

Environmental Noise Control Study Proposed Building Addition

29 Russell Avenue
Ottawa, Ontario

Prepared for 29 Russell Street Holdings Inc.
c/o Smart Living Properties

Report PG6480-1 dated October 28, 2022

Table of Contents

	PAGE
1.0 Introduction.....	1
2.0 Proposed Development	1
3.0 Methodology and Noise Assessment Criteria.....	2
4.0 Analysis.....	6
5.0 Results.....	8
6.0 Discussion and Recommendations	9
6.1 Outdoor Living Areas.....	9
6.2 Indoor Living Areas and Ventilation.....	9
7.0 Summary of Findings	10
8.0 Statement of Limitations	11

Appendices

Appendix 1	Table 8 - Summary of Reception Points and Geometry Drawing PG6480-1 - Site Plan Drawing PG6480-2 - Receptor Location Plan Drawing PG6480-3 - Site Geometry Drawing PG6480-3A - Site Geometry - REC 1-1 and REC 1-3 Drawing PG6480-3B - Site Geometry - REC 2-1 and REC 2-3 Drawing PG6480-3C - Site Geometry - REC 3-1 and REC 3-3 Drawing PG6480-3D - Site Geometry - REC 4-1 and REC 4-3
Appendix 2	STAMSON Results

1.0 Introduction

Paterson Group (Paterson) was commissioned by 29 Russell Street Holdings Inc. c/o Smart Living Properties to conduct an environmental noise control study for the proposed building addition to be located at 29 Russell 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 development will consist of a three (3) storey building addition with a basement level, located east of the existing three-storey building. The building addition will consist of 7 units and will rise 10 metres above grade. It is noted that the proposed development will also consist of an additional one (1) storey building addition with basement, connected to the three-storey building addition. Associated walkways, bicycle parking area, and landscaped areas are further anticipated. No outdoor living area is identified on the proposed site plan.

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
<ul style="list-style-type: none"> ➤ 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
<ul style="list-style-type: none"> ➤ 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. The noise level limits of residential building are 45 dBA daytime and 40 dBA nighttime. 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.

When the noise levels are equal to or less than the specified criteria, no noise attenuation (control) measures are required.

When the exceedance of the recommended noise level limits is between 1 dBA and 5 dBA for outdoor living areas ($55 \text{ dBA} < L_{eq} \leq 60 \text{ dBA}$), the proposed development can be completed with no noise control measures incorporated into the site, but the prospective purchasers / tenants should be made aware by suitable Warning Clauses. When the exceedance of recommended noise level limits is more than 5 dBA for outdoor living areas ($L_{eq} > 60 \text{ dBA}$), noise control measures are required to reduce L_{eq} to below 60 dBA and as close as 55 dBA as it is technically and economically feasible.

Noise attenuation (control) measures include any or all of the following:

- Noise attenuation barrier
- Provisions for the installation of central air conditioning
- Central air conditioning
- Architectural components designed to provide additional acoustic insulation

In addition to the implementation of noise attenuation features, if required, the following Warning Clauses may be recommended to advise the prospective purchasers / tenants of affected units of potential environmental noise problem:

Table 3 – Warning Clauses for Outdoor Living Areas		
Leq (dBA)	Warning Clause	Description
$55 \text{ dBA} < L_{eq(16)} \leq 60 \text{ dBA}$	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."
$60 \text{ dBA} < L_{eq(16)}$	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."
<ul style="list-style-type: none"> ➤ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300 		

Table 4 – Warning Clauses for Indoor Living Areas		
Leq (dBA)	Warning Clause	Description
$55 \text{ dBA} < L_{\text{eq}(16)} \leq 65 \text{ dBA}$ $50 \text{ dBA} < L_{\text{eq}(8)} \leq 60 \text{ dBA}$	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."
$65 \text{ dBA} < L_{\text{eq}(16)}$ $60 \text{ dBA} < L_{\text{eq}(8)}$	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."
<p>➤ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300</p>		

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 development is bordered to the north by commercial building, institutional building, and parking lot followed by Laurier Avenue East, to the east by residential dwellings and Chapel Street, followed by institutional building and residential building, to the south by residential dwellings, and to the west by Russell Avenue followed by residential dwellings. Laurier Avenue East, Chapel Street, and Russell Avenue are identified within the 100 m radius of proposed development.

Based on the City of Ottawa’s Official Plan, Laurier Avenue East is considered a 2-lane major collector road (2-UMCU), and Chapel Street is considered a 2-lane urban collector road (2-UCU). 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 sources of traffic noise are due to the Laurier Avenue East to the north, and the Chapel Street to the east of the proposed development.

All noise sources are presented in Drawing PG6480-3 - 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 5 – Traffic and Road Parameters						
Segment	Roadway Classification	AADT Veh/Day	Speed Limit (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Laurier Avenue East	2-UMCU	12,000	50	92/8	7	5
Chapel Street	2-UCU	8,000	40	92/8	7	5
➤ Data obtained from the City of Ottawa document ENCG						

Two (2) 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 6 – Elevations of Reception Points			
Floor Number	Elevation at Centre of Window (m)	Floor Use	Daytime / Nighttime Analysis
First Floor	1.5	Living Area/Bedroom	Daytime / Nighttime
Third Floor	7.5	Living Area/Bedroom	Daytime / Nighttime

For this analysis, a reception point was taken at the centre of each floor, at the first floor and top floor. Reception points are detailed on Drawing PG6480-2 - 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 PG6480-3A to 3D - Site Geometry in Appendix 1.

Table 8 - 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 generally levelled and at grade with the neighbouring roads within the 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 7.

Reception Point	Height Above Grade (m)	Receptor Location	Daytime $L_{eq(16)}$ (dBA)	Nighttime $L_{eq(8)}$ (dBA)
REC 1-1	1.5	Northern Elevation, 1st Floor	53	45
REC 1-3	7.5	Northern Elevation, 3rd Floor	54	46
REC 2-1	1.5	Western Elevation, 1st Floor	43	36
REC 2-3	7.5	Western Elevation, 3rd Floor	44	37
REC 3-1	1.5	Eastern Elevation, 1st Floor	54	46
REC 3-3	7.5	Eastern Elevation, 3rd Floor	55	47
REC 4-1	1.5	Southern Elevation, 1st Floor	49	42
REC 4-3	7.5	Southern Elevation, 3rd Floor	50	43

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

No outdoor living areas were identified for this development.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicate that the noise levels at proposed building addition will range between 43 dBA and 55 dBA during the daytime period (07:00-23:00) and between 36 dBA and 47 dBA during the nighttime period (23:00-7:00). The noise levels at the proposed building addition will be equal or below the exterior of the pane of glass (55 dBA) specified by the ENCG. Therefore, no further noise attenuation measures are required. It is also noted that the results of STAMSON modeling indicate that the noise levels at proposed building addition 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 29 Russell Avenue, in the City of Ottawa. It is understood that the proposed development will consist of a three-storey building addition with basement, located east to the existing three-storey building. The building addition will rise 10 metres above grade. There are two major sources of surface transportation noise to the proposed development: Laurier Avenue East and Chapel Street.

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 noise levels at the proposed building addition are expected to be equal or below the 55 dBA threshold specified by the ENCG. Therefore, no further noise attenuation measures are required. It is also noted that the results of STAMSON modeling indicate that the noise levels at proposed building addition will be below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

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 29 Russell Street Holdings Inc. c/o Smart Living Properties 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.A.Sc.



Stephanie A. Boisvenue, P.Eng.

Report Distribution:

- 29 Russell Street Holdings Inc. c/o Smart Living Properties (email copy)
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APPENDIX 1

TABLE 8 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

Drawing PG6480-1 - Site Plan

Drawing PG6480-2 - Receptor Location Plan

Drawing PG6480-3 - Site Geometry

Drawing PG6480-3A - Site Geometry (REC 1-1 and REC 1-3)

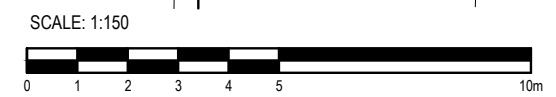
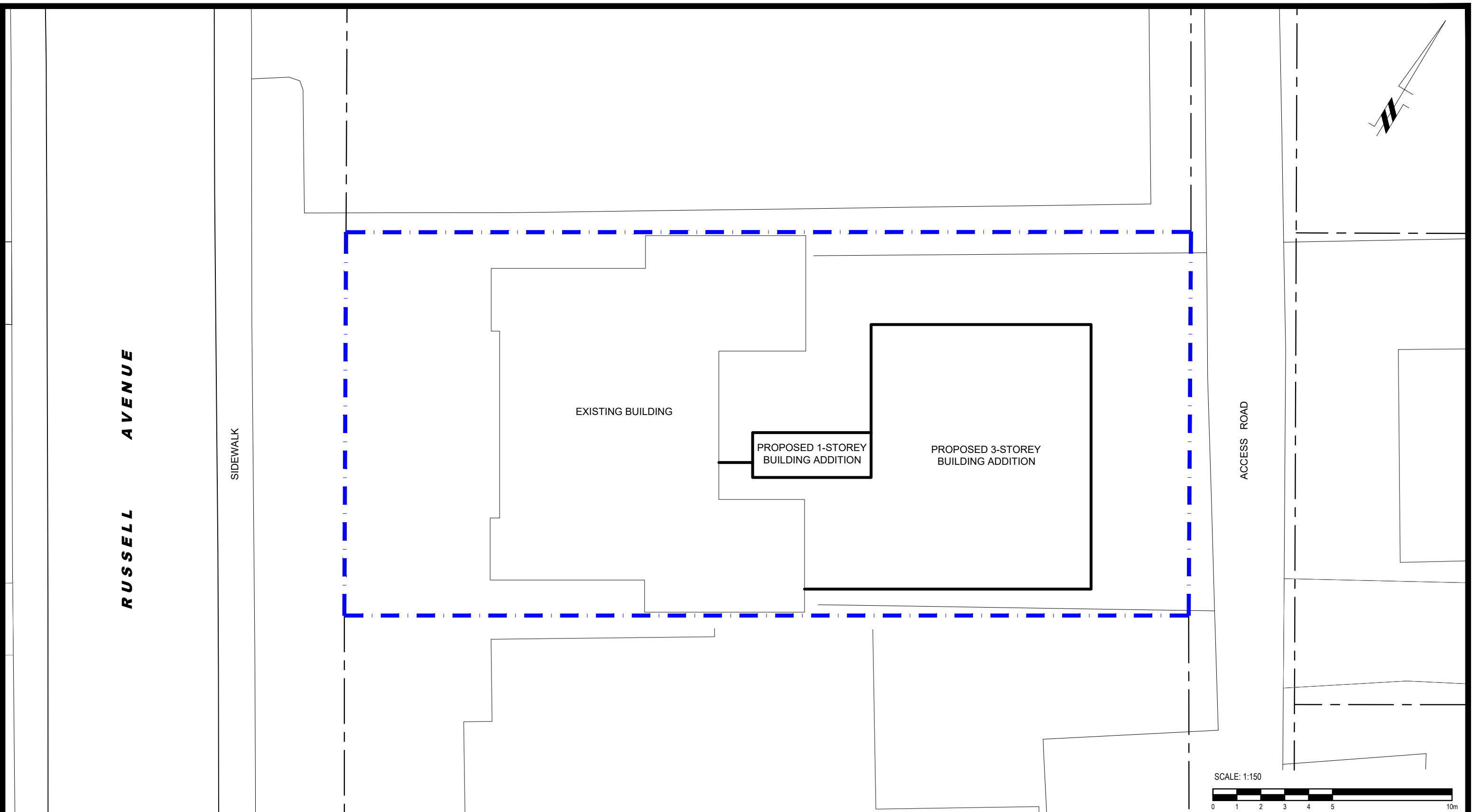
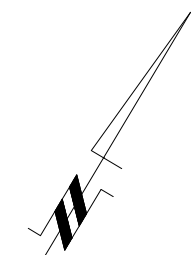
Drawing PG6480-3B - Site Geometry (REC 2-1 and REC 2-3)

Drawing PG6480-3C - Site Geometry (REC 3-1 and REC 3-3)

Drawing PG6480-3D - Site Geometry (REC 4-1 and REC 4-3)

**Table 8 - Summary of Reception Points and Geometry
29 Russell Avenue**

Point of Reception	Location	Leq Day (dBA)	Laurier Avenue East						Chapel Street					
			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	Northern Elevation, 1st Floor	53	70	1.5	70.0	-55, 50	2	40	50	1.5	50.0	-61, 0	1	20
REC 1-3	Northern Elevation, 3th Floor	54	70	7.5	70.4	-55, 50	2	40	50	7.5	50.6	-61, 0	1	20
REC 2-1	Western Elevation, 1st Floor	43	75	1.5	75.0	-22, 0	2	40	n/a	n/a	n/a	n/a	n/a	n/a
REC 2-3	Western Elevation, 3rd Floor	44	75	7.5	75.4	-22, 0	2	40	n/a	n/a	n/a	n/a	n/a	n/a
REC 3-1	Eastern Elevation, 1st Floor	54	75	1.5	75.0	0, 46	2	40	45	1.5	45.0	-65, 65	1	20
REC 3-3	Eastern Elevation, 3rd Floor	55	75	7.5	75.4	0, 46	2	40	45	7.5	45.6	-65, 65	1	20
REC 4-1	Southern Elevation, 1st Floor	49	n/a	n/a	n/a	n/a	n/a	n/a	50	1.5	50.0	0, 61	1	20
REC 4-3	Southern Elevation, 3rd Floor	50	n/a	n/a	n/a	n/a	n/a	n/a	50	7.5	50.6	0, 61	1	20



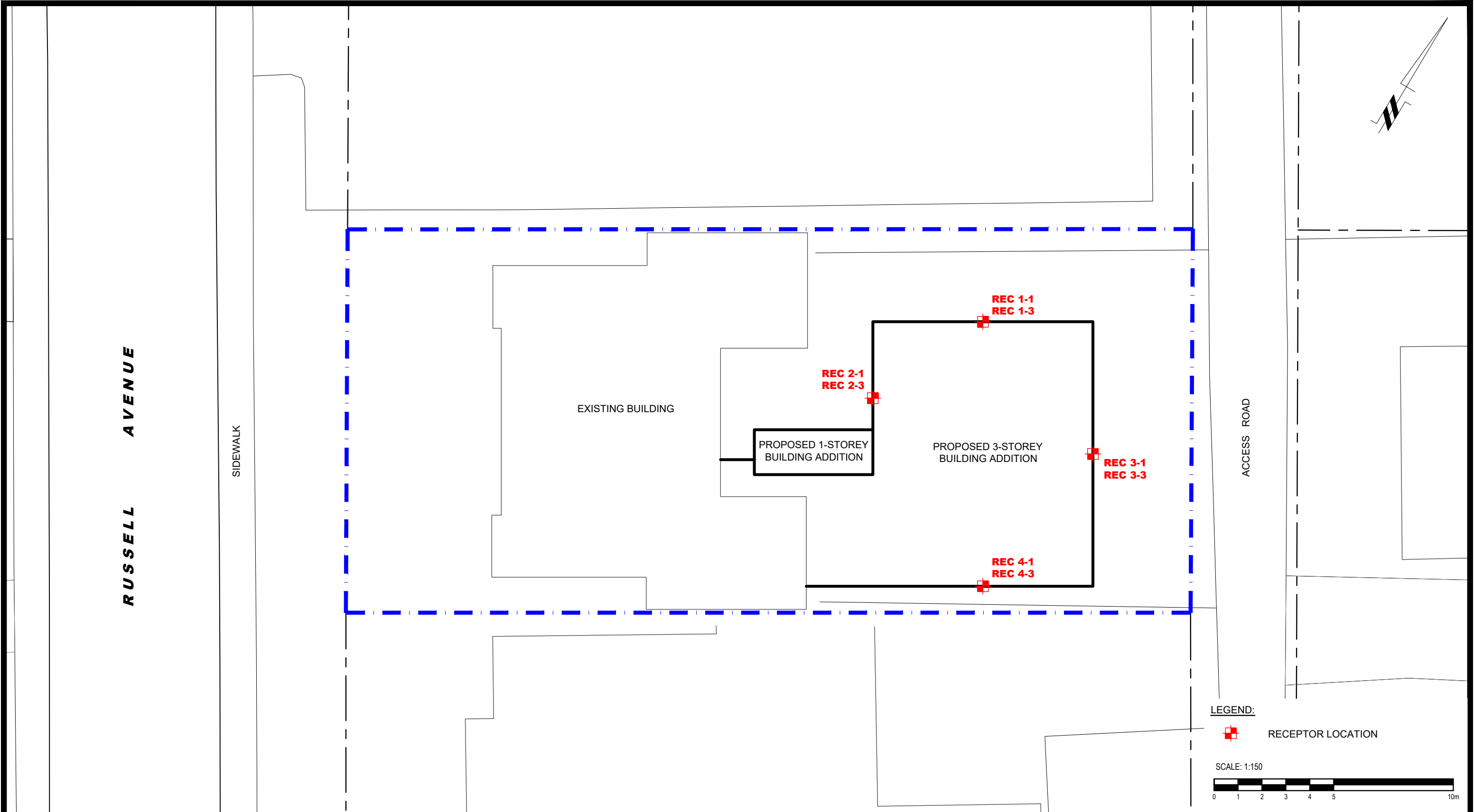
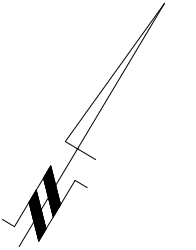

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NO.	REVISIONS	DATE	INITIAL

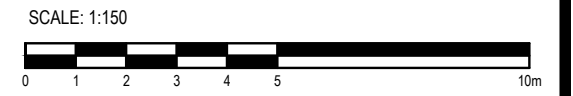
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NOISE ATTENUATION STUDY
PROPOSED BUILDING ADDITION
29 RUSSELL AVENUE
ONTARIO

OTTAWA,
 Title:
SITE PLAN

Scale:	1:150	Date:	10/2022
Drawn by:	YA	Report No.:	PG6480-1
Checked by:	YT	Dwg. No.:	PG6480-1
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LEGEND:
 RECEPTOR LOCATION



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 PROPOSED BUILDING ADDITION
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RECEPTOR LOCATION PLAN

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Checked by:	YT	Dwg. No.:	PG6480-2
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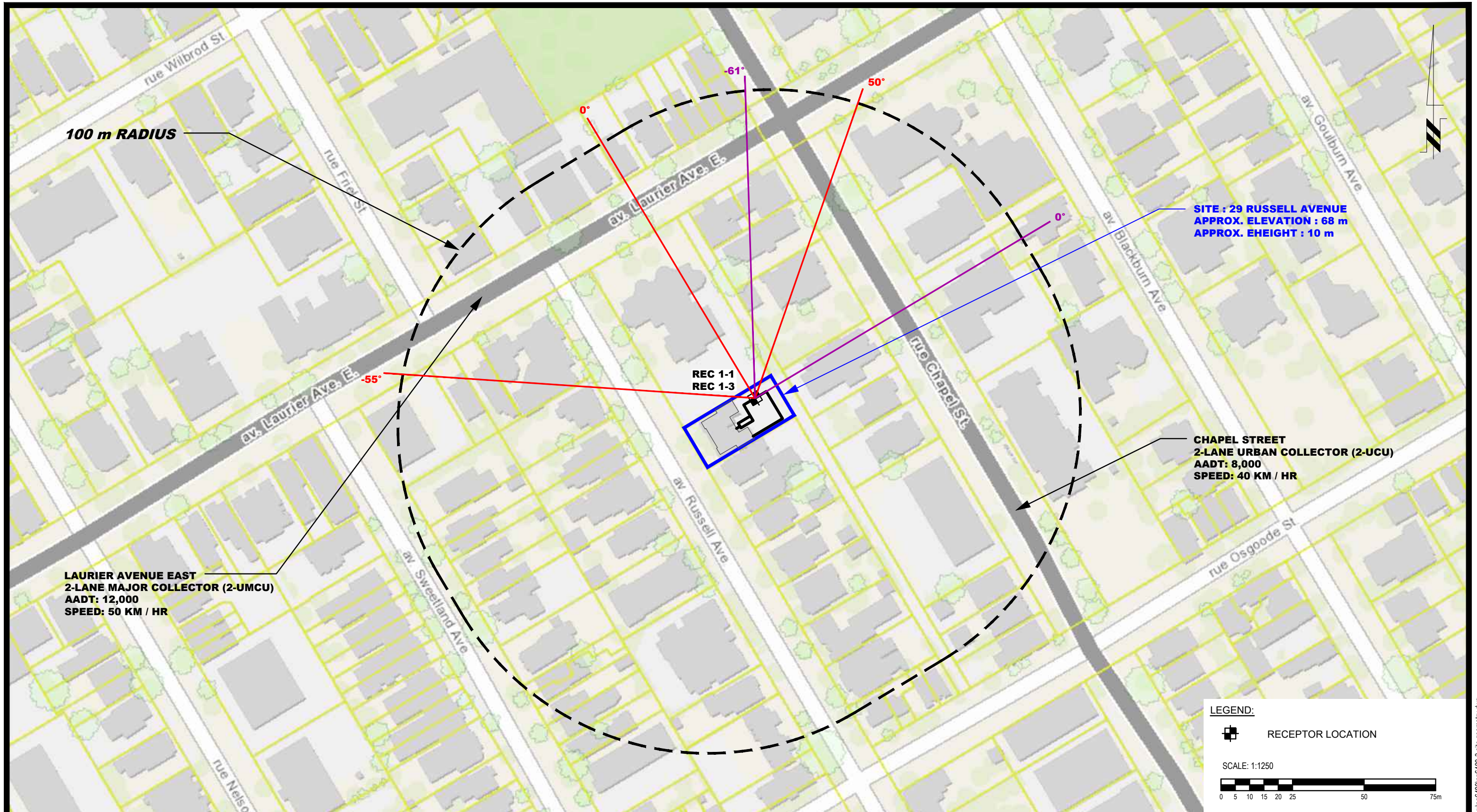


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 OTTAWA, ONTARIO
 Title: **SITE GEOMETRY**

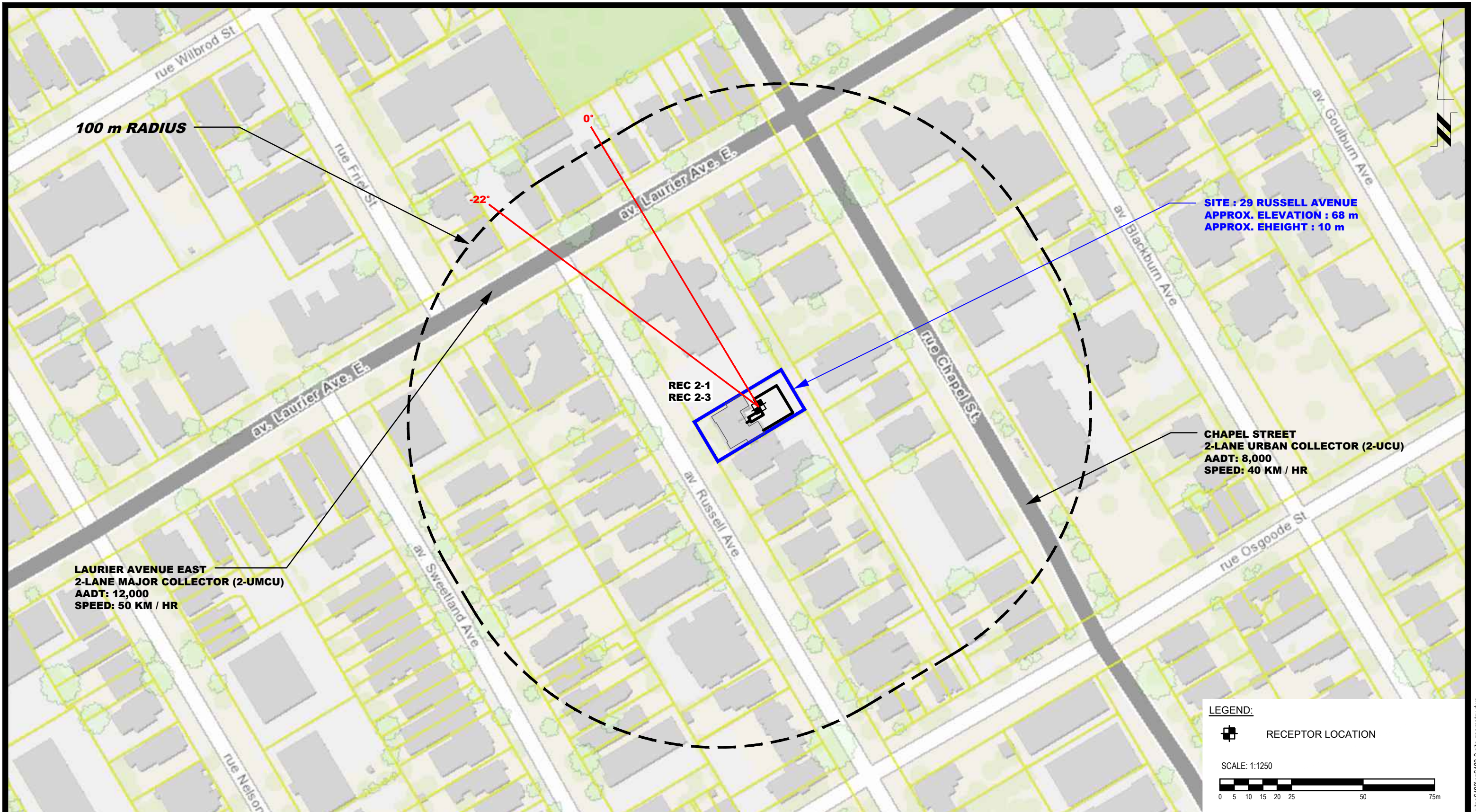
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Title: SITE GEOMETRY - REC 1-1 AND REC 1-3

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Checked by:	YT	Dwg. No.:	PG6480-3A
Approved by:	SB	Revision No.:	

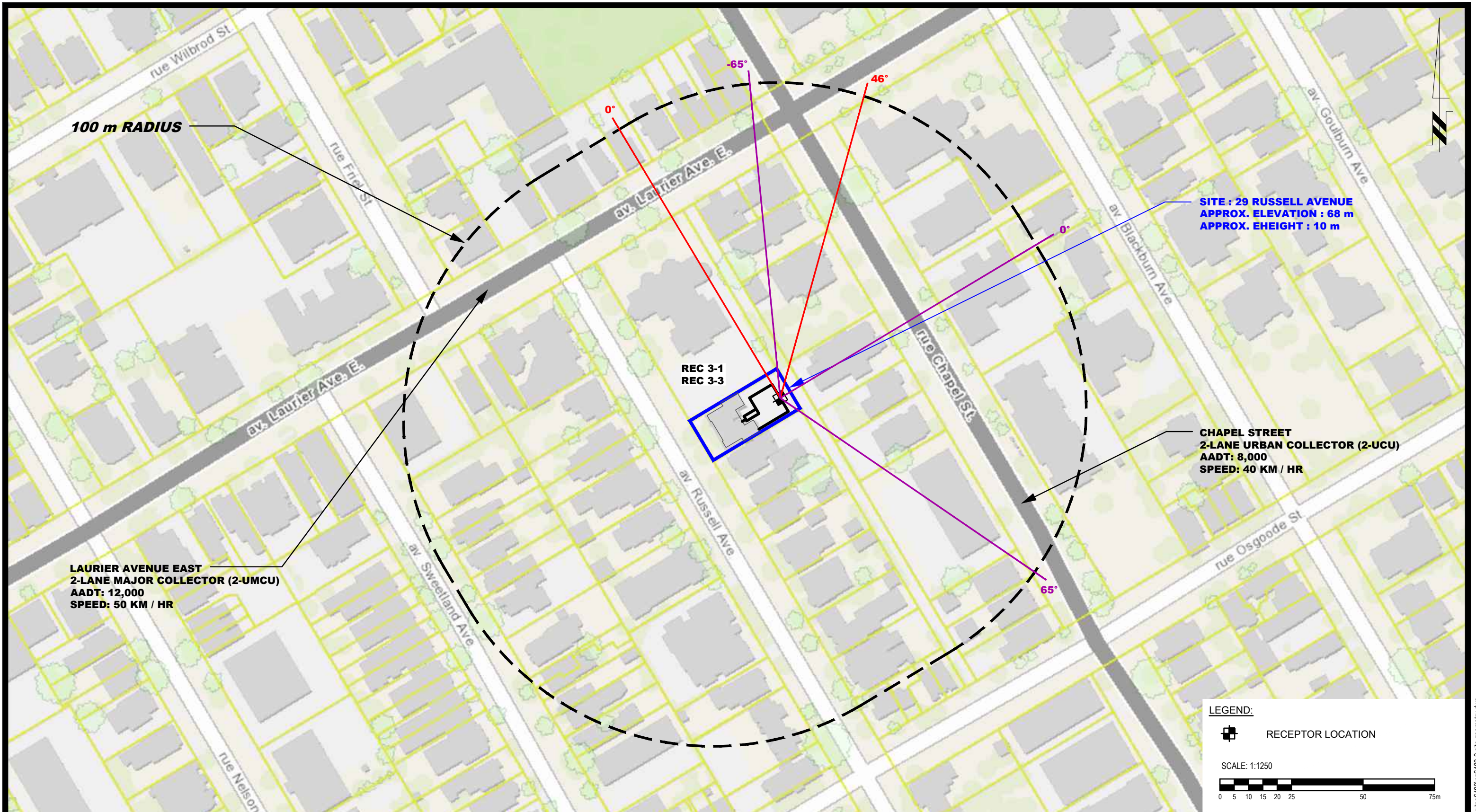


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 PROPOSED BUILDING ADDITION
 29 RUSSELL AVENUE**
 OTTAWA, ONTARIO
Title: SITE GEOMETRY - REC 2-1 AND REC 2-3

Scale:	1:1250	Date:	10/2022
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SCALE: 1:1250

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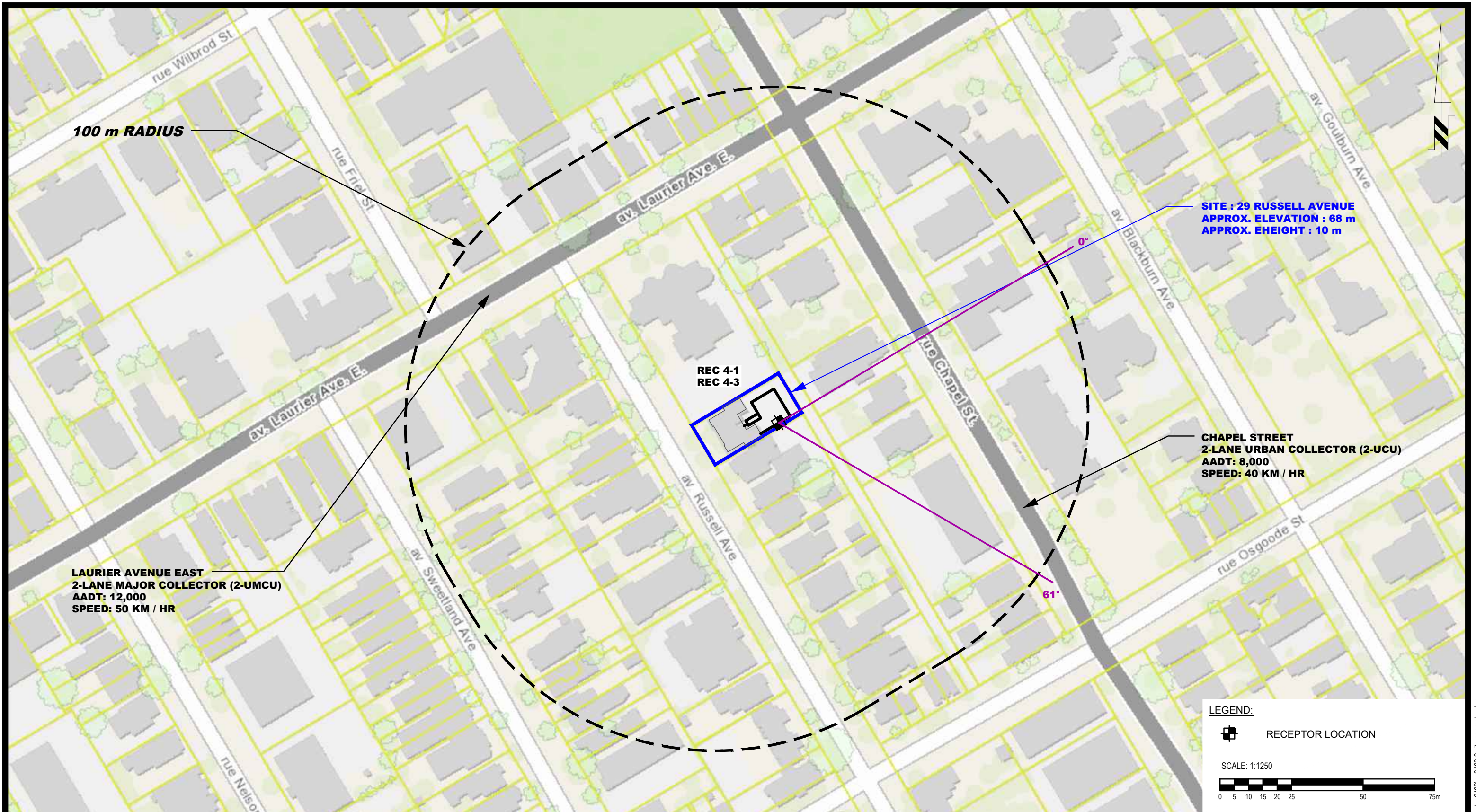
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PROPOSED BUILDING ADDITION
29 RUSSELL AVENUE

OTTAWA, ONTARIO

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

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 PROPOSED BUILDING ADDITION
 29 RUSSELL AVENUE**
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Title: SITE GEOMETRY - REC 4-1 AND REC 4-3

Scale:	1:1250	Date:	10/2022
Drawn by:	YA	Report No.:	PG6480-1
Checked by:	YT	Dwg. No.:	PG6480-3D
Approved by:	SB	Revision No.:	

APPENDIX 2

STAMSON RESULTS

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

Road data, segment # 1: LaurierAve E (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: LaurierAve E (day/night)

Angle1 Angle2 : -55.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 40 %
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

↑

Road data, segment # 2: Chapel St (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000

Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Chapel St (day/night)

 Angle1 Angle2 : -61.00 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 : 50.00 / 50.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: LaurierAve E (day)

Source height = 1.50 m

ROAD (0.00 + 50.14 + 0.00) = 50.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	50	0.66	67.51	0.00	-11.11	-2.77	0.00	-3.50	0.00	50.14

Segment Leq : 50.14 dBA

↑
 Results segment # 2: Chapel St (day)

Source height = 1.50 m

ROAD (0.00 + 49.09 + 0.00) = 49.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-61	0	0.66	63.96	0.00	-8.68	-5.28	0.00	-0.90	0.00	49.09

Segment Leq : 49.09 dBA

Total Leq All Segments: 52.66 dBA

↑
 Results segment # 1: LaurierAve E (night)

Source height = 1.50 m

ROAD (0.00 + 42.54 + 0.00) = 42.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	50	0.66	59.91	0.00	-11.11	-2.77	0.00	-3.50	0.00	42.54

Segment Leq : 42.54 dBA

↑

Results segment # 2: Chapel St (night)

Source height = 1.50 m

ROAD (0.00 + 41.50 + 0.00) = 41.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-61	0	0.66	56.36	0.00	-8.68	-5.28	0.00	-0.90	0.00	41.50

Segment Leq : 41.50 dBA

Total Leq All Segments: 45.06 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 52.66
(NIGHT): 45.06

↑

↑

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

Road data, segment # 1: LaurierAve E (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: LaurierAve E (day/night)

Angle1 Angle2 : -55.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 40 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 / 70.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Chapel St (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000

Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Chapel St (day/night)

 Angle1 Angle2 : -61.00 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 : 50.00 / 50.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: LaurierAve E (day)

 Source height = 1.50 m

ROAD (0.00 + 51.45 + 0.00) = 51.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	50	0.48	67.51	0.00	-9.90	-2.65	0.00	-3.50	0.00	51.45

Segment Leq : 51.45 dBA



Results segment # 2: Chapel St (day)

 Source height = 1.50 m

ROAD (0.00 + 50.19 + 0.00) = 50.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-61	0	0.48	63.96	0.00	-7.74	-5.13	0.00	-0.90	0.00	50.19

Segment Leq : 50.19 dBA

Total Leq All Segments: 53.88 dBA



Results segment # 1: LaurierAve E (night)

Source height = 1.50 m

ROAD (0.00 + 43.86 + 0.00) = 43.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	50	0.48	59.91	0.00	-9.90	-2.65	0.00	-3.50	0.00	43.86

Segment Leq : 43.86 dBA

↑

Results segment # 2: Chapel St (night)

Source height = 1.50 m

ROAD (0.00 + 42.59 + 0.00) = 42.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-61	0	0.48	56.36	0.00	-7.74	-5.13	0.00	-0.90	0.00	42.59

Segment Leq : 42.59 dBA

Total Leq All Segments: 46.28 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 53.88
(NIGHT): 46.28

↑

↑

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

Road data, segment # 1: LaurierAve E (day/night)

```
-----
Car traffic volume : 9715/845   veh/TimePeriod *
Medium truck volume : 773/67    veh/TimePeriod *
Heavy truck volume  : 552/48    veh/TimePeriod *
Posted speed limit  : 50 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 12000
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: LaurierAve E (day/night)

```
-----
Angle1  Angle2      : -22.00 deg  0.00 deg
Wood depth          : 0          (No woods.)
No of house rows    : 2 / 2
House density       : 40 %
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: LaurierAve E (day)

Source height = 1.50 m

ROAD (0.00 + 43.21 + 0.00) = 43.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-22	0	0.66	67.51	0.00	-11.60	-9.20	0.00	-3.50	0.00	43.21

Segment Leq : 43.21 dBA

Total Leq All Segments: 43.21 dBA

↑

Results segment # 1: LaurierAve E (night)

Source height = 1.50 m

ROAD (0.00 + 35.61 + 0.00) = 35.61 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-22 0 0.66 59.91 0.00 -11.60 -9.20 0.00 -3.50 0.00 35.61

Segment Leq : 35.61 dBA

Total Leq All Segments: 35.61 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 43.21
(NIGHT): 35.61

↑

↑

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

Road data, segment # 1: LaurierAve E (day/night)

```
-----
Car traffic volume : 9715/845   veh/TimePeriod *
Medium truck volume : 773/67    veh/TimePeriod *
Heavy truck volume  : 552/48    veh/TimePeriod *
Posted speed limit  : 50 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 12000
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: LaurierAve E (day/night)

```
-----
Angle1  Angle2      : -22.00 deg  0.00 deg
Wood depth          : 0          (No woods.)
No of house rows    : 2 / 2
House density       : 40 %
Surface             : 1          (Absorptive ground surface)
Receiver source distance : 75.00 / 75.00 m
Receiver height     : 7.50 / 7.50 m
Topography          : 1          (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

↑
 Results segment # 1: LaurierAve E (day)

Source height = 1.50 m

ROAD (0.00 + 44.49 + 0.00) = 44.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-22	0	0.48	67.51	0.00	-10.35	-9.18	0.00	-3.50	0.00	44.49

Segment Leq : 44.49 dBA

Total Leq All Segments: 44.49 dBA

↑

Results segment # 1: LaurierAve E (night)

Source height = 1.50 m

ROAD (0.00 + 36.89 + 0.00) = 36.89 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-22 0 0.48 59.91 0.00 -10.35 -9.18 0.00 -3.50 0.00 36.89

Segment Leq : 36.89 dBA

Total Leq All Segments: 36.89 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 44.49
(NIGHT): 36.89

↑

↑

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

Road data, segment # 1: LaurierAve E (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: LaurierAve E (day/night)

Angle1 Angle2 : 0.00 deg 46.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 40 %
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

↑
Road data, segment # 2: Chapel St (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000

Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Chapel St (day/night)

 Angle1 Angle2 : -65.00 deg 65.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 20 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 45.00 / 45.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: LaurierAve E (day)

 Source height = 1.50 m

ROAD (0.00 + 46.16 + 0.00) = 46.16 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 0 46 0.66 67.51 0.00 -11.60 -6.25 0.00 -3.50 0.00 46.16

Segment Leq : 46.16 dBA

↑
 Results segment # 2: Chapel St (day)

 Source height = 1.50 m

ROAD (0.00 + 53.05 + 0.00) = 53.05 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -65 65 0.66 63.96 0.00 -7.92 -2.08 0.00 -0.90 0.00 53.05

Segment Leq : 53.05 dBA

Total Leq All Segments: 53.86 dBA

↑
 Results segment # 1: LaurierAve E (night)

Source height = 1.50 m

ROAD (0.00 + 38.56 + 0.00) = 38.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	46	0.66	59.91	0.00	-11.60	-6.25	0.00	-3.50	0.00	38.56

Segment Leq : 38.56 dBA

↑

Results segment # 2: Chapel St (night)

Source height = 1.50 m

ROAD (0.00 + 45.46 + 0.00) = 45.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	65	0.66	56.36	0.00	-7.92	-2.08	0.00	-0.90	0.00	45.46

Segment Leq : 45.46 dBA

Total Leq All Segments: 46.27 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 53.86
(NIGHT): 46.27

↑

↑

Filename: rec33.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 3-3

Road data, segment # 1: LaurierAve E (day/night)

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 12000
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: LaurierAve E (day/night)

Angle1 Angle2 : 0.00 deg 46.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 40 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 / 75.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Chapel St (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 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): 8000

Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Chapel St (day/night)

 Angle1 Angle2 : -65.00 deg 65.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 20 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 45.00 / 45.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00



Results segment # 1: LaurierAve E (day)

Source height = 1.50 m

ROAD (0.00 + 47.51 + 0.00) = 47.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	46	0.48	67.51	0.00	-10.35	-6.16	0.00	-3.50	0.00	47.51

Segment Leq : 47.51 dBA



Results segment # 2: Chapel St (day)

Source height = 1.50 m

ROAD (0.00 + 54.08 + 0.00) = 54.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	65	0.48	63.96	0.00	-7.06	-1.91	0.00	-0.90	0.00	54.08

Segment Leq : 54.08 dBA

Total Leq All Segments: 54.94 dBA



Results segment # 1: LaurierAve E (night)

Source height = 1.50 m

ROAD (0.00 + 39.91 + 0.00) = 39.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	46	0.48	59.91	0.00	-10.35	-6.16	0.00	-3.50	0.00	39.91

Segment Leq : 39.91 dBA

↑

Results segment # 2: Chapel St (night)

Source height = 1.50 m

ROAD (0.00 + 46.49 + 0.00) = 46.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	65	0.48	56.36	0.00	-7.06	-1.91	0.00	-0.90	0.00	46.49

Segment Leq : 46.49 dBA

Total Leq All Segments: 47.35 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 54.94
(NIGHT): 47.35

↑

↑

Filename: rec41.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 4-1

Road data, segment # 1: Chapel St (day/night)

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 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): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Chapel St (day/night)

 Angle1 Angle2 : 0.00 deg 61.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 20 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 50.00 / 50.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Chapel St (day)

 Source height = 1.50 m

ROAD (0.00 + 49.09 + 0.00) = 49.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	61	0.66	63.96	0.00	-8.68	-5.28	0.00	-0.90	0.00	49.09

Segment Leq : 49.09 dBA

Total Leq All Segments: 49.09 dBA

↑

Results segment # 1: Chapel St (night)

Source height = 1.50 m

ROAD (0.00 + 41.50 + 0.00) = 41.50 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0	61	0.66	56.36	0.00	-8.68	-5.28	0.00	-0.90	0.00	41.50
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Segment Leq : 41.50 dBA

Total Leq All Segments: 41.50 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 49.09

(NIGHT): 41.50

↑

↑

Filename: rec43.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 4-3

Road data, segment # 1: Chapel St (day/night)

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 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): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Chapel St (day/night)

 Angle1 Angle2 : 0.00 deg 61.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 20 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 50.00 / 50.00 m
 Receiver height : 7.50 / 7.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Chapel St (day)

 Source height = 1.50 m

ROAD (0.00 + 50.19 + 0.00) = 50.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	61	0.48	63.96	0.00	-7.74	-5.13	0.00	-0.90	0.00	50.19

Segment Leq : 50.19 dBA

Total Leq All Segments: 50.19 dBA

↑

Results segment # 1: Chapel St (night)

Source height = 1.50 m

ROAD (0.00 + 42.59 + 0.00) = 42.59 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0	61	0.48	56.36	0.00	-7.74	-5.13	0.00	-0.90	0.00	42.59
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Segment Leq : 42.59 dBA

Total Leq All Segments: 42.59 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 50.19

(NIGHT): 42.59

↑

↑