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Environmental Noise Control Study

Proposed Multi-Storey Apartment Building
1400 Bank Street, Ottawa

Prepared For

SerCo Realty Group

September 22, 2021

Report: PG5945-1

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by SerCo Realty Group to conduct an environmental noise control study for the proposed multi-storey apartment building to be located at 1400 Bank Street, 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 sixteen (16) storey apartment building and rise approximately 48 metres above grade. Three (3) basement levels are anticipated at the building, consisting of parking areas, mechanical and electrical rooms. A total of 136 units are expected at the building. Associated at-grade landscaped areas and walkways are also anticipated. A terrace amenity area at 3rd floor rooftop that will serve as an Outdoor Living Area (OLA) is further anticipated at the building.

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 Belanger Avenue followed by commercial and institutional buildings, to the east by Bank Street, to the south by residential dwellings, and to the west by residential dwellings and commercial buildings. Belanger Avenue, Bank Street, Lamira Street and Rockingham Avenue are identified within the 100 m radius of proposed building.

Based on the City of Ottawa's Official Plan, Schedule F, Bank Street is considered a 4 lane urban arterial divided road (4-UAD), and Lamira 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 Bank Street and the Lamira Street to the north and east of the proposed building.

The Beachburg Rail corridor is located just outside the 300 m radius of the proposed building and is therefore not included in this analysis.

All noise sources are presented in Drawing PG5945-3 - 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 %
Bank Street	4-UAD	35000	60	92/8	7	5
Lamira Street	2-UCU	8000	50	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 addition.

Table 5 – 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
Sixteenth Floor	46.5	Living Area/Bedroom	Daytime / Nighttime
Third Floor Rooftop Terrace	10.5	Outdoor Living Area	Daytime / Nighttime

For this analysis, a reception point was taken at the centre of each floor, at the first floor and top floor. An Outdoor Living Area - terrace amenity area is anticipated at third floor rooftop of the proposed building. A reception point in the centre of third floor rooftop terrace, 10.5 m high, was selected for the analysis of this area. Reception points are detailed on Drawing PG5945-2 - 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 PG5945-3A to 3F - 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	1.5	Northern Elevation, 1st Floor	67	60
REC 1-16	46.5	Northern Elevation, 16th Floor	70	62
REC 2-1	1.5	Eastern Elevation, 1st Floor	72	65
REC 2-16	46.5	Eastern Elevation, 16th Floor	72	64
REC 3-1	1.5	Southern Elevation, 1st Floor	61	53
REC 3-16	46.5	Southern Elevation, 16th Floor	63	56
REC 4	10.5	OLA – 3rd Floor Rooftop Terrace	64	N/A*

*Nighttime noise levels at OLA are not considered as per ENCG

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

There is a rooftop terrace amenity area that will serve as an Outdoor Living Area (OLA). One (1) receptor point (REC 4) was selected in the centre of third floor rooftop of proposed building. It is assumed that the rooftop terrace will only be utilized as an Outdoor Living Area (OLA) provided that the proposed building is constructed. The noise levels at the rooftop terrace will be 64 dBA during the daytime period (7:00-23:00), which exceed 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 terrace 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 60 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 4 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 61 dBA and 72 dBA during the daytime period (07:00-23:00) and between 53 dBA and 65 dBA during the nighttime period (23:00-7:00). The noise levels on the northern, eastern, and southern elevations will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. It is also noted that the noise levels on the northern and eastern elevations will exceed 65 dBA. Therefore, units on the northern, eastern, and southern elevations of this building should be supplied with a central air conditioning unit, along with the warning clause Type D, as outlined in Table 3.

This building does exceed the 65 dBA threshold for noise on the northern and eastern elevations. Therefore, an analysis of the building materials will be required. However, at this time the building materials and exterior wall construction details have not been finalized. Therefore, a review of the proposed building materials on the northern and eastern elevations will need to be completed.

Proposed Construction Specifications

It is understood that typical window and wall details are proposed for the residential buildings. The effectiveness of the noise insulation can be expressed as the Acoustical Insulation Factor (AIF), calculated as follows:

$$AIF = L_{eq(16)(Exterior)} - L_{eq(16)(Interior)} + 10\log_{10}(N) + 2 \text{ dBA}$$

Where:

$L_{eq(16)(Exterior)}$ = Calculated value at the window pane
$L_{eq(16)(Interior)}$ = 45 dBA
N = number of components in the room

No floor plans or detailed design drawings were provided for this portion of the review. A conservative approach is to assume that there are 2 components per room. Therefore, the AIF would need to be at least 32 dBA.

A conversion from AIF to a Standard Transmission Class (STC) rating will require the knowledge of room dimensions in addition to the wall and window dimensions. However, a conservative approach would be to increase the AIF factor by 3. **Therefore, provided the building materials of either the windows and/or exterior walls have an STC rating of 35 or higher, this would be a sufficient noise attenuation device.**

A review of industry standards for construction material indicates that, as long as the exterior cladding of the northern and eastern elevations consist of brick or concrete panels and that all windows consist of double pane glass, these materials have an STC rating of greater than 35 and are considered acceptable. If alternative materials are to be utilized on the northern and eastern elevations, then a review will need to be completed once design details are finalized.

7.0 Summary of Findings

The subject site is located at 1400 Bank Street, in the City of Ottawa. It is understood that the proposed development will consist of sixteen (16) storey apartment building and rise approximately 48 metres above grade. There are two major sources of surface transportation noise to the proposed building: Bank Street and Lamira 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 northern, eastern, and southern elevations of the proposed building are expected to exceed the 55 dBA threshold specified by the ENCG. It is also noted that the noise levels on the northern and eastern elevations will exceed 65 dBA. Therefore, the installation of a central air conditioning unit, along with a warning clause Type D, will be required for the units on the northern, eastern, and southern elevations of proposed building. A review of industry standards for construction material indicates that, provided the exterior cladding of the northern and eastern elevations consist of brick or concrete panels and that all windows consist of double pane glass, these materials have an STC rating of greater than 35 and are considered acceptable.

The surface transportation noise analysis was completed at the Outdoor Living Area – third floor rooftop terrace as well. The results of STAMSON modeling indicate that the noise levels at the rooftop terrace is expected to exceed 60 dBA during the daytime period. 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 addition of a solid 1 m noise barrier around the perimeter of the outdoor living area found that the noise levels can be reduce to 60 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.

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

> "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."

"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 SerCo Realty Group 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.

September 22, 2021

Yolanda Tang, M.Sc.Eng Stephanie A. Boisvenue, P.Eng.

Report Distribution:

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APPENDIX 1

TABLE 7 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG5945-1 - SITE PLAN

DRAWING PG5945-2 - RECEPTOR LOCATION PLAN

DRAWING PG5945-3 – SITE GEOMETRY

DRAWING PG5945-3A - SITE GEOMETRY (REC 1-1 and REC 1-16)

DRAWING PG5945-3B - SITE GEOMETRY (REC 2-1)

DRAWING PG5945-3C - SITE GEOMETRY (REC 2-16)

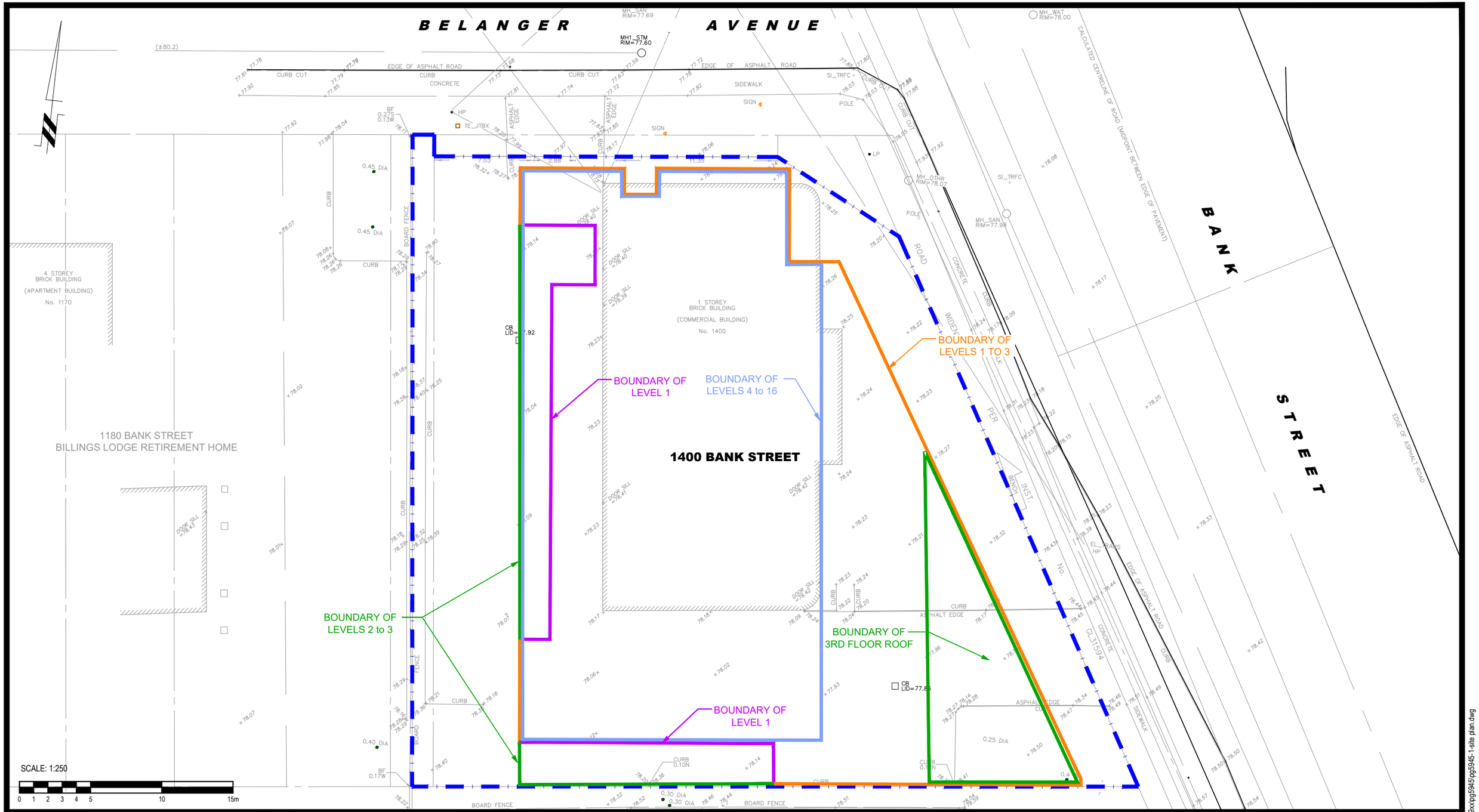
DRAWING PG5945-3D - SITE GEOMETRY (REC 3-1)

DRAWING PG5945-3E - SITE GEOMETRY (REC 3-16)

DRAWING PG5945-3F - SITE GEOMETRY (REC 4)

Table 7 - Summary of Reception Points and Geometry
1400 Bank Street

Point of Reception	Location	Leq Day (dBA)	Bank Street						Lamira 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	67	20	1.5	20.1	-90, 0	n/a	n/a	15	1.5	15.1	-34, -22	n/a	n/a
REC 1-16	Northern Elevation, 16th Floor	70	20	46.5	50.6	-90, 0	n/a	n/a	15	46.5	48.9	-34, -22	n/a	n/a
REC 2-1	Eastern Elevation, 1st Floor	72	15	1.5	15.1	-82, 86	n/a	n/a	45	1.5	45.0	-52, -15	n/a	n/a
REC 2-16	Eastern Elevation, 16th Floor	72	20	46.5	50.6	-90, 59	n/a	n/a	45	46.5	64.7	-68, -36	n/a	n/a
REC 3-1	Southern Elevation, 1st Floor	61	40	1.5	40.0	0, 51	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
REC 3-16	Southern Elevation, 16th Floor	63	45	46.5	64.7	0, 51	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
REC 4	3rd Floor Rooftop Terrace	64	15	10.5	18.3	-81, 86	n/a	n/a	60	10.5	60.9	-59, -21	n/a	n/a



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SERCO REALTY GROUP

NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY APARTMENT BUILDING
1400 BANK STREET

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:250	Date: 08/2021
Drawn by: YA	Report No.: PG5945-1
Checked by: YT	Dwg. No.: PG5945-1
Approved by: SB	Revision No.:

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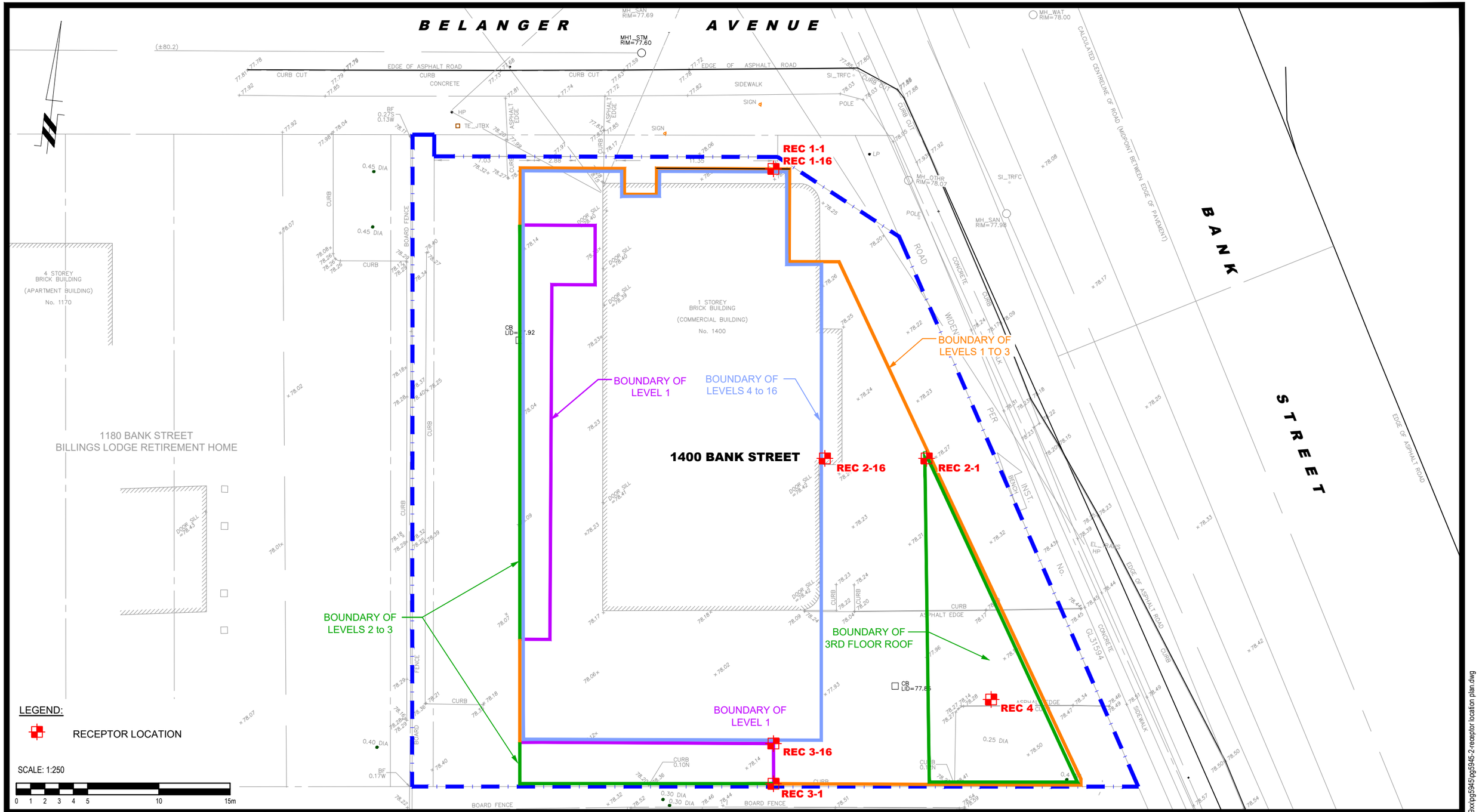

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OTTAWA, ONTARIO

Title:

RECEPTOR LOCATION PLAN

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Drawn by: YA	Report No.: PG5945-1
Checked by: YT	Dwg. No.: PG5945-2
Approved by: SB	Revision No.:

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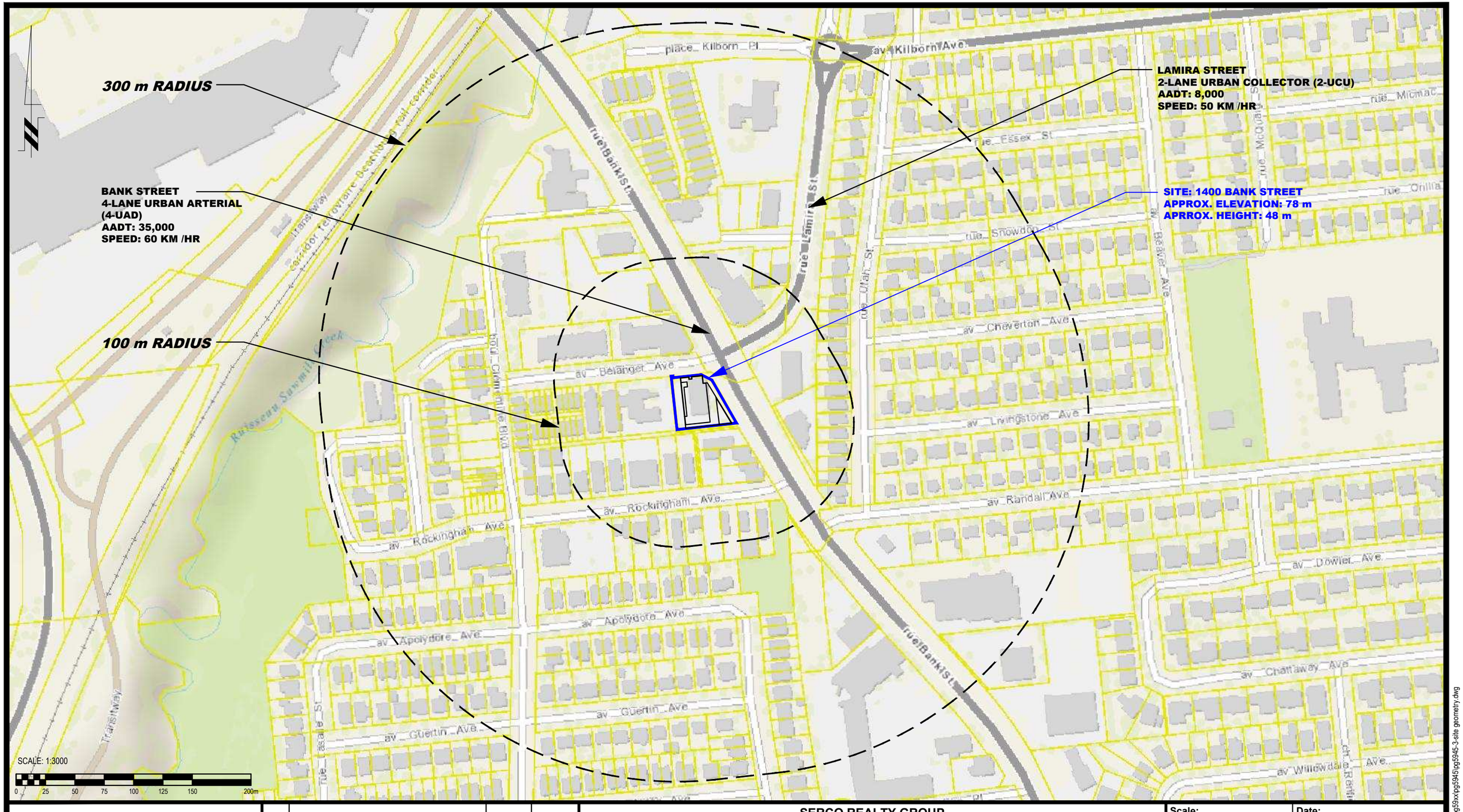

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OTTAWA, ONTARIO

Title:

SITE GEOMETRY

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Approved by: SB	Revision No.:

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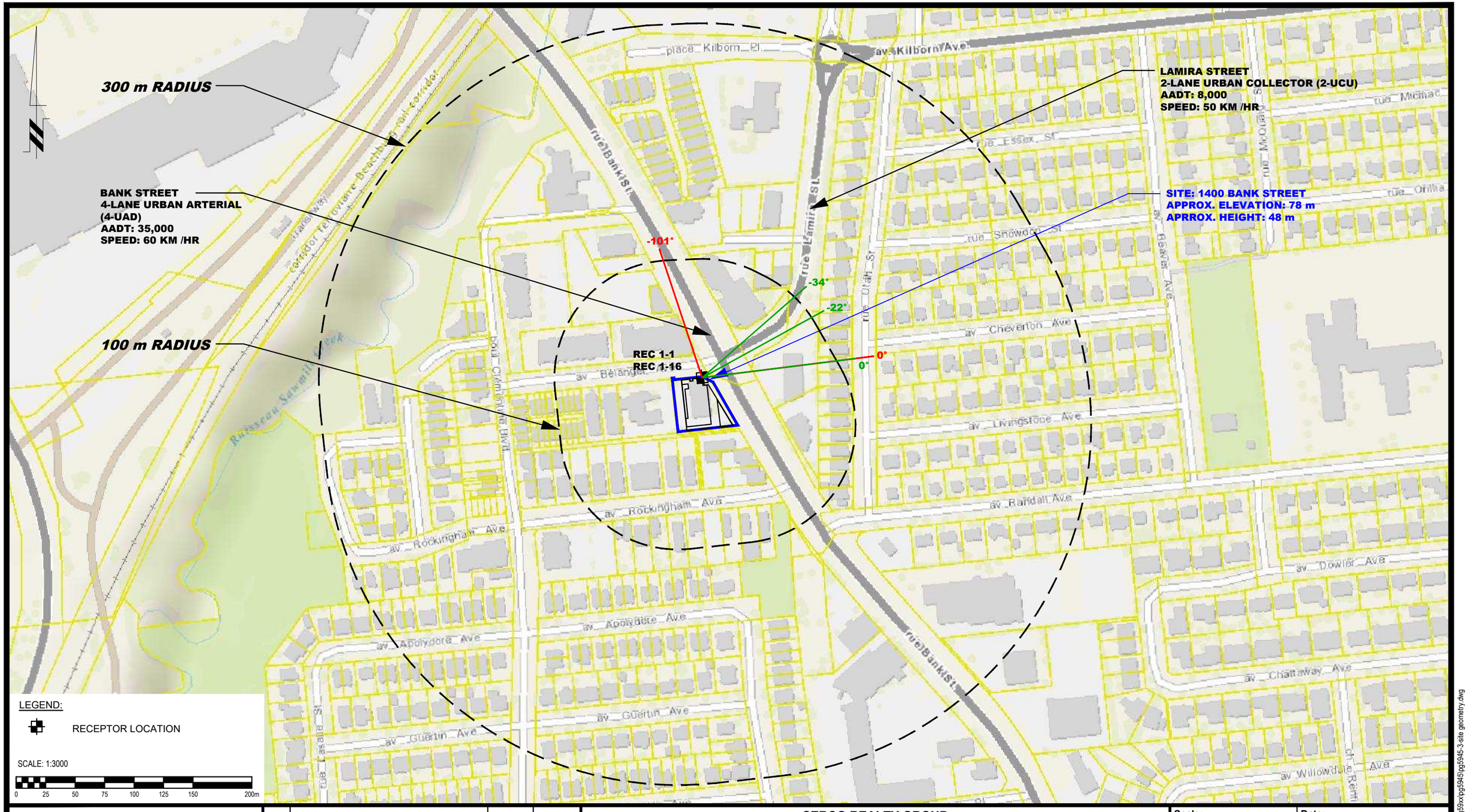

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1400 BANK STREET

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 1-1 AND REC 1-16

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Approved by: SB	Revision No.:

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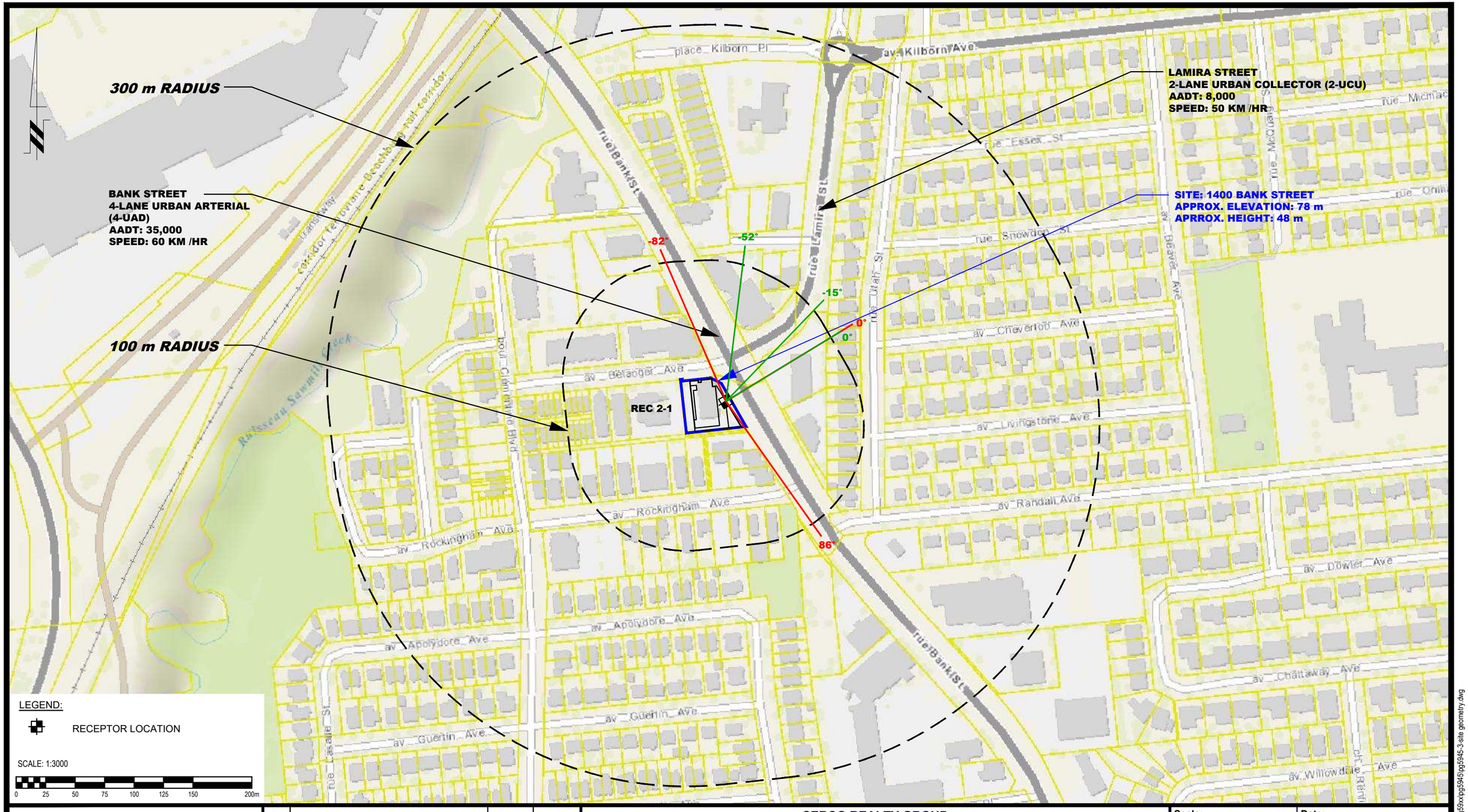

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1400 BANK STREET

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 2-1

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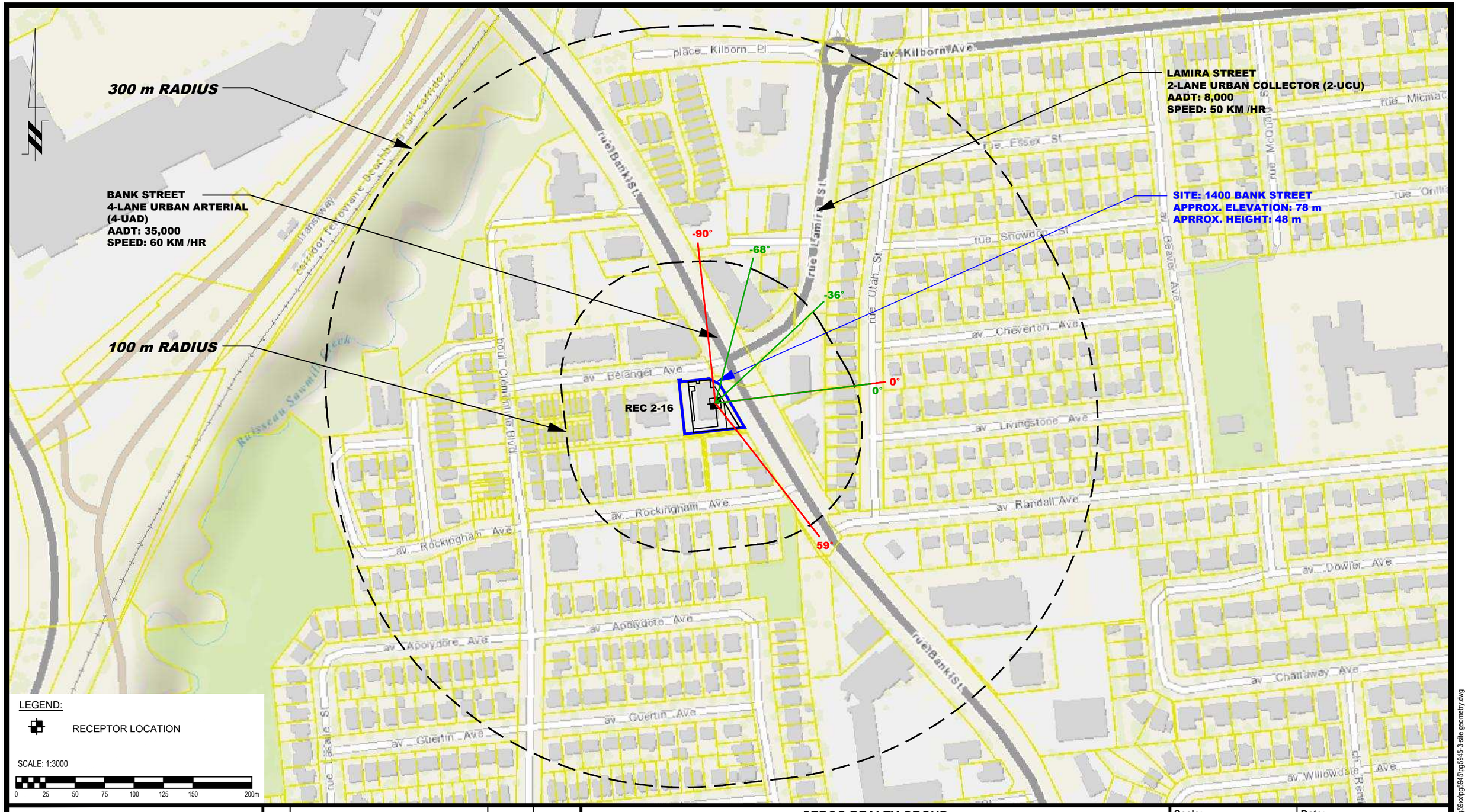

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Title:

SITE GEOMETRY - REC 2-16

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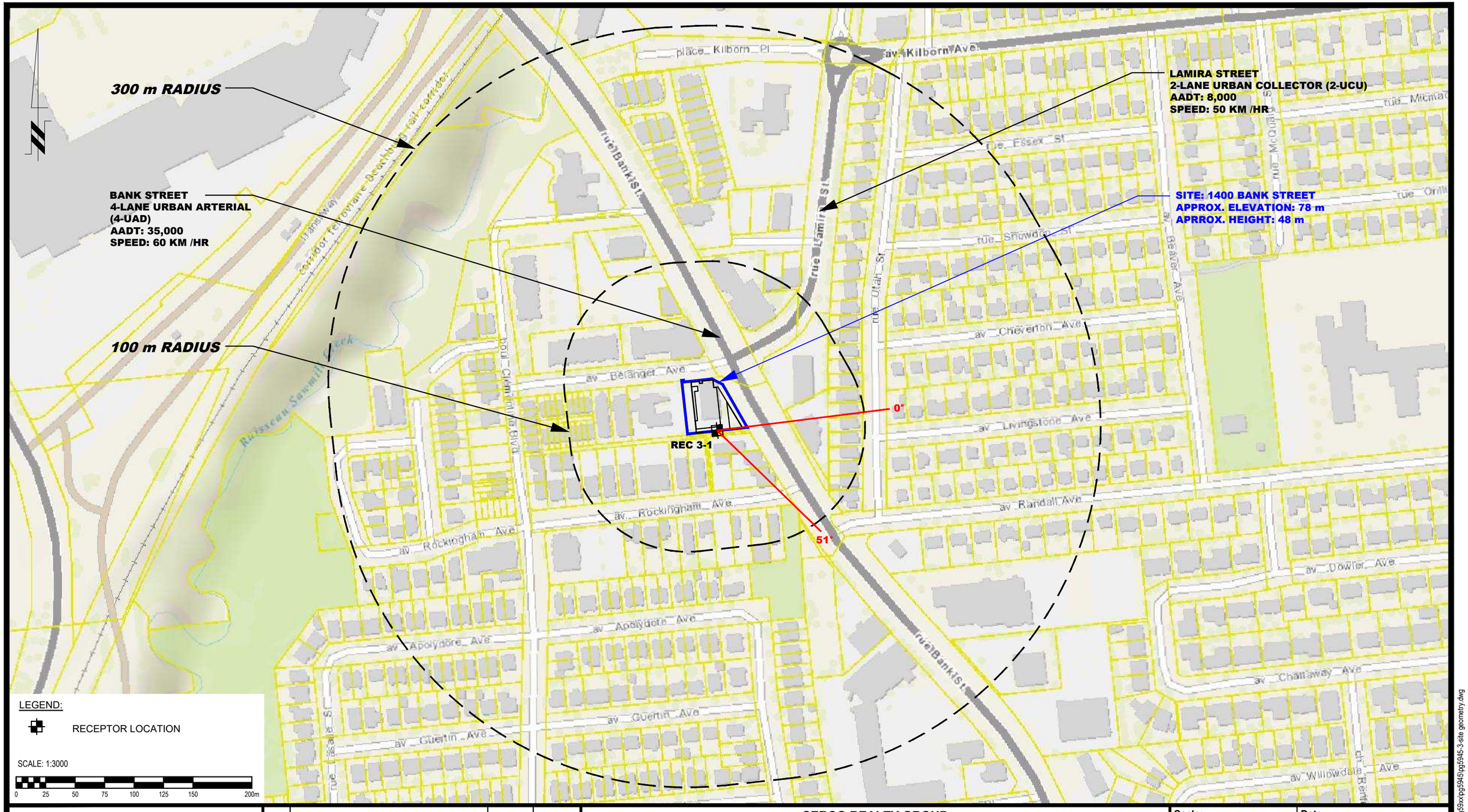

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Title:

SITE GEOMETRY - REC 3-1

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Approved by: SB	Revision No.:

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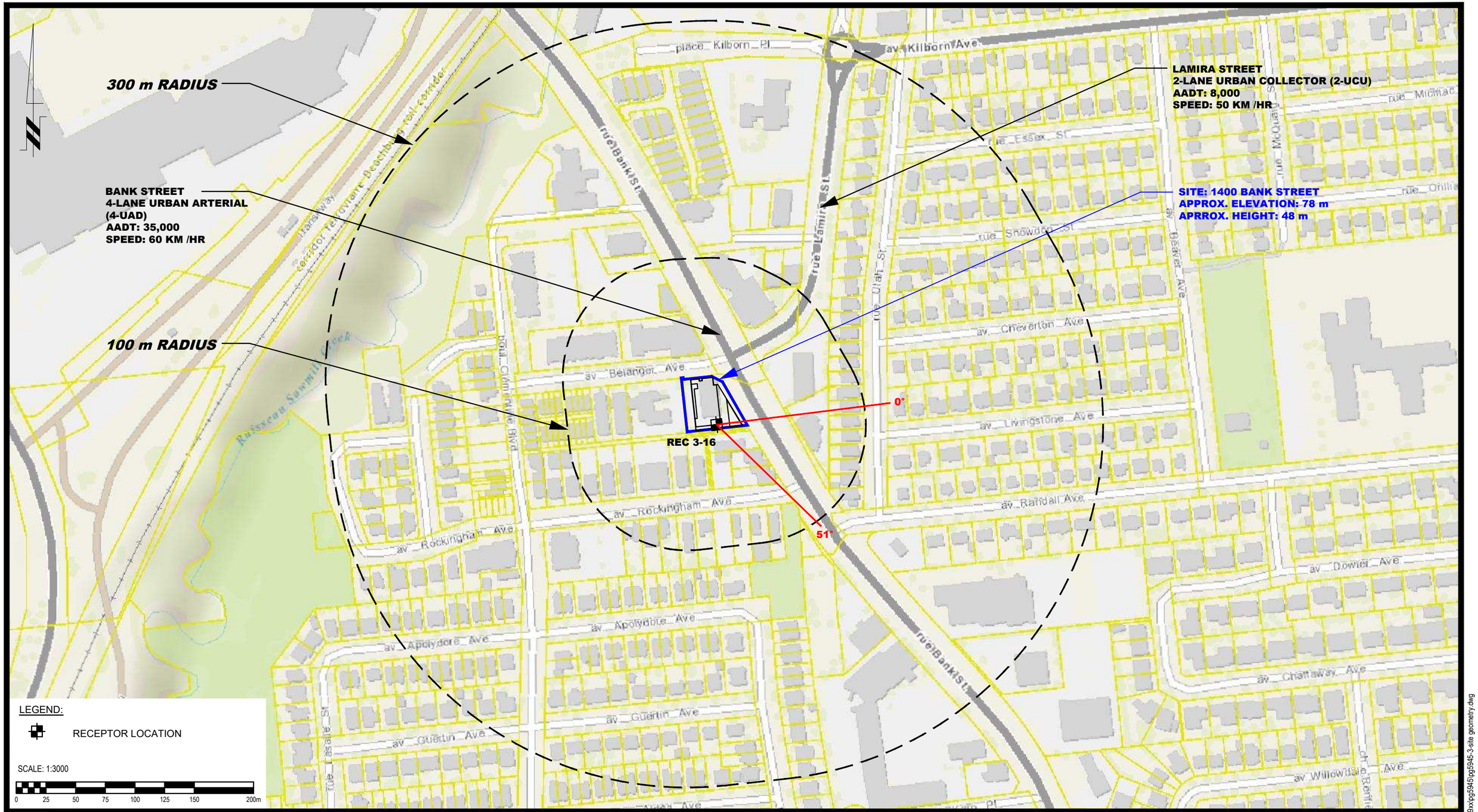

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NO.	REVISIONS	DATE	INITIAL

SERCO REALTY GROUP

NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY APARTMENT BUILDING
1400 BANK STREET

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 3-16

Scale: 1:3000	Date: 08/2021
Drawn by: YA	Report No.: PG5945-1
Checked by: YT	Dwg. No.: PG5945-3E
Approved by: SB	Revision No.:

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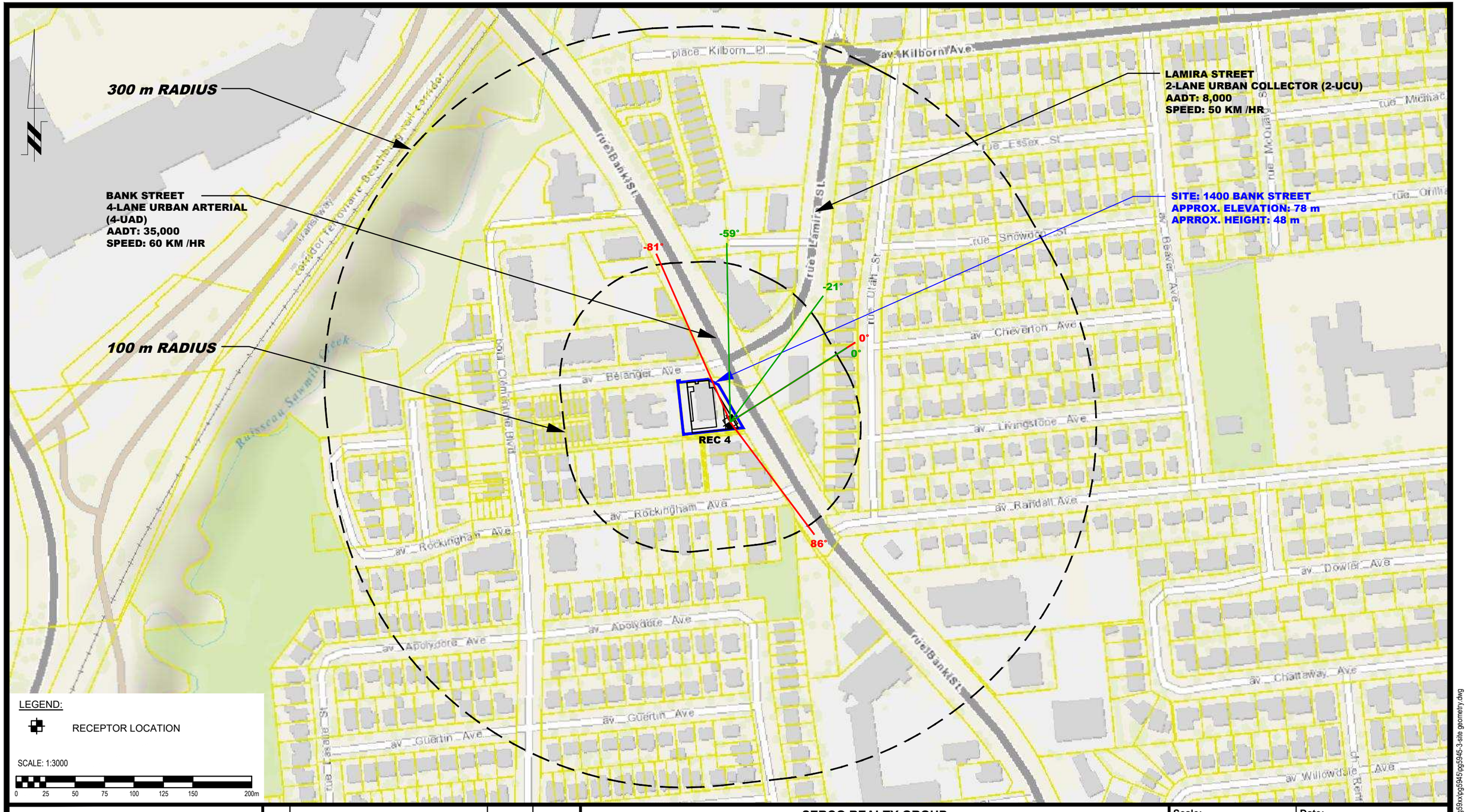

LEGEND:

RECEPTOR LOCATION

SCALE: 1:3000

0 25 50 75 100 125 150 200m

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NO.	REVISIONS	DATE	INITIAL

SERCO REALTY GROUP

NOISE ATTENUATION STUDY
PROPOSED MULTI-STOREY APARTMENT BUILDING
1400 BANK STREET

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 4

Scale: 1:3000	Date: 08/2021
Drawn by: YA	Report No.: PG5945-1
Checked by: YT	Dwg. No.: PG5945-3F
Approved by: SB	Revision No.:

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APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 17-08-2021 17:41:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Road data, segment # 2: Lamira 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 : 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): 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: Lamira St (day/night)
-------------------------------------------
Angle1   Angle2           : -34.00 deg   -22.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: Bank Street (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.13 + 0.00) = 67.13 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.66  73.68   0.00  -2.07  -4.47   0.00   0.00   0.00  67.13
-------------------------------------------------------------------------------

Segment Leq : 67.13 dBA
```

↟

```
Results segment # 2: Lamira St (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.63 + 0.00) = 53.63 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -34    -22   0.66  65.75   0.00   0.00 -12.12   0.00   0.00   0.00  53.63
-------------------------------------------------------------------------------

Segment Leq : 53.63 dBA

Total Leq All Segments: 67.32 dBA
```

↟

```
Results segment # 1: Bank Street (night)
----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 59.54 + 0.00) = 59.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	66.08	0.00	-2.07	-4.47	0.00	0.00	0.00	59.54

Segment Leq : 59.54 dBA

Results segment # 2: Lamira St (night)

Source height = 1.50 m

ROAD (0.00 + 46.03 + 0.00) = 46.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	-22	0.66	58.16	0.00	0.00	-12.12	0.00	0.00	0.00	46.03

Segment Leq : 46.03 dBA

Total Leq All Segments: 59.73 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.32
(NIGHT): 59.73

STAMSON 5.0 NORMAL REPORT Date: 17-08-2021 17:43:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec116.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-16

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

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 46.50 / 46.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Road data, segment # 2: Lamira 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 : 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): 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: Lamira St (day/night)
-------------------------------------------
Angle1   Angle2           : -34.00 deg   -22.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: Bank Street (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.42 + 0.00) = 69.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.00  73.68   0.00  -1.25  -3.01   0.00   0.00   0.00  69.42
-------------------------------------------------------------------------------

Segment Leq : 69.42 dBA
```

↟

```
Results segment # 2: Lamira St (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.99 + 0.00) = 53.99 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -34    -22   0.00  65.75   0.00   0.00 -11.76   0.00   0.00   0.00  53.99
-------------------------------------------------------------------------------

Segment Leq : 53.99 dBA

Total Leq All Segments: 69.54 dBA
```

↟

```
Results segment # 1: Bank Street (night)
----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 61.82 + 0.00) = 61.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.08	0.00	-1.25	-3.01	0.00	0.00	0.00	61.82

Segment Leq : 61.82 dBA

Results segment # 2: Lamira St (night)

Source height = 1.50 m

ROAD (0.00 + 46.40 + 0.00) = 46.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	-22	0.00	58.16	0.00	0.00	-11.76	0.00	0.00	0.00	46.40

Segment Leq : 46.40 dBA

Total Leq All Segments: 61.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.54
(NIGHT): 61.94

STAMSON 5.0 NORMAL REPORT Date: 17-08-2021 17:45:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -82.00 deg 86.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Road data, segment # 2: Lamira 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 : 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): 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: Lamira St (day/night)
-------------------------------------------
Angle1   Angle2           : -52.00 deg   -15.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
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: Bank Street (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 72.16 + 0.00) = 72.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -82     86   0.66  73.68   0.00   0.00  -1.52   0.00   0.00   0.00  72.16
-------------------------------------------------------------------------------

Segment Leq : 72.16 dBA
```

↟

```
Results segment # 2: Lamira St (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 50.38 + 0.00) = 50.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -52    -15   0.66  65.75   0.00  -7.92  -7.45   0.00   0.00   0.00  50.38
-------------------------------------------------------------------------------

Segment Leq : 50.38 dBA

Total Leq All Segments: 72.19 dBA
```

↟

```
Results segment # 1: Bank Street (night)
----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 64.56 + 0.00) = 64.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-82	86	0.66	66.08	0.00	0.00	-1.52	0.00	0.00	0.00	64.56

Segment Leq : 64.56 dBA

Results segment # 2: Lamira St (night)

Source height = 1.50 m

ROAD (0.00 + 42.79 + 0.00) = 42.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-52	-15	0.66	58.16	0.00	-7.92	-7.45	0.00	0.00	0.00	42.79

Segment Leq : 42.79 dBA

Total Leq All Segments: 64.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.19
(NIGHT): 64.59

STAMSON 5.0 NORMAL REPORT Date: 17-08-2021 17:46:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec216.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2-16

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

Angle1 Angle2 : -90.00 deg 59.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 46.50 / 46.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Road data, segment # 2: Lamira 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 : 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): 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: Lamira St (day/night)
-------------------------------------------
Angle1   Angle2           : -68.00 deg   -36.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  45.00 / 45.00  m
Receiver height           :  46.50 / 46.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠝
Results segment # 1: Bank Street (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.61 + 0.00) = 71.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     59   0.00  73.68   0.00  -1.25  -0.82   0.00   0.00   0.00  71.61
-------------------------------------------------------------------------------

Segment Leq : 71.61 dBA

🠝
Results segment # 2: Lamira St (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.48 + 0.00) = 53.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -68    -36   0.00  65.75   0.00  -4.77  -7.50   0.00   0.00   0.00  53.48
-------------------------------------------------------------------------------

Segment Leq : 53.48 dBA

Total Leq All Segments: 71.68 dBA

🠝
Results segment # 1: Bank Street (night)
----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 64.01 + 0.00) = 64.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	59	0.00	66.08	0.00	-1.25	-0.82	0.00	0.00	0.00	64.01

Segment Leq : 64.01 dBA

↟

Results segment # 2: Lamira St (night)

Source height = 1.50 m

ROAD (0.00 + 45.88 + 0.00) = 45.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-68	-36	0.00	58.16	0.00	-4.77	-7.50	0.00	0.00	0.00	45.88

Segment Leq : 45.88 dBA

Total Leq All Segments: 64.08 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 71.68
(NIGHT): 64.08

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 12-08-2021 16:47:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 0.00 deg 51.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank Street (day)

Source height = 1.50 m

ROAD (0.00 + 60.73 + 0.00) = 60.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	51	0.66	73.68	0.00	-7.07	-5.87	0.00	0.00	0.00	60.73

Segment Leq : 60.73 dBA

Total Leq All Segments: 60.73 dBA

↟
Results segment # 1: Bank Street (night)

Source height = 1.50 m

ROAD (0.00 + 53.13 + 0.00) = 53.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	51	0.66	66.08	0.00	-7.07	-5.87	0.00	0.00	0.00	53.13

Segment Leq : 53.13 dBA

Total Leq All Segments: 53.13 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 60.73
(NIGHT): 53.13
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 12-08-2021 16:48:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec316.te Time Period: Day/Night 16/8 hours
Description: Reception Point 3-16

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

Angle1 Angle2 : 0.00 deg 51.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 45.00 / 45.00 m
Receiver height : 46.50 / 46.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Results segment # 1: Bank Street (day)

Source height = 1.50 m

ROAD (0.00 + 63.43 + 0.00) = 63.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	51	0.00	73.68	0.00	-4.77	-5.48	0.00	0.00	0.00	63.43

Segment Leq : 63.43 dBA

Total Leq All Segments: 63.43 dBA

↟
Results segment # 1: Bank Street (night)

Source height = 1.50 m

ROAD (0.00 + 55.83 + 0.00) = 55.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	51	0.00	66.08	0.00	-4.77	-5.48	0.00	0.00	0.00	55.83

Segment Leq : 55.83 dBA

Total Leq All Segments: 55.83 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 63.43
(NIGHT): 55.83
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 17-08-2021 17:48:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -81.00 deg 86.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 10.50 / 10.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -81.00 deg Angle2 : 86.00 deg
Barrier height : 9.00 m
Barrier receiver distance : 5.00 / 5.00 m
Source elevation : 78.00 m
Receiver elevation : 78.00 m
Barrier elevation : 78.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Lamira 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 : 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):   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: Lamira St (day/night)
------------------------------------------
Angle1   Angle2           : -59.00 deg   -21.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -59.00 deg   Angle2 : -21.00 deg
Barrier height            :   9.00 m
Barrier receiver distance :   5.00 / 5.00   m
Source elevation          :  78.00 m
Receiver elevation        :  78.00 m
Barrier elevation         :  78.00 m
Reference angle           :   0.00

↟
Results segment # 1: Bank Street (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 !       10.50 !        7.50 !        85.50

ROAD (0.00 + 63.70 + 0.00) = 63.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -81     86   0.00  73.68   0.00   0.00  -0.33   0.00   0.00  -9.65  63.70
-------------------------------------------------------------------------------

Segment Leq : 63.70 dBA

↟
```

Results segment # 2: Lamira St (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	9.75	87.75

ROAD (0.00 + 50.13 + 0.00) = 50.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-59	-21	0.00	65.75	0.00	-6.02	-6.75	0.00	0.00	-2.07	50.90*
-59	-21	0.39	65.75	0.00	-8.37	-7.25	0.00	0.00	0.00	50.13

* Bright Zone !

Segment Leq : 50.13 dBA

Total Leq All Segments: 63.89 dBA

↟

Results segment # 1: Bank Street (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	7.50	85.50

ROAD (0.00 + 56.11 + 0.00) = 56.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-81	86	0.00	66.08	0.00	0.00	-0.33	0.00	0.00	-9.65	56.11

Segment Leq : 56.11 dBA

↟

Results segment # 2: Lamira St (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	9.75	87.75

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
-59	-21	0.00	58.16	0.00	-6.02	-6.75	0.00	0.00	-2.07	43.31*
-59	-21	0.39	58.16	0.00	-8.37	-7.25	0.00	0.00	0.00	42.54

* Bright Zone !

Segment Leq : 42.54 dBA

Total Leq All Segments: 56.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.89
(NIGHT): 56.30

STAMSON 5.0 NORMAL REPORT Date: 17-08-2021 17:49:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -81.00 deg 86.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 10.50 / 10.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -81.00 deg Angle2 : 86.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 5.00 / 5.00 m
Source elevation : 78.00 m
Receiver elevation : 78.00 m
Barrier elevation : 78.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Lamira 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 : 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):   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: Lamira St (day/night)
-------------------------------------------
Angle1   Angle2           : -59.00 deg   -21.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -59.00 deg   Angle2 : -21.00 deg
Barrier height            :  10.00 m
Barrier receiver distance :   5.00 / 5.00   m
Source elevation          :  78.00 m
Receiver elevation        :  78.00 m
Barrier elevation         :  78.00 m
Reference angle           :   0.00

↟
Results segment # 1: Bank Street (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 !       10.50 !        7.50 !        85.50

ROAD (0.00 + 60.16 + 0.00) = 60.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -81     86   0.00  73.68   0.00   0.00  -0.33   0.00   0.00 -13.19  60.16
-------------------------------------------------------------------------------

Segment Leq : 60.16 dBA

↟
```

Results segment # 2: Lamira St (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	9.75	87.75

ROAD (0.00 + 47.71 + 0.00) = 47.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-59	-21	0.00	65.75	0.00	-6.02	-6.75	0.00	0.00	-5.26	47.71

Segment Leq : 47.71 dBA

Total Leq All Segments: 60.40 dBA

↟
Results segment # 1: Bank Street (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	10.50	7.50	85.50

ROAD (0.00 + 52.57 + 0.00) = 52.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-81	86	0.00	66.08	0.00	0.00	-0.33	0.00	0.00	-13.19	52.57

Segment Leq : 52.57 dBA

↟
Results segment # 2: Lamira St (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 !       10.50 !        9.75 !        87.75

ROAD (0.00 + 40.12 + 0.00) = 40.12 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -59    -21   0.00  58.16   0.00  -6.02  -6.75   0.00   0.00  -5.26  40.12
-------------------------------------------------------------------------------

Segment Leq : 40.12 dBA

Total Leq All Segments: 52.81 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 60.40
                           (NIGHT): 52.81
↟
↟
```