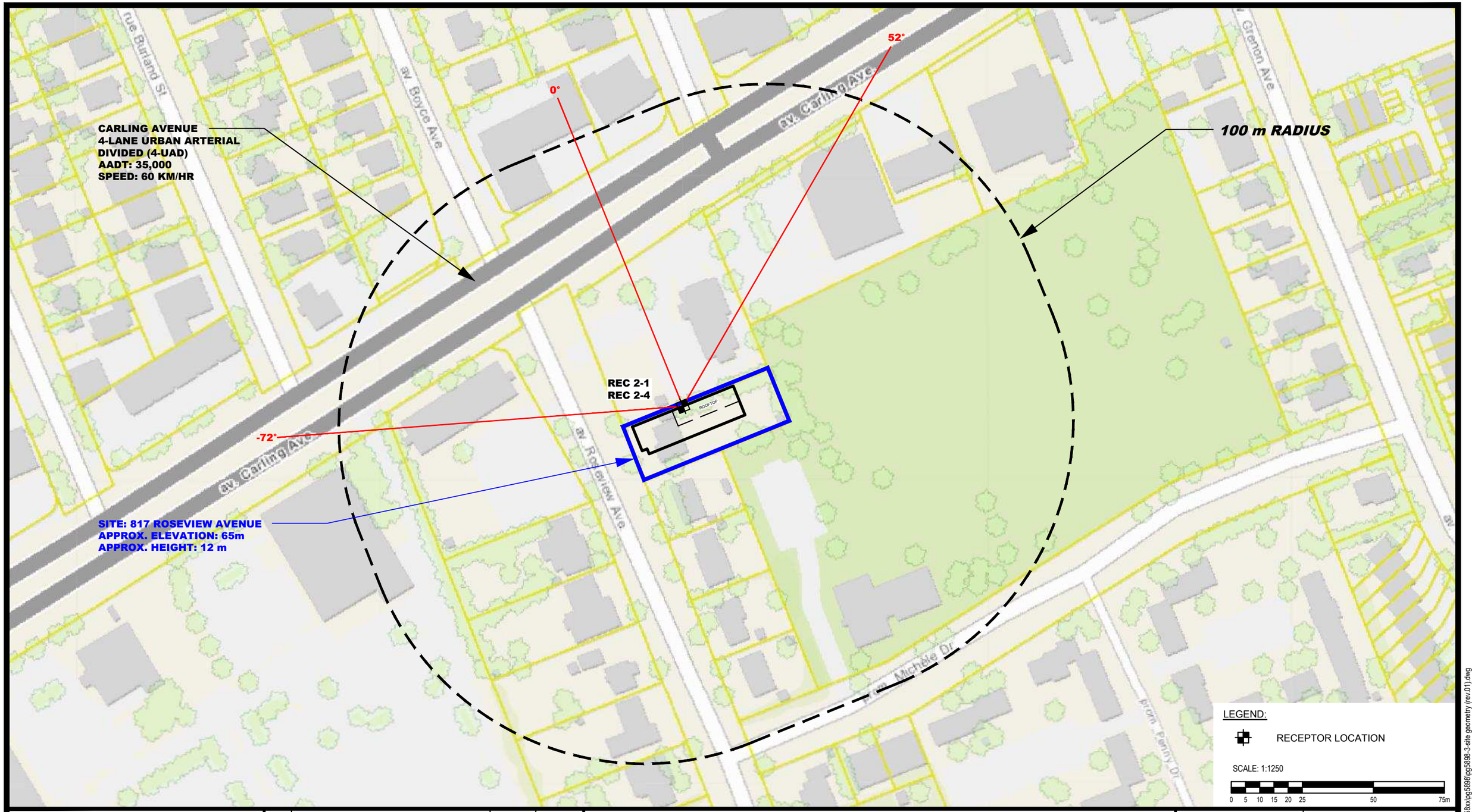


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# SITE GEOMETRY - REC 2-1 AND REC 2-4

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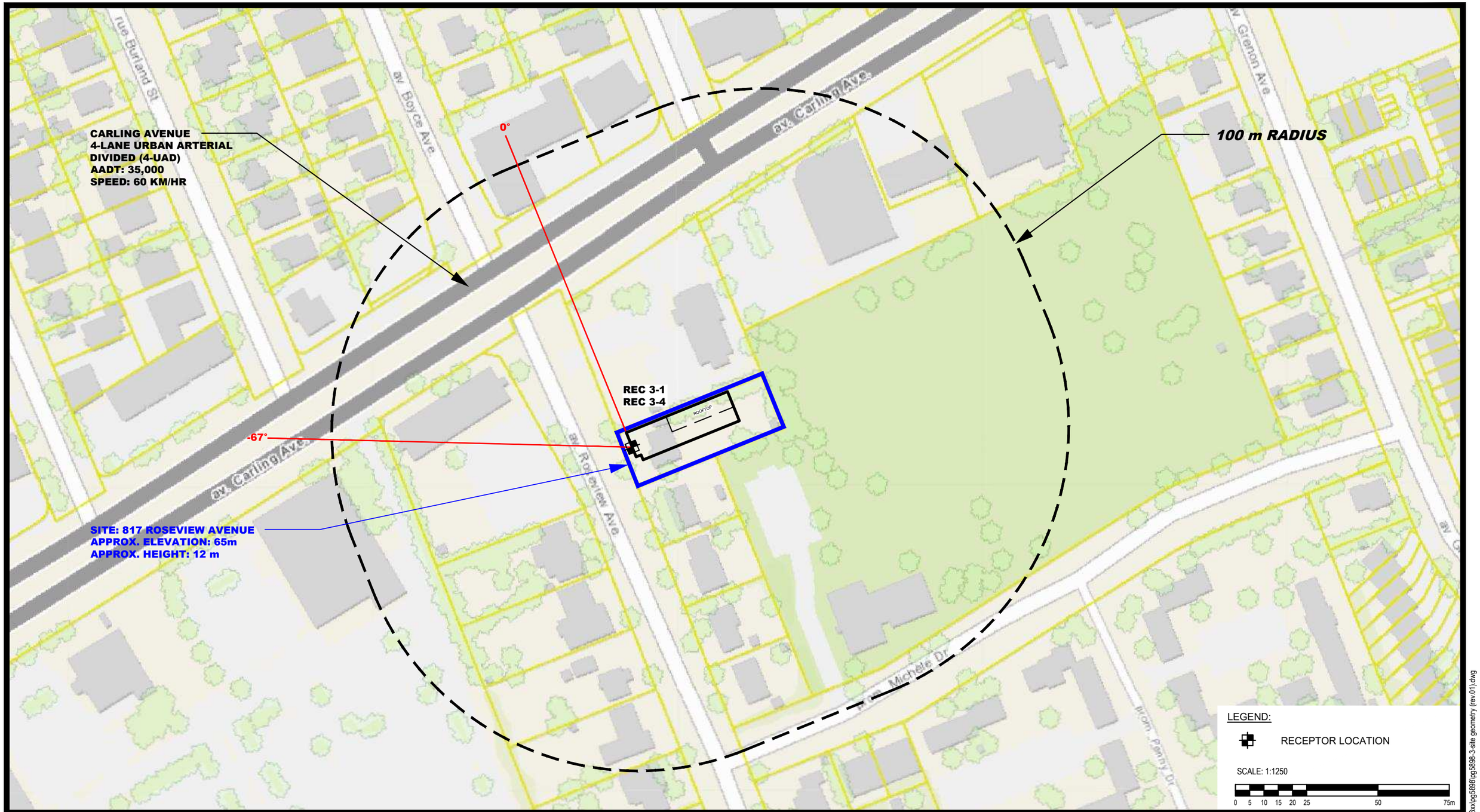


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# SITE GEOMETRY - REC 3-1 AND REC 3-4

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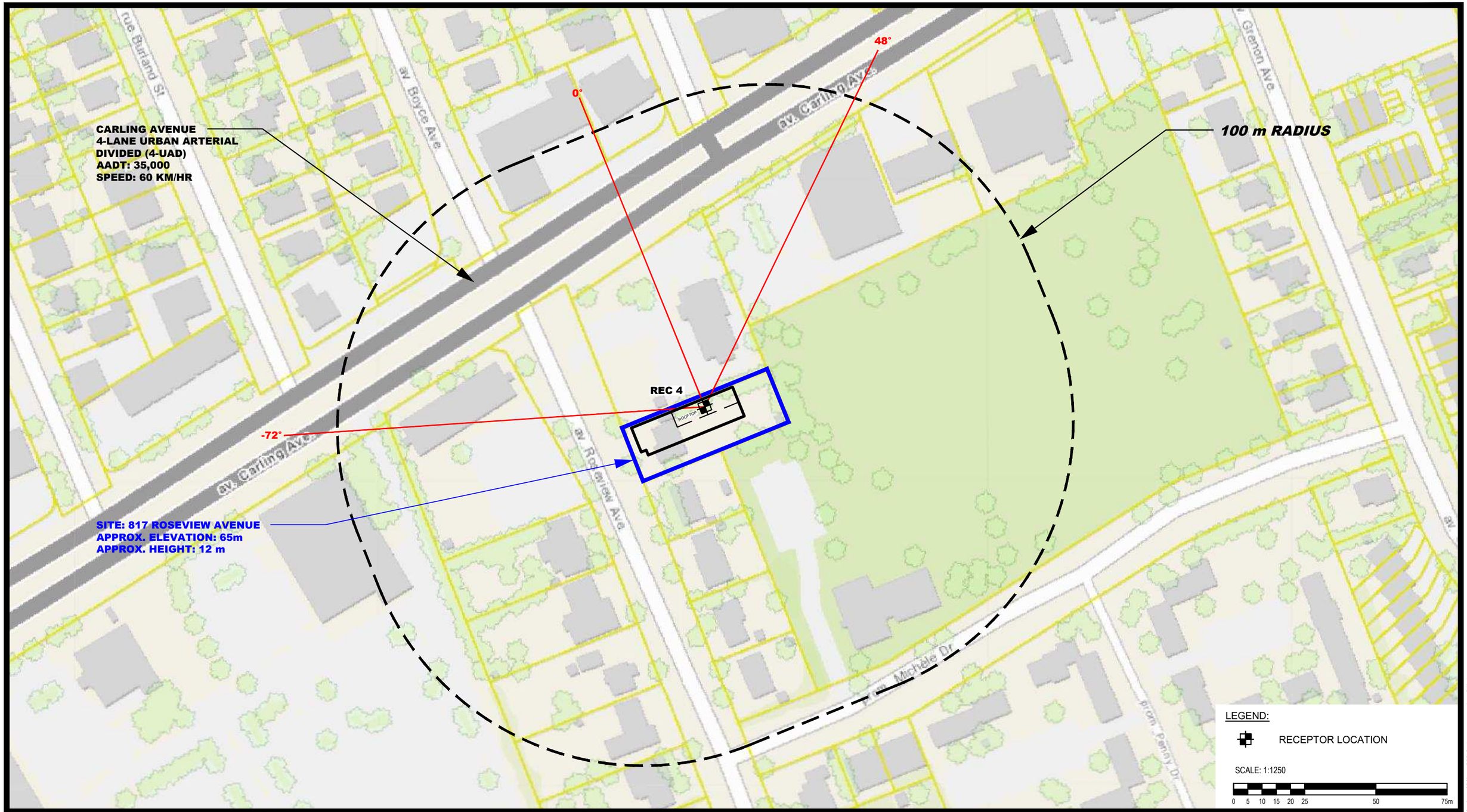



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# SITE GEOMETRY - REC 4

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| 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.: 1 |

p:\autocad drawings\geotechnical\pg58xx\pg5898\pg5898-3-site geometry (rev.01).dwg

# APPENDIX 2

## STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:21:25
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 44.00 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 : 3.00 / 3.00 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 + 54.64 + 0.00) = 54.64 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 44 | 0.62 | 73.68 | 0.00 | -11.74 | -6.39 | 0.00 | -0.90 | 0.00 | 54.64 |

Segment Leq : 54.64 dBA

Total Leq All Segments: 54.64 dBA

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

Source height = 1.50 m

ROAD (0.00 + 47.05 + 0.00) = 47.05 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 44 | 0.62 | 66.08 | 0.00 | -11.74 | -6.39 | 0.00 | -0.90 | 0.00 | 47.05 |

Segment Leq : 47.05 dBA

Total Leq All Segments: 47.05 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 54.64
(NIGHT): 47.05

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:22:17
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 44.00 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 : 12.50 / 12.50 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 + 56.84 + 0.00) = 56.84 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 44 | 0.33 | 73.68 | 0.00 | -9.67 | -6.27 | 0.00 | -0.90 | 0.00 | 56.84 |

Segment Leq : 56.84 dBA

Total Leq All Segments: 56.84 dBA

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

Source height = 1.50 m

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 44 | 0.33 | 66.08 | 0.00 | -9.67 | -6.27 | 0.00 | -0.90 | 0.00 | 49.24 |

Segment Leq : 49.24 dBA

Total Leq All Segments: 49.24 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 56.84
(NIGHT): 49.24
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:29:42
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 : 60.00 / 60.00 m
Receiver height : 3.00 / 3.00 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 + 60.82 + 0.00) = 60.82 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -72 | 52 | 0.62 | 73.68 | 0.00 | -9.72 | -2.23 | 0.00 | -0.90 | 0.00 | 60.82 |

Segment Leq : 60.82 dBA

Total Leq All Segments: 60.82 dBA

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

Source height = 1.50 m

ROAD (0.00 + 53.22 + 0.00) = 53.22 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -72 | 52 | 0.62 | 66.08 | 0.00 | -9.72 | -2.23 | 0.00 | -0.90 | 0.00 | 53.22 |

Segment Leq : 53.22 dBA

Total Leq All Segments: 53.22 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 60.82
(NIGHT): 53.22

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:30:49
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 : 60.00 / 60.00 m
Receiver height : 12.50 / 12.50 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 + 62.80 + 0.00) = 62.80 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -72 | 52 | 0.33 | 73.68 | 0.00 | -8.01 | -1.96 | 0.00 | -0.90 | 0.00 | 62.80 |

Segment Leq : 62.80 dBA

Total Leq All Segments: 62.80 dBA

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

Source height = 1.50 m

ROAD (0.00 + 55.21 + 0.00) = 55.21 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -72 | 52 | 0.33 | 66.08 | 0.00 | -8.01 | -1.96 | 0.00 | -0.90 | 0.00 | 55.21 |

Segment Leq : 55.21 dBA

Total Leq All Segments: 55.21 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 62.80
(NIGHT): 55.21

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:33:21
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 : 65.00 / 65.00 m
Receiver height : 3.00 / 3.00 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 + 57.53 + 0.00) = 57.53 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -67 | 0 | 0.62 | 73.68 | 0.00 | -10.29 | -4.96 | 0.00 | -0.90 | 0.00 | 57.53 |

Segment Leq : 57.53 dBA

Total Leq All Segments: 57.53 dBA

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

Source height = 1.50 m

ROAD (0.00 + 49.93 + 0.00) = 49.93 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -67 | 0 | 0.62 | 66.08 | 0.00 | -10.29 | -4.96 | 0.00 | -0.90 | 0.00 | 49.93 |

Segment Leq : 49.93 dBA

Total Leq All Segments: 49.93 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 57.53
(NIGHT): 49.93
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:34:45
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 : 65.00 / 65.00 m
Receiver height : 12.50 / 12.50 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 + 59.64 + 0.00) = 59.64 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -67 | 0 | 0.33 | 73.68 | 0.00 | -8.47 | -4.67 | 0.00 | -0.90 | 0.00 | 59.64 |

Segment Leq : 59.64 dBA

Total Leq All Segments: 59.64 dBA

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

Source height = 1.50 m

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| -67 | 0 | 0.33 | 66.08 | 0.00 | -8.47 | -4.67 | 0.00 | -0.90 | 0.00 | 52.04 |

Segment Leq : 52.04 dBA

Total Leq All Segments: 52.04 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 59.64
(NIGHT): 52.04
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:52:12
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 : -72.00 deg 48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height : 15.80 / 15.80 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -72.00 deg Angle2 : 48.00 deg
Barrier height : 14.30 m
Barrier receiver distance : 7.00 / 7.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 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 !       15.80 !       14.26 !        79.26

ROAD (0.00 + 60.54 + 0.00) = 60.54 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -72     48   0.23  73.68   0.00  -7.84  -2.00   0.00  -0.90   0.00  62.94
   -72     48   0.00  73.68   0.00  -6.37  -1.76   0.00   0.00  -5.01  60.54
-------------------------------------------------------------------------------

Segment Leq : 60.54 dBA

Total Leq All Segments: 60.54 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 !       15.80 !       14.26 !        79.26

ROAD (0.00 + 52.94 + 0.00) = 52.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -72     48   0.23  66.08   0.00  -7.84  -2.00   0.00  -0.90   0.00  55.34
   -72     48   0.00  66.08   0.00  -6.37  -1.76   0.00   0.00  -5.01  52.94
-------------------------------------------------------------------------------

Segment Leq : 52.94 dBA

Total Leq All Segments: 52.94 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 60.54
                           (NIGHT): 52.94
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 02-03-2022 12:54:23
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 : -72.00 deg 48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height : 15.80 / 15.80 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -72.00 deg Angle2 : 48.00 deg
Barrier height : 15.30 m
Barrier receiver distance : 7.00 / 7.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 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 !       15.80 !       14.26 !        79.26

ROAD (0.00 + 57.82 + 0.00) = 57.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -72     48   0.23  73.68   0.00  -7.84  -2.00   0.00  -0.90   0.00  62.94
   -72     48   0.00  73.68   0.00  -6.37  -1.76   0.00   0.00  -7.73  57.82
-------------------------------------------------------------------------------

Segment Leq : 57.82 dBA

Total Leq All Segments: 57.82 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 !       15.80 !       14.26 !        79.26

ROAD (0.00 + 50.22 + 0.00) = 50.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -72     48   0.23  66.08   0.00  -7.84  -2.00   0.00  -0.90   0.00  55.34
   -72     48   0.00  66.08   0.00  -6.37  -1.76   0.00   0.00  -7.73  50.22
-------------------------------------------------------------------------------

Segment Leq : 50.22 dBA

Total Leq All Segments: 50.22 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 57.82
                           (NIGHT): 50.22
↟
↟
```