Environmental Noise Control Study
Proposed Mixed-Use Building

47 Beechwood Avenue, 5 Springfield Road,
and 12 Douglas Avenue
Ottawa, Ontario

Prepared for Mr. Hussain Rahal

Report PG6487-1 Revision 1 dated May 8, 2024

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Mr. Hussain Rahal to conduct an environmental noise control study for the proposed mixed-use building to be located at 47 Beechwood Avenue, 5 Springfield Road, and 12 Douglas 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 the 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 an eight (8) storey mixed-use building. The proposed mixed-use building will consist of 4 commercial units and 123 residential units. It is further understood that the ground floor will consist of commercial units and residential units, and the upper levels will consist of residential units. Associated walkways, driveways, and landscaped areas are further anticipated. Outdoor living areas, and balcony terraces greater than 4 m in depth, were further identified in the updated 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 the 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, and 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 the 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 of providing a minimum 20 dBA noise reduction. The noise level limits of residential buildings are 45 dBA daytime and 40 dBA nighttime. Therefore, where noise levels exceed 55 dBA during daytime and 50 dBA at nighttime, the ventilation for the building should consider the provision for central air conditioning. Where noise levels exceed 65 dBA during daytime and 60 dBA at 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 dBA < Leq ≤ 60 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 (Leq > 60 dBA), noise control measures are required to reduce Leq 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 problems:

Table 3 – Warning Clauses for Outdoor Living Areas

Leq (dBA)	Warning Clause	Description
55 dBA < $L_{eq(16)}$ ≤ 60 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 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."

- 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 dBA < $L_{eq(16)}$ ≤ 65 dBA 50 dBA < $L_{eq(8)}$ ≤ 60 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 dBA < $L_{eq(16)}$ 60 dBA < $L_{eq(8)}$	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."

- 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 proposed residential development is not in proximity to any existing or approved stationary sources of noise. Therefore, a stationary noise analysis will not be required with respect to off-site stationary noise sources impacting the proposed development.

However, if the proposed development is expected to include roof top units a stationary noise study with respect to these new stationary noise sources will be completed under a separate cover.

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 residential dwellings and commercial buildings; to the east by Douglas Avenue followed by residential dwellings, commercial buildings and Beechwood Avenue; to the south by Beechwood Avenue followed by parking areas, commercial buildings, and Loyer Street; and to the west by Springfield Road followed by residential dwellings, commercial buildings, parking lot, Bertrand Street, and Schoolhouse Private. Douglas Avenue, Beechwood Avenue, Loyer Street, Springfield Road, Bertrand Street, and Schoolhouse Private are identified within the 100 m radius of the proposed development.

Based on the City of Ottawa's Official Plan, Beechwood Avenue is considered a 2-lane urban arterial road (2-UAU). Springfield Road 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 Beechwood Avenue to the south and Springfield Road to the west of the proposed development.

All noise sources are presented in Drawing PG6487-3 - 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 %
Beechwood Avenue	2-UAU	15000	50	92/8	7	5
Springfield Road	2-UCU	8000	50	92/8	7	5

➢ Data obtained from the City of Ottawa document ENCG

Five (5) levels of reception points were selected for this analysis. The following elevations were selected from the heights provided on the survey plan for the subject building.

Table 6 – Elevations of Reception Points			
Floor Number	**Elevation at the Centre of the Window (m)**	**Floor Use**	**Daytime / Nighttime Analysis**
First Floor	1.5	Living Area/Bedroom	Daytime / Nighttime
Seventh Floor	21.5	Living Area/Bedroom	Daytime / Nighttime
Balcony Terrace – 2nd Floor	4.5	--	Outdoor Living Area
Balcony Terrace – 4th Floor	11.5	--	Outdoor Living Area
Balcony Terrace – 7th Floor	21.5	--	Outdoor Living Area

For this analysis, a reception point was taken at the centre of each floor, at the first floor and top floor. Outdoor living areas, consisting of the balcony terraces, are anticipated at the proposed building. A total of four (4) receptor points were selected in the centre of the second-floor, fourth-floor and seventh-floor terraces, at heights 4.5 m, 11.5 m and 21.5 m, respectively. It should be noted that only terraces with widths greater than 4.0 m were analyzed as per City of Ottawa standards. Reception points are detailed in Drawing PG6487-2 - 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 PG6487-3A to 3K - 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 a 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 modelling can be found in Appendix 2, and the summary of the results can be found in Table 7.

Table 7: 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	Southern Elevation, 1st Floor	67	59
REC 1-7	21.5	Southern Elevation, 7th Floor	68	60
REC 2-1	1.5	Western Elevation, 1st Floor	65	57
REC 2-7	21.5	Western Elevation, 7th Floor	67	59
REC 3-1	1.5	Northern Elevation, 1st Floor	57	49
REC 3-7	21.5	Northern Elevation, 7th Floor	59	51
REC 4-1	1.5	Eastern Elevation, 1st Floor	59	51
REC 4-7	21.5	Eastern Elevation, 7th Floor	62	55
REC 5	11.5	Balcony - 4th Floor Terrace (Southern Elevation)	62	--
REC 6	21.5	Balcony - 7th Floor Terrace (Southern Elevation)	57	--
REC 7	4.5	Balcony – 2nd Floor Terrace (Western Elevation)	65	--
REC 8	11.5	Balcony - 4th Floor Terrace (Northern Elevation)	48	--

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

Terraces are anticipated at the balconies of the proposed building. One (1) receptor point was selected on the second-floor terrace (REC 7), two (2) receptor points were selected on the fourth-floor terrace (REC 5 and REC 8), and one (1) receptor point was selected on the seventh-floor terrace (REC 6) for analysis. It should be noted that an outdoor living area located on the second-floor terrace on the northern elevation of the proposed building was initially identified for analysis. However, upon review, it was noted that this terrace is too narrow to be considered an outdoor living area and therefore is not included in this analysis.

It is assumed that the balcony terraces will only be utilized as outdoor living areas provided that the proposed building is constructed. Utilizing the exteriors of the proposed building as noise barriers, the noise levels at the fourth-floor and seventh-floor balcony terraces on the southern elevation will be 62 dBA and 57 dBA, respectively, which exceed the 55 dBA threshold value specified by the ENCG. The noise level at the second-floor balcony terrace on the western elevation will be 65 dBA, which exceeds the 55 dBA threshold value. The noise level at the fourth-floor balcony terrace on the northern elevation will be 48 dBA, which is below the 55 dBA threshold value specified by the ENCG.

Upon review of the aforementioned result for the proposed building, a noise attenuation feature consisting of solid glass railings surrounding the fourth-floor and seventh-floor balcony terraces on the southern elevation and the second-floor balcony terrace on the western elevation was considered. The solid glass railings would be considered noise barriers and are designed to be 1 m high. The glass railings, in addition to utilizing the exteriors of the proposed building as noise barriers, were completed as REC 5TR, REC 6TR and REC 7TR, and are included in Appendix 2. The results of STAMSON modelling indicate that, with the combination of the application of exterior claddings and the 1 m high noise barriers, the anticipated noise levels at the fourth-floor and seventh-floor balcony terraces on the southern elevation and the second-floor balcony terrace on the western elevation will be 58 dBA, 54 dBA and 60 dBA, respectively, during the daytime period (7:00-23:00). Since the noise levels at the second-floor and fourth-floor balcony terraces, with the inclusion of noise barriers, cannot be economically reduced to 55 dBA, these exceedances in noise levels are 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 modelling indicate that the noise levels at proposed mixed-use building will range between 58 dBA and 68 dBA during the daytime period (07:00-23:00) and between 50 dBA and 60 dBA during the nighttime period (23:00-07:00). The noise levels on the southern, western, northern, and eastern elevations of proposed building will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. Also, the noise levels on the southern and western elevations of the proposed building will exceed the 65 dBA threshold. Therefore, all units of this proposed 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 southern and western 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 southern and western elevations will need to be completed.

Proposed Construction Specifications

It is understood that typical window and wall details are proposed for the residential building. 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 28 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 31 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 southern and western 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 31 and are considered acceptable. It is understood based on conversations with Project 1 Studios that the proposed exterior building materials will be comprised of concrete with brick or masonry cladding. As brick and Masonry Stone have an STC rating higher than 31 these materials are considered acceptable. Reference can further be made to Appendix 3 for building material industry standards. If alternative materials are to be utilized on the southern and western 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 47 Beechwood Avenue, 5 Springfield Road, and 12 Douglas Avenue, in the City of Ottawa. It is understood that the proposed development will consist of a seven (7) storey mixed-use building. The building will consist of 4 commercial units and 110 residential units, and it will rise 23 metres above grade. There are two major sources of surface transportation noise to the proposed building: Beechwood Avenue and Springfield Road.

Terraces are anticipated at the balconies of the proposed building to serve as Outdoor Living Areas (OLA). The results of STAMSON modelling indicate that the noise levels at the fourth-floor and seventh-floor balcony terraces on the southern elevation and the second-floor balcony terrace on the western elevation will be 62 dBA, 57 dBA and 65 dBA during the daytime period, respectively, which exceed the 55 dBA threshold value specified by the ENCG. The noise level at the fourth-floor balcony terrace on the northern elevation will be 48 dBA during the daytime period, which is below the 55 dBA threshold value specified by the ENCG. According to ENCG, noise control measures (i.e. barriers) are required to reduce the Leq 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 solid 1 m noise barriers around the perimeters of the outdoor living areas found that the noise levels at the second-floor, fourth-floor and seventh-floor balcony terraces can be reduced to 60 dBA, 58 dBA, and 54 dBA, respectively. The noise levels at second-floor and fourth-floor balcony terraces 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, the exceedances in noise level are considered acceptable provided that the warning clause Type A is included on all deeds of sale.

Several reception points were selected for the surface transportation noise analysis, consisting of the centre of the first level and the top level. The results of STAMSON modelling indicate that the noise levels on the southern, western, northern, and eastern elevations of the proposed building are expected to exceed the 55 dBA threshold specified by the ENCG. Also, the noise levels on the southern and western elevations of the proposed building are expected to exceed the 65 dBA threshold value. Therefore, the installation of a central air conditioning unit, along with a warning clause Type D, will be required for all units of the proposed building. A review of industry standards for construction materials and based on conversations with Project 1 Studios, provided the exterior claddings of the southern and western 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 31 and are considered acceptable.

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 Mr. Hussain Rahal 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.

Otillia McLaughlin B.Eng.

Stephanie A. Boisvenue, P.Eng.

Report Distribution:

- ❑ Mr. Hussain Rahal (email copy)
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APPENDIX 1

Table 8 - Summary of Reception Points and Geometry

Drawing PG6487-1 - Site Plan

Drawing PG6487-2 - Receptor Location Plan

Drawing PG6487-3 - Site Geometry

Drawing PG6487-3A - Site Geometry - REC 1-1

Drawing PG6487-3B - Site Geometry - REC 1-7

Drawing PG6487-3C - Site Geometry - REC 2-1

Drawing PG6487-3D - Site Geometry - REC 2-7

Drawing PG6487-3E - Site Geometry - REC 3-1 and REC 3-7

Drawing PG6487-3F - Site Geometry - REC 4-1

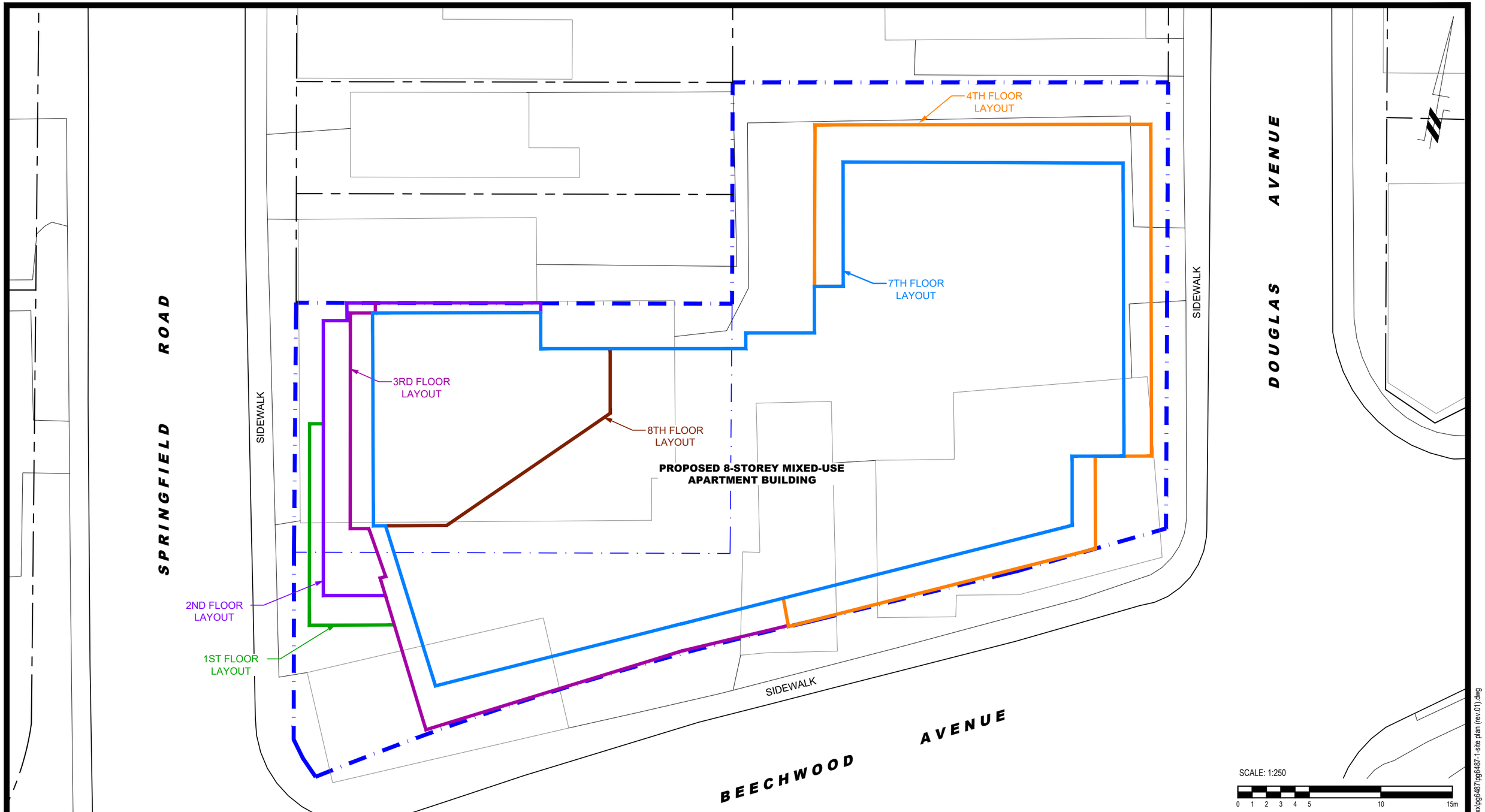
Drawing PG6487-3G - Site Geometry - REC 4-7

Drawing PG6487-3H - Site Geometry - REC 5

Drawing PG6487-3I - Site Geometry - REC 6

Drawing PG6487-3J - Site Geometry - REC 7

Drawing PG6487-3K - Site Geometry - REC 8



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MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-1
Approved by: SB	Revision No.: 1

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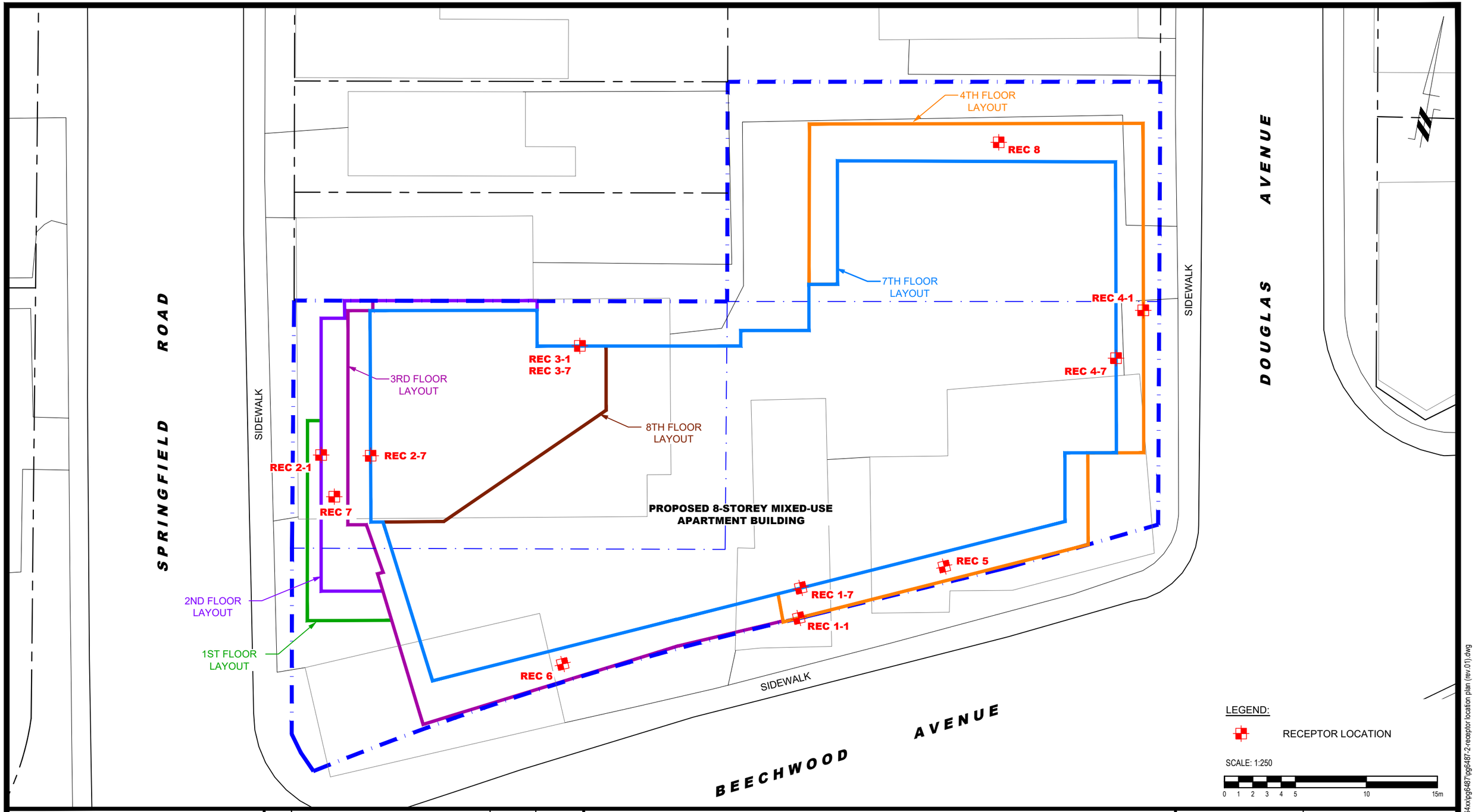

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47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

RECEPTOR LOCATION PLAN

Scale: 1:250	Date: 05/2024
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Checked by: OM	Dwg. No.: PG6487-2
Approved by: SB	Revision No.: 1

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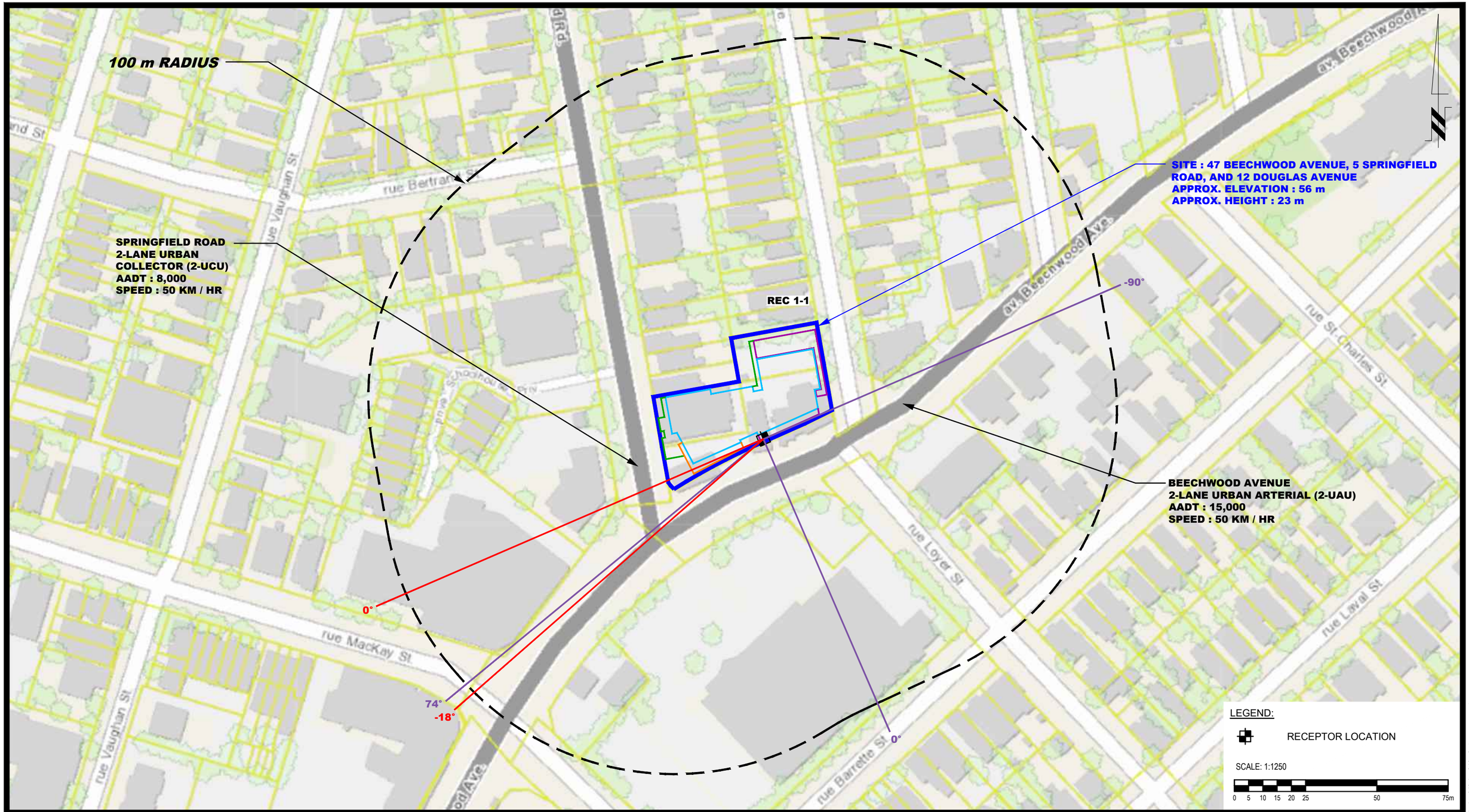

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47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 1-1

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Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3A
Approved by: SB	Revision No.: 1

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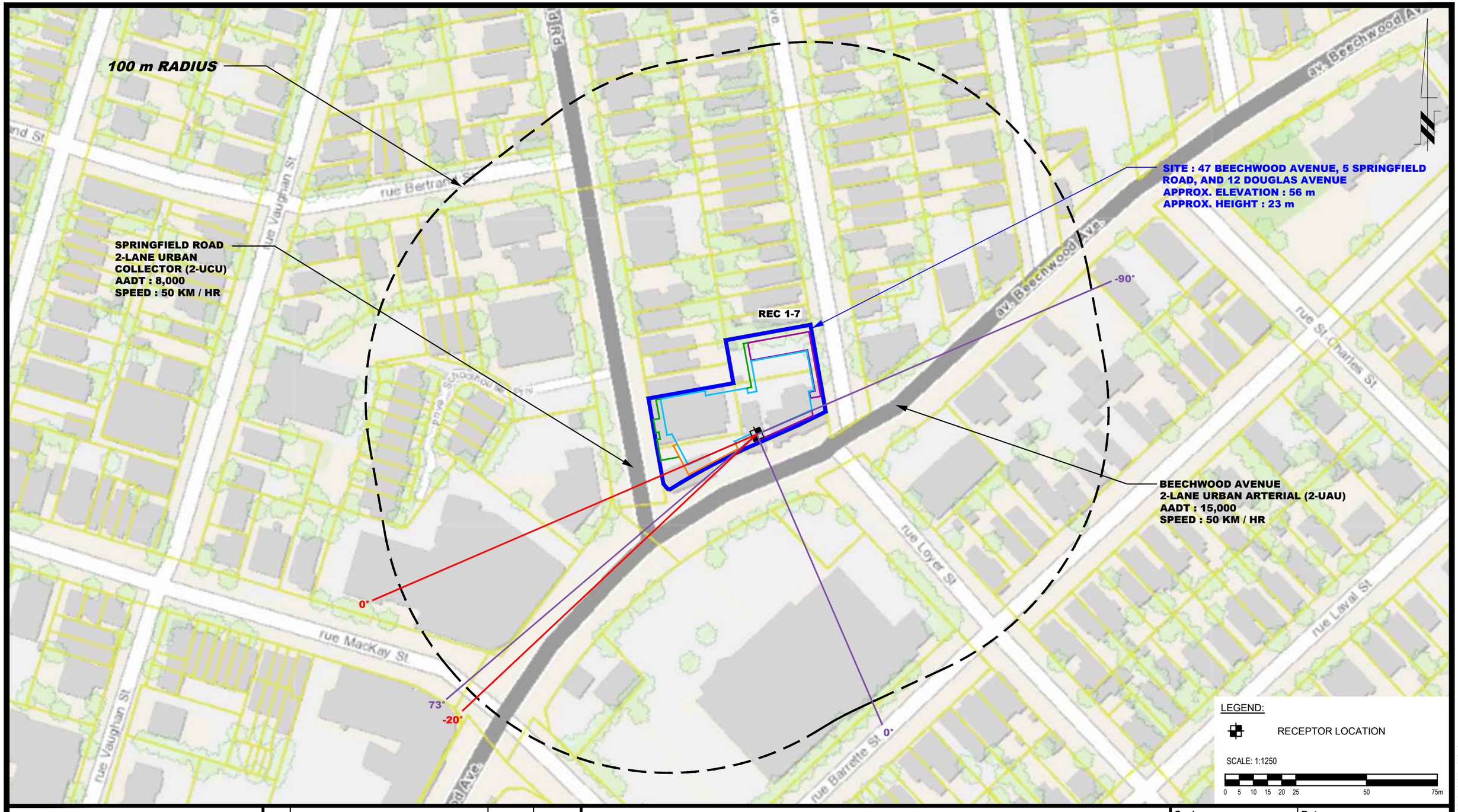

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47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 1-7

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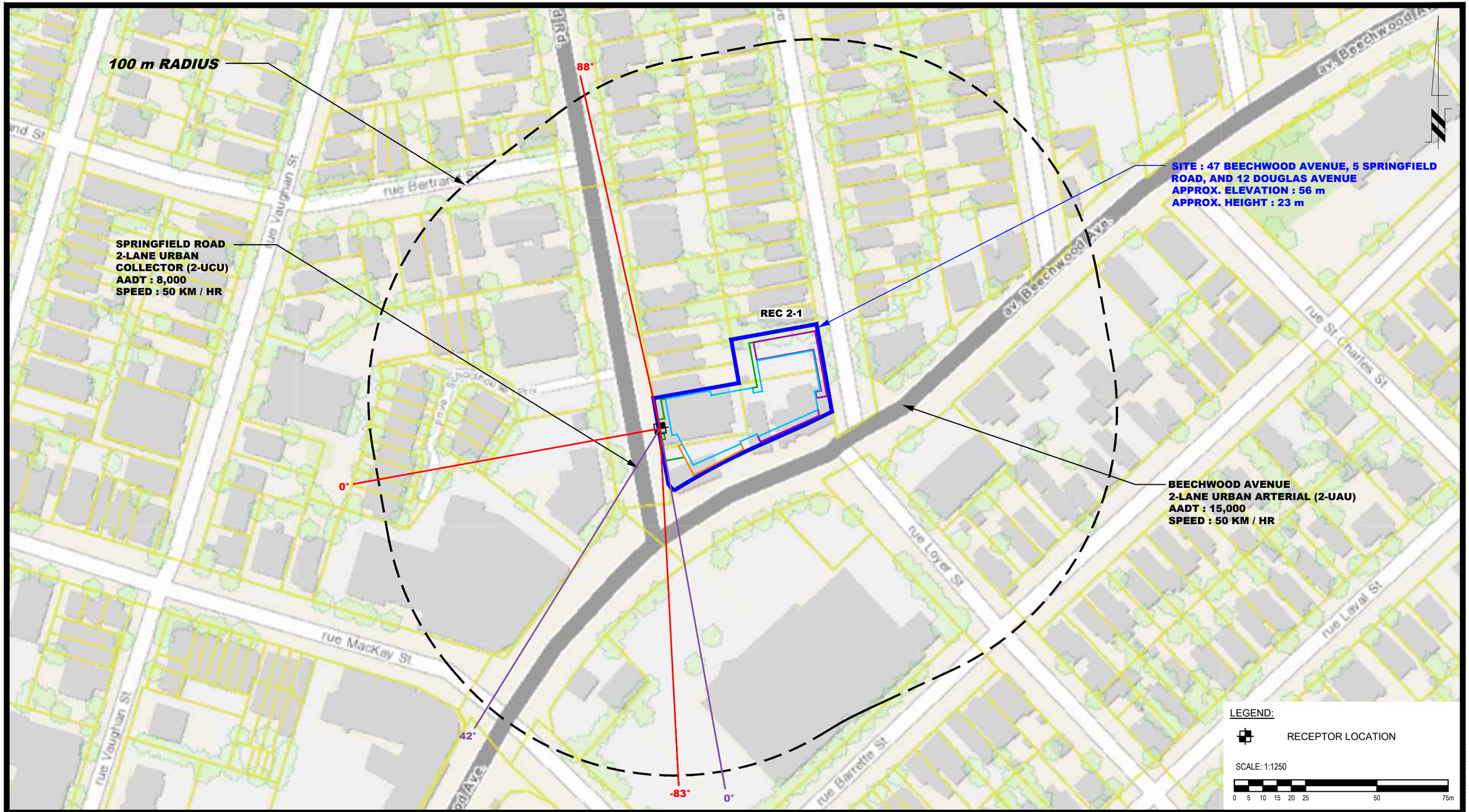

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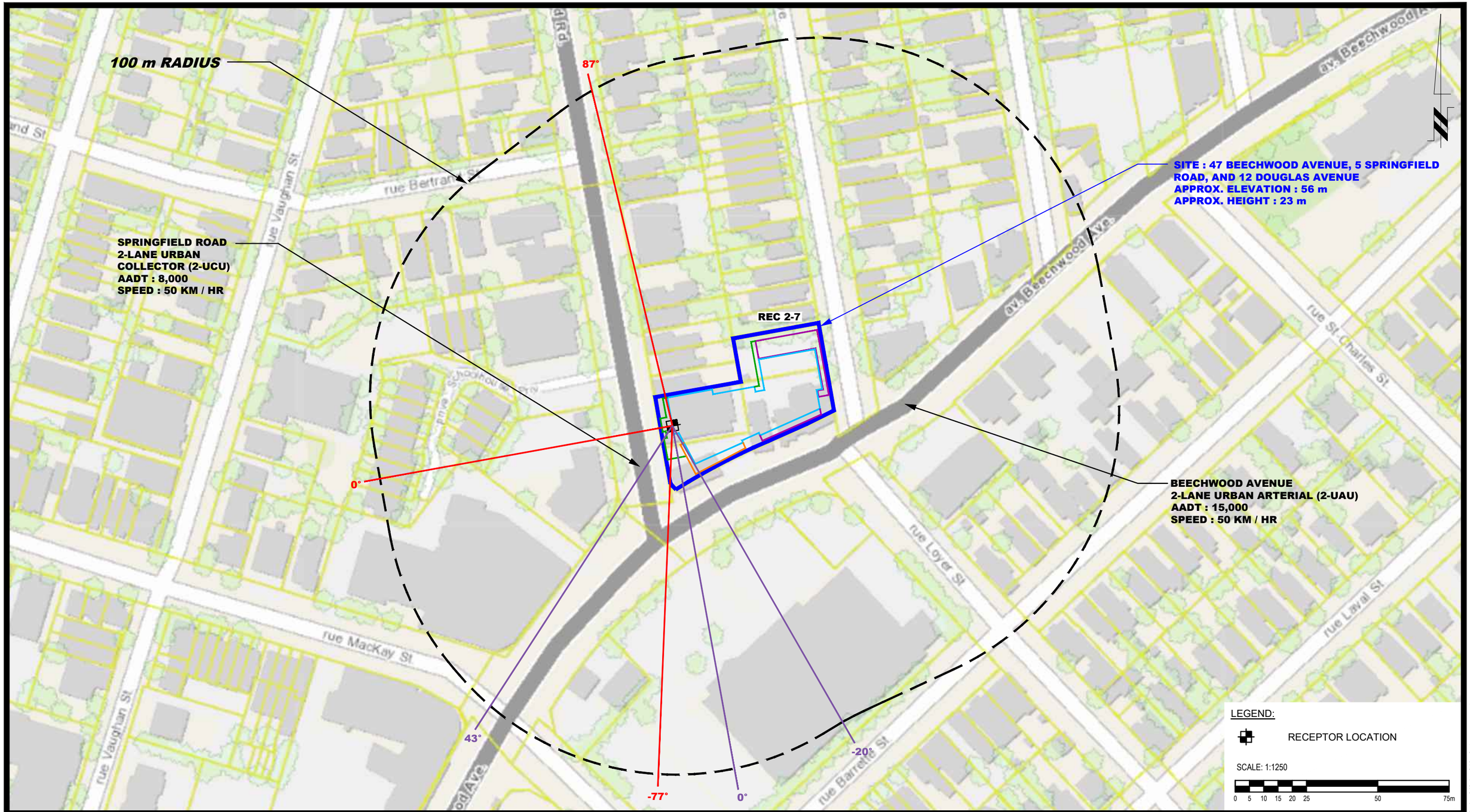

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 2-7

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3D
Approved by: SB	Revision No.: 1

11x17

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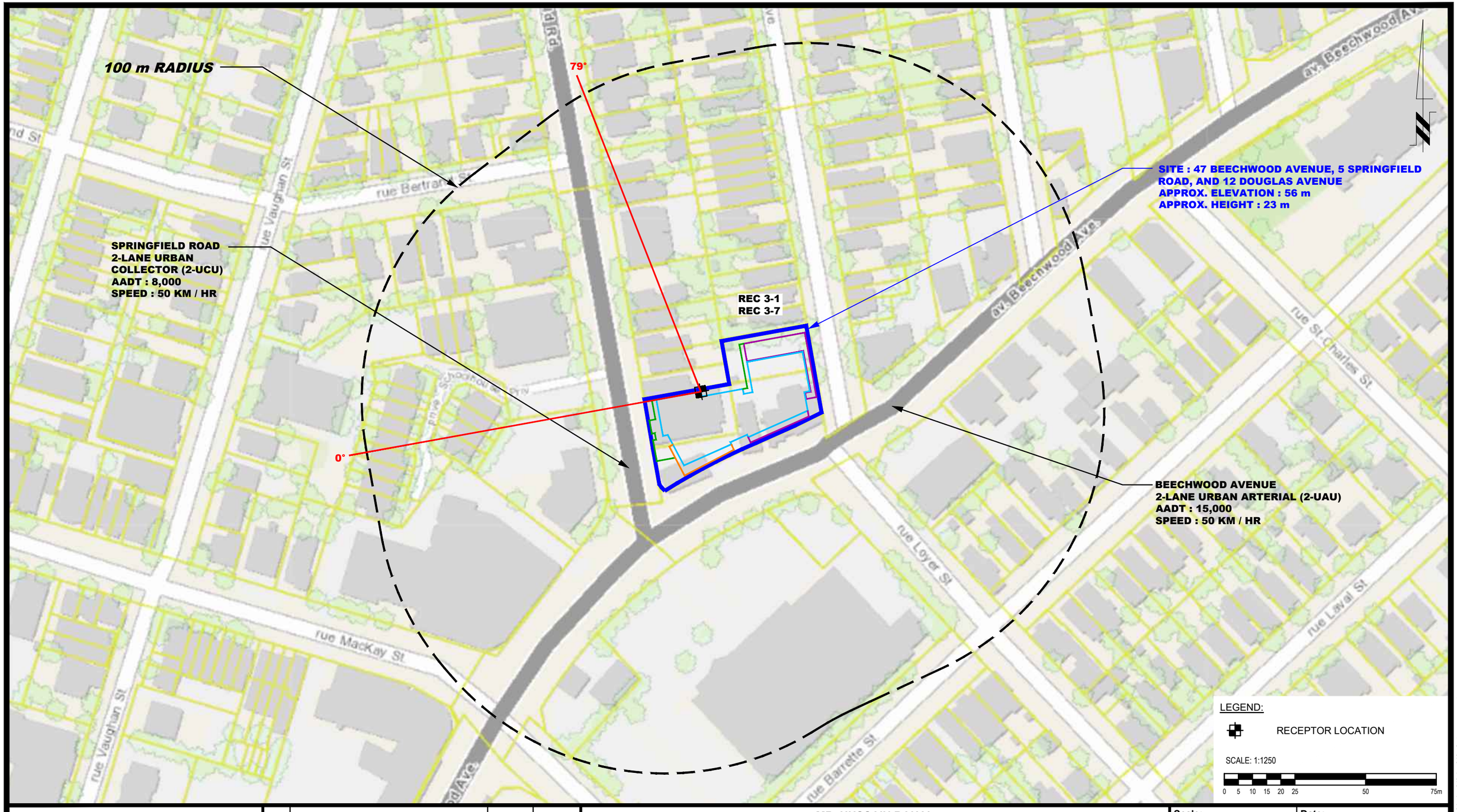

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NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

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NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 3-1 AND REC 3-7

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3E
Approved by: SB	Revision No.: 1

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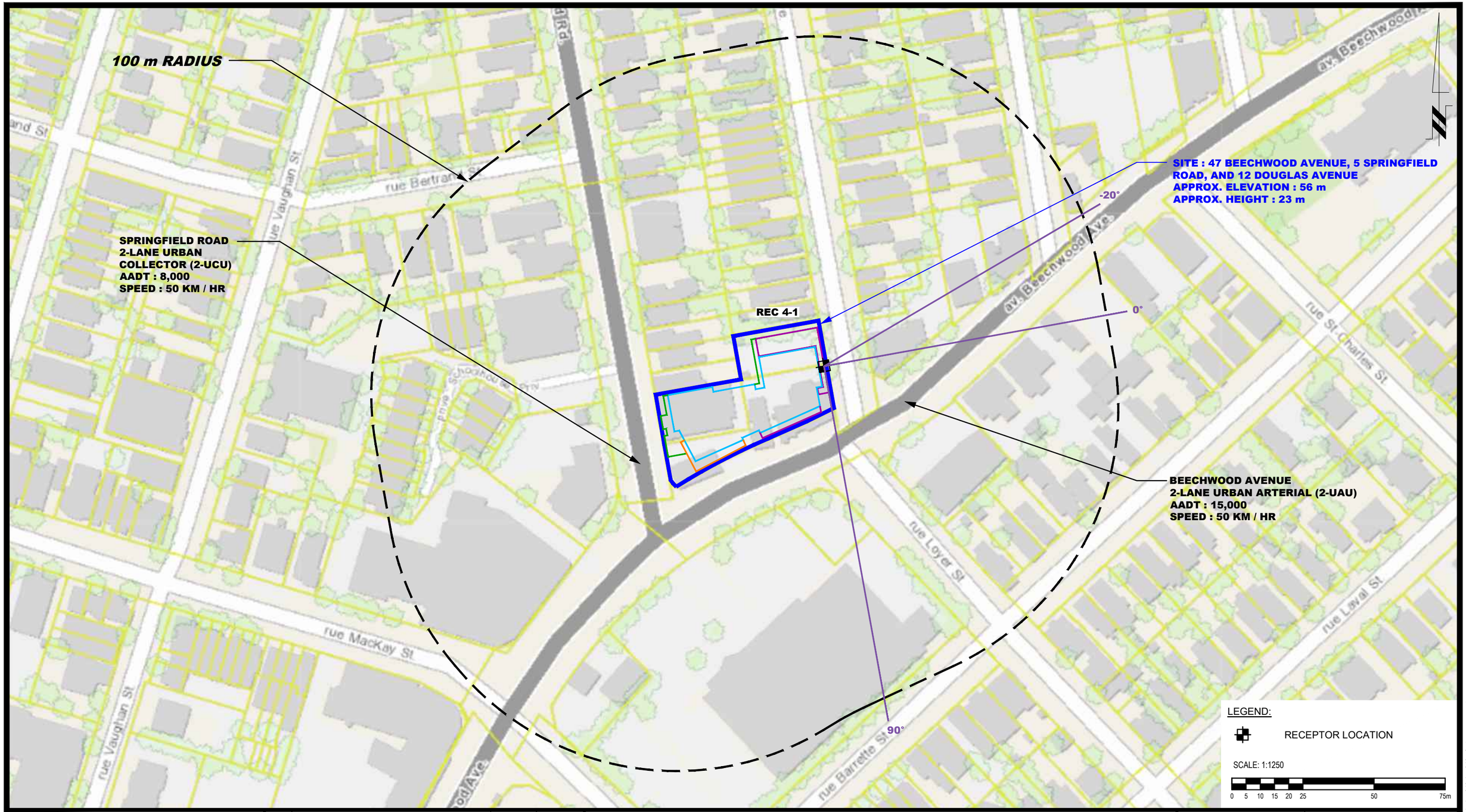

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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 4-1

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3F
Approved by: SB	Revision No.: 1

11x17

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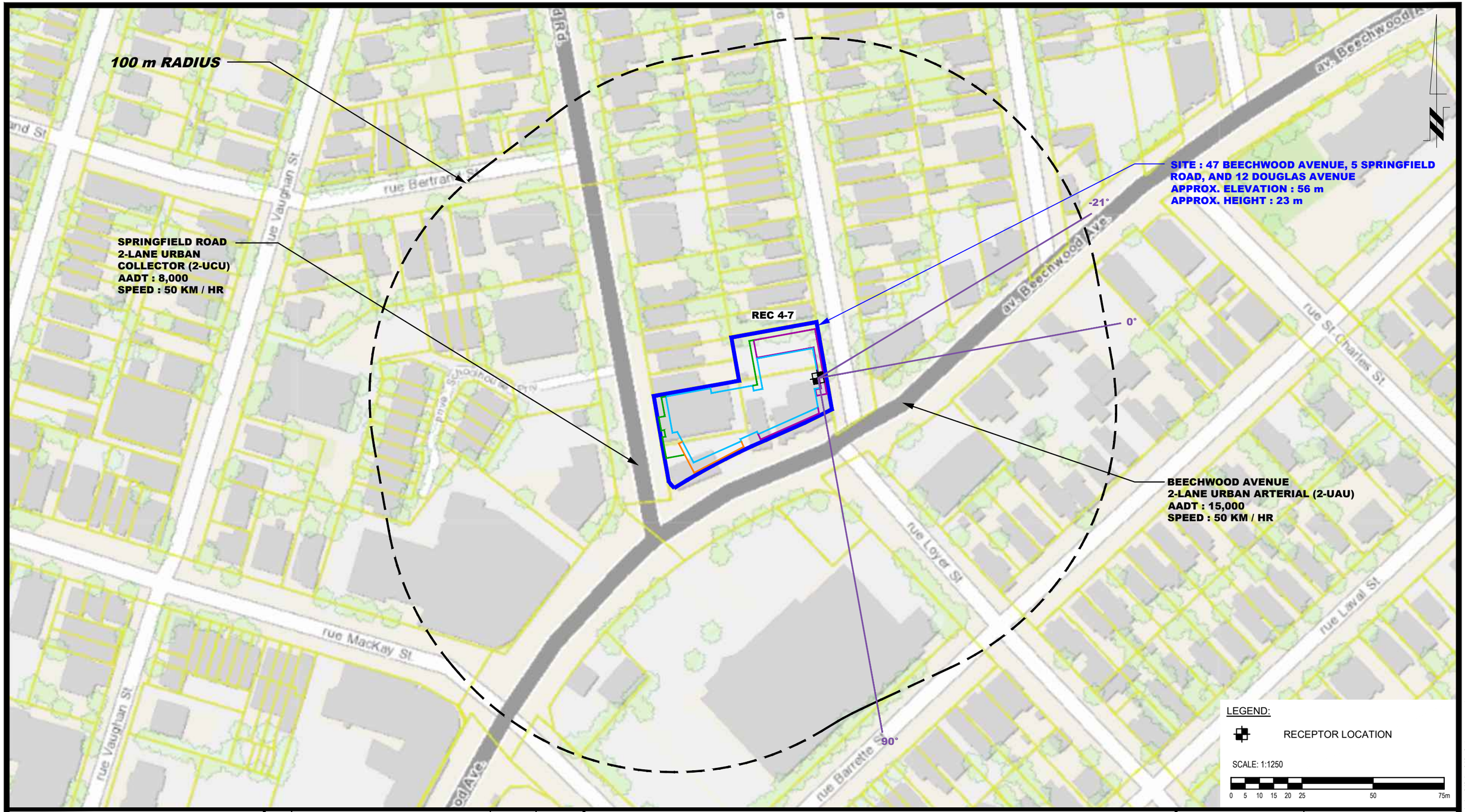

PATERSON GROUP
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 4-7

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3G
Approved by: SB	Revision No.: 1

11x17

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NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 5

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3H
Approved by: SB	Revision No.: 1

11x17

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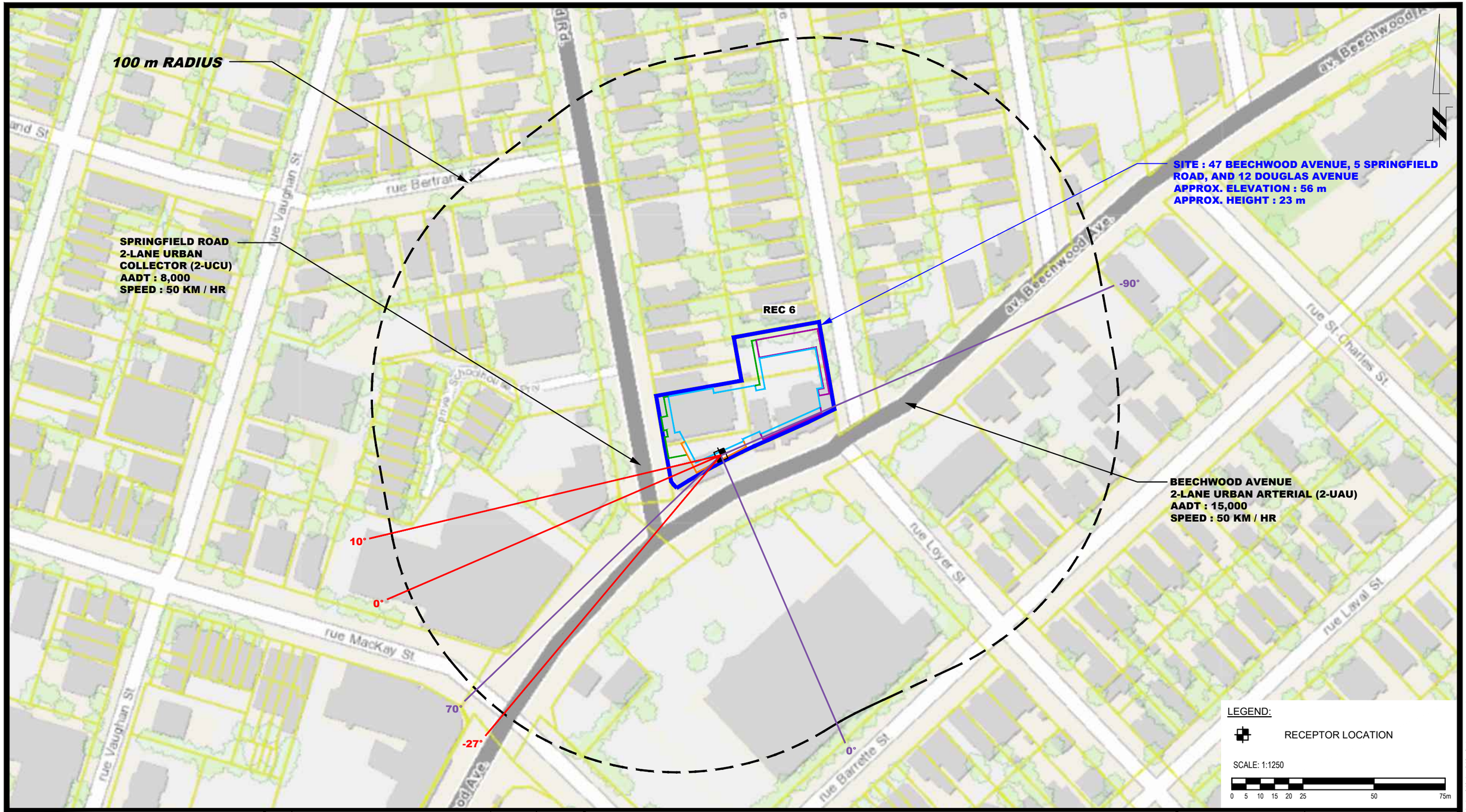

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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

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NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 6

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3I
Approved by: SB	Revision No.: 1

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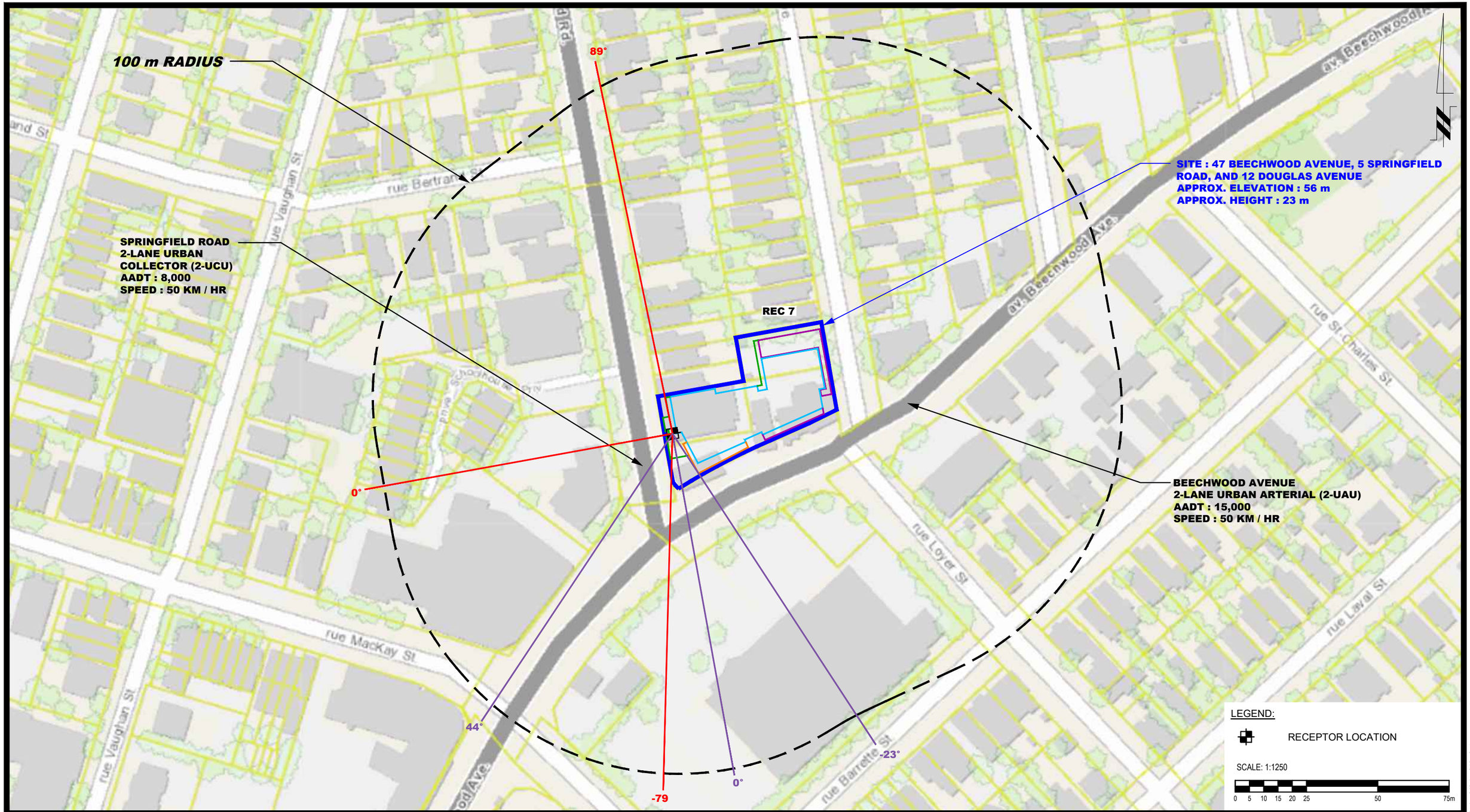

PATERSON GROUP
9 AURIGA DRIVE
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K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 7

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3J
Approved by: SB	Revision No.: 1

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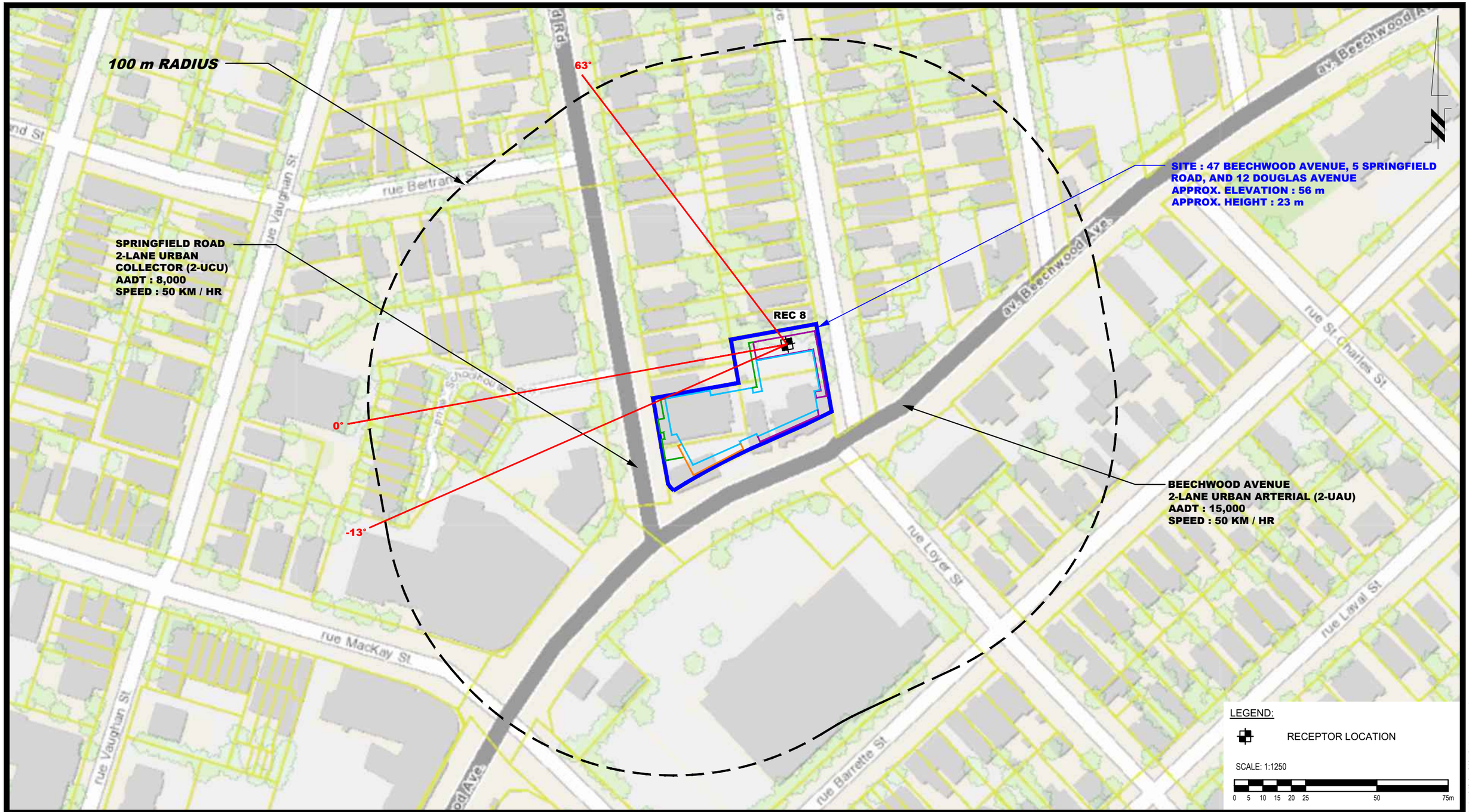
11x17



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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	05/2024	OM

MR. HUSSAIN RAHAL

NOISE ATTENUATION STUDY

PROPOSED MULTI-STOREY MIXED-USE APARTMENT BUILDING

47 BEECHWOOD AVENUE, 5 SPRINGFIELD ROAD & 12 DOUGLAS AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 8

Scale: 1:1250	Date: 05/2024
Drawn by: YA	Report No.: PG6487-1
Checked by: OM	Dwg. No.: PG6487-3K
Approved by: SB	Revision No.: 1

11x17

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APPENDIX 2

STAMSON RESULTS

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 09:35:31
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: BeechwoodAve (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -90.00 deg 74.00 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: Springfield (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: Springfield (day/night)
------------------------------------------------
Angle1   Angle2           : -18.00 deg   0.00 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: BeechwoodAve (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 66.88 + 0.00) = 66.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     74   0.66  68.48   0.00   0.00  -1.60   0.00   0.00   0.00  66.88
-------------------------------------------------------------------------------

Segment Leq : 66.88 dBA
```

↟

```
Results segment # 2: Springfield (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.63 + 0.00) = 48.63 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -18      0   0.66  65.75   0.00  -7.07 -10.05   0.00   0.00   0.00  48.63
-------------------------------------------------------------------------------

Segment Leq : 48.63 dBA

Total Leq All Segments: 66.94 dBA
```

↟

```
Results segment # 1: BeechwoodAve (night)
-----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 59.28 + 0.00) = 59.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	74	0.66	60.88	0.00	0.00	-1.60	0.00	0.00	0.00	59.28

Segment Leq : 59.28 dBA

↟

Results segment # 2: Springfield (night)

Source height = 1.50 m

ROAD (0.00 + 41.04 + 0.00) = 41.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-18	0	0.66	58.16	0.00	-7.07	-10.05	0.00	0.00	0.00	41.04

Segment Leq : 41.04 dBA

Total Leq All Segments: 59.34 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 66.94
(NIGHT): 59.34

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 09:42:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec17.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-7

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -90.00 deg 73.00 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 : 21.50 / 21.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Road data, segment # 2: Springfield (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: Springfield (day/night)
------------------------------------------
Angle1   Angle2           : -20.00 deg   0.00 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           :  21.50 / 21.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: BeechwoodAve (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.91 + 0.00) = 67.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     73   0.06  68.48   0.00   0.00  -0.57   0.00   0.00   0.00  67.91
-------------------------------------------------------------------------------

Segment Leq : 67.91 dBA
```

↟

```
Results segment # 2: Springfield (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.69 + 0.00) = 51.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -20      0   0.06  65.75   0.00  -4.52  -9.55   0.00   0.00   0.00  51.69
-------------------------------------------------------------------------------

Segment Leq : 51.69 dBA

Total Leq All Segments: 68.01 dBA
```

↟

```
Results segment # 1: BeechwoodAve (night)
-----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 60.32 + 0.00) = 60.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	73	0.06	60.88	0.00	0.00	-0.57	0.00	0.00	0.00	60.32

Segment Leq : 60.32 dBA

↟

Results segment # 2: Springfield (night)

Source height = 1.50 m

ROAD (0.00 + 44.09 + 0.00) = 44.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-20	0	0.06	58.16	0.00	-4.52	-9.55	0.00	0.00	0.00	44.09

Segment Leq : 44.09 dBA

Total Leq All Segments: 60.42 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 68.01
(NIGHT): 60.42

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 09:58:00
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: BeechwoodAve (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : 0.00 deg 42.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Road data, segment # 2: Springfield (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: Springfield (day/night)
------------------------------------------
Angle1   Angle2           : -83.00 deg   88.00 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: BeechwoodAve (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.90 + 0.00) = 56.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     42   0.66  68.48   0.00  -5.00  -6.59   0.00   0.00   0.00  56.90
-------------------------------------------------------------------------------

Segment Leq : 56.90 dBA
```

↟

```
Results segment # 2: Springfield (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.25 + 0.00) = 64.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -83     88   0.66  65.75   0.00   0.00  -1.50   0.00   0.00   0.00  64.25
-------------------------------------------------------------------------------

Segment Leq : 64.25 dBA

Total Leq All Segments: 64.98 dBA
```

↟

```
Results segment # 1: BeechwoodAve (night)
-----------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 49.30 + 0.00) = 49.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	42	0.66	60.88	0.00	-5.00	-6.59	0.00	0.00	0.00	49.30

Segment Leq : 49.30 dBA

↟

Results segment # 2: Springfield (night)

Source height = 1.50 m

ROAD (0.00 + 56.66 + 0.00) = 56.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-83	88	0.66	58.16	0.00	0.00	-1.50	0.00	0.00	0.00	56.66

Segment Leq : 56.66 dBA

Total Leq All Segments: 57.39 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 64.98
(NIGHT): 57.39

↟

↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 10:03:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec27.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2-7

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -20.00 deg 43.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 21.50 / 21.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Springfield (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

STAMSON 5.0 NORMAL REPORT Date: 07-05-2024 16:22:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 0.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.50 / 22.50 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Results segment # 1: Springfield (day)

Source height = 1.50 m

ROAD (0.00 + 57.31 + 0.00) = 57.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.66	65.75	0.00	-2.92	-4.62	0.00	-0.90	0.00	57.31

Segment Leq : 57.31 dBA

Total Leq All Segments: 57.31 dBA

↟

Results segment # 1: Springfield (night)

Source height = 1.50 m

ROAD (0.00 + 49.71 + 0.00) = 49.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.66	58.16	0.00	-2.92	-4.62	0.00	-0.90	0.00	49.71

Segment Leq : 49.71 dBA

Total Leq All Segments: 49.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.31
(NIGHT): 49.71

STAMSON 5.0 NORMAL REPORT Date: 07-05-2024 16:22:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec37.te Time Period: Day/Night 16/8 hours
Description: REC 3-7 Revision 1

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

Angle1 Angle2 : 0.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.50 / 22.50 m
Receiver height : 21.50 / 21.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Springfield (day)

Source height = 1.50 m

ROAD (0.00 + 59.30 + 0.00) = 59.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.06	65.75	0.00	-1.87	-3.68	0.00	-0.90	0.00	59.30

Segment Leq : 59.30 dBA

Total Leq All Segments: 59.30 dBA

↟
Results segment # 1: Springfield (night)

Source height = 1.50 m

ROAD (0.00 + 51.71 + 0.00) = 51.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	79	0.06	58.16	0.00	-1.87	-3.68	0.00	-0.90	0.00	51.71

Segment Leq : 51.71 dBA

Total Leq All Segments: 51.71 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 59.30
(NIGHT): 51.71
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 12:26:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -20.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: BeechwoodAve (day)

Source height = 1.50 m

ROAD (0.00 + 59.07 + 0.00) = 59.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-20	90	0.66	68.48	0.00	-6.11	-3.31	0.00	0.00	0.00	59.07

Segment Leq : 59.07 dBA

Total Leq All Segments: 59.07 dBA

↟
Results segment # 1: BeechwoodAve (night)

Source height = 1.50 m

ROAD (0.00 + 51.47 + 0.00) = 51.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-20	90	0.66	60.88	0.00	-6.11	-3.31	0.00	0.00	0.00	51.47

Segment Leq : 51.47 dBA

Total Leq All Segments: 51.47 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 59.07
(NIGHT): 51.47
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 12:28:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec47.te Time Period: Day/Night 16/8 hours
Description: Reception Point 4-7

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -21.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 21.50 / 21.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Results segment # 1: BeechwoodAve (day)

Source height = 1.50 m

ROAD (0.00 + 62.34 + 0.00) = 62.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-21	90	0.06	68.48	0.00	-3.90	-2.24	0.00	0.00	0.00	62.34

Segment Leq : 62.34 dBA

Total Leq All Segments: 62.34 dBA

↟
Results segment # 1: BeechwoodAve (night)

Source height = 1.50 m

ROAD (0.00 + 54.74 + 0.00) = 54.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-21	90	0.06	60.88	0.00	-3.90	-2.24	0.00	0.00	0.00	54.74

Segment Leq : 54.74 dBA

Total Leq All Segments: 54.74 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 62.34
(NIGHT): 54.74
↟
↟

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 10:18:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec5.te Time Period: Day/Night 16/8 hours
Description: Reception Point 5

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -90.00 deg 75.00 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 : 11.50 / 11.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 75.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

↟
Road data, segment # 2: Springfield (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: Springfield (day/night)
---------------------------------------------
Angle1   Angle2           : -16.00 deg   2.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  11.50 / 11.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -16.00 deg   Angle2 : 2.00 deg
Barrier height            :  10.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :  56.00 m
Receiver elevation        :  56.00 m
Barrier elevation         :  56.00 m
Reference angle           :   0.00

↟
Results segment # 1: BeechwoodAve (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 !       11.50 !        9.50 !        65.50

ROAD (0.00 + 62.08 + 0.00) = 62.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     75   0.00  68.48   0.00   0.00  -0.38   0.00   0.00  -6.03  62.08
-------------------------------------------------------------------------------

Segment Leq : 62.08 dBA

↟
```

Results segment # 2: Springfield (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	11.50	8.50	64.50

ROAD (0.00 + 41.70 + 0.00) = 41.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	2	0.00	65.75	0.00	-5.23	-10.00	0.00	0.00	-8.82	41.70

Segment Leq : 41.70 dBA

Total Leq All Segments: 62.12 dBA

↟
Results segment # 1: BeechwoodAve (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	11.50	9.50	65.50

ROAD (0.00 + 54.48 + 0.00) = 54.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	75	0.00	60.88	0.00	0.00	-0.38	0.00	0.00	-6.03	54.48

Segment Leq : 54.48 dBA

↟
Results segment # 2: Springfield (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 !       11.50 !        8.50 !        64.50

ROAD (0.00 + 34.11 + 0.00) = 34.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -16      2   0.00  58.16   0.00  -5.23 -10.00   0.00   0.00  -8.82  34.11
-------------------------------------------------------------------------------

Segment Leq : 34.11 dBA

Total Leq All Segments: 54.52 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 62.12
                           (NIGHT): 54.52
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 12:45:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec5tr.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 5tr

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -90.00 deg 75.00 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 : 11.50 / 11.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 75.00 deg
Barrier height : 11.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Springfield (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: Springfield (day/night)
---------------------------------------------
Angle1   Angle2           : -16.00 deg   2.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  11.50 / 11.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -16.00 deg   Angle2 : 2.00 deg
Barrier height            :  11.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :  56.00 m
Receiver elevation        :  56.00 m
Barrier elevation         :  56.00 m
Reference angle           :   0.00

↟
Results segment # 1: BeechwoodAve (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 !       11.50 !        9.50 !        65.50

ROAD (0.00 + 57.52 + 0.00) = 57.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     75   0.00  68.48   0.00   0.00  -0.38   0.00   0.00 -10.59  57.52
-------------------------------------------------------------------------------

Segment Leq : 57.52 dBA

↟
```

Results segment # 2: Springfield (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	11.50	8.50	64.50

ROAD (0.00 + 38.21 + 0.00) = 38.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-16	2	0.00	65.75	0.00	-5.23	-10.00	0.00	0.00	-12.31	38.21

Segment Leq : 38.21 dBA

Total Leq All Segments: 57.57 dBA

↟
Results segment # 1: BeechwoodAve (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	11.50	9.50	65.50

ROAD (0.00 + 49.92 + 0.00) = 49.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	75	0.00	60.88	0.00	0.00	-0.38	0.00	0.00	-10.59	49.92

Segment Leq : 49.92 dBA

↟
Results segment # 2: Springfield (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 !       11.50 !        8.50 !        64.50

ROAD (0.00 + 30.62 + 0.00) = 30.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -16      2   0.00  58.16   0.00  -5.23 -10.00   0.00   0.00 -12.31  30.62
-------------------------------------------------------------------------------

Segment Leq : 30.62 dBA

Total Leq All Segments: 49.97 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 57.57
                           (NIGHT): 49.97
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 10:28:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec6.te Time Period: Day/Night 16/8 hours
Description: Reception Point 6

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -90.00 deg 70.00 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 : 21.50 / 21.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 70.00 deg
Barrier height : 20.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

↟
Road data, segment # 2: Springfield (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: Springfield (day/night)
---------------------------------------------
Angle1   Angle2           : -27.00 deg   10.00 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           :  21.50 / 21.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -27.00 deg   Angle2 : 10.00 deg
Barrier height            :  20.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :  56.00 m
Receiver elevation        :  56.00 m
Barrier elevation         :  56.00 m
Reference angle           :   0.00

↟
Results segment # 1: BeechwoodAve (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 !       21.50 !       17.50 !        73.50

ROAD (0.00 + 56.55 + 0.00) = 56.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     70   0.00  68.48   0.00   0.00  -0.51   0.00   0.00 -11.42  56.55
-------------------------------------------------------------------------------

Segment Leq : 56.55 dBA

↟
```

Results segment # 2: Springfield (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	21.50	6.50	62.50

ROAD (0.00 + 37.63 + 0.00) = 37.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-27	10	0.00	65.75	0.00	-1.25	-6.87	0.00	0.00	-20.00	37.63

Segment Leq : 37.63 dBA

Total Leq All Segments: 56.61 dBA

↟
Results segment # 1: BeechwoodAve (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	21.50	17.50	73.50

ROAD (0.00 + 48.96 + 0.00) = 48.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	70	0.00	60.88	0.00	0.00	-0.51	0.00	0.00	-11.42	48.96

Segment Leq : 48.96 dBA

↟
Results segment # 2: Springfield (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 !       21.50 !        6.50 !        62.50

ROAD (0.00 + 30.04 + 0.00) = 30.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -27     10   0.00  58.16   0.00  -1.25  -6.87   0.00   0.00 -20.00  30.04
-------------------------------------------------------------------------------

Segment Leq : 30.04 dBA

Total Leq All Segments: 49.02 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 56.61
                           (NIGHT): 49.02
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 29-11-2022 17:02:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec6tr.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 6tr

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -90.00 deg 70.00 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 : 21.50 / 21.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 70.00 deg
Barrier height : 21.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Springfield (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: Springfield (day/night)
---------------------------------------------
Angle1   Angle2           : -27.00 deg   10.00 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           :  21.50 / 21.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -27.00 deg   Angle2 : 10.00 deg
Barrier height            :  21.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :  56.00 m
Receiver elevation        :  56.00 m
Barrier elevation         :  56.00 m
Reference angle           :   0.00

↟
Results segment # 1: BeechwoodAve (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 !       21.50 !       17.50 !        73.50

ROAD (0.00 + 53.68 + 0.00) = 53.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     70   0.00  68.48   0.00   0.00  -0.51   0.00   0.00 -14.29  53.68
-------------------------------------------------------------------------------

Segment Leq : 53.68 dBA

↟
```

Results segment # 2: Springfield (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	21.50	6.50	62.50

ROAD (0.00 + 37.63 + 0.00) = 37.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-27	10	0.00	65.75	0.00	-1.25	-6.87	0.00	0.00	-20.00	37.63

Segment Leq : 37.63 dBA

Total Leq All Segments: 53.79 dBA

↟
Results segment # 1: BeechwoodAve (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	21.50	17.50	73.50

ROAD (0.00 + 46.08 + 0.00) = 46.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	70	0.00	60.88	0.00	0.00	-0.51	0.00	0.00	-14.29	46.08

Segment Leq : 46.08 dBA

↟
Results segment # 2: Springfield (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 !       21.50 !        6.50 !        62.50

ROAD (0.00 + 30.04 + 0.00) = 30.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -27     10   0.00  58.16   0.00  -1.25  -6.87   0.00   0.00 -20.00  30.04
-------------------------------------------------------------------------------

Segment Leq : 30.04 dBA

Total Leq All Segments: 46.19 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 53.79
                           (NIGHT): 46.19
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 01-12-2022 11:44:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec7.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 7

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -23.00 deg 44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 4.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -23.00 deg Angle2 : 44.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 18.00 / 18.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Springfield (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: Springfield (day/night)
---------------------------------------------
Angle1   Angle2           : -79.00 deg   89.00 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           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -79.00 deg   Angle2 : 89.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  56.00 m
Receiver elevation        :  56.00 m
Barrier elevation         :  56.00 m
Reference angle           :   0.00

↟
Results segment # 1: BeechwoodAve (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 !        4.50 !        2.34 !        58.34

ROAD (0.00 + 54.18 + 0.00) = 54.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -23     44   0.39  68.48   0.00  -3.08  -4.42   0.00   0.00  -6.79  54.18
-------------------------------------------------------------------------------

Segment Leq : 54.18 dBA

↟
```

Results segment # 2: Springfield (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	4.50	3.90	59.90

ROAD (0.00 + 64.35 + 0.00) = 64.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-79	89	0.39	65.75	0.00	0.00	-1.09	0.00	0.00	-0.42	64.24*
-79	89	0.57	65.75	0.00	0.00	-1.40	0.00	0.00	0.00	64.35

* Bright Zone !

Segment Leq : 64.35 dBA

Total Leq All Segments: 64.75 dBA

↟

Results segment # 1: BeechwoodAve (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	4.50	2.34	58.34

ROAD (0.00 + 46.59 + 0.00) = 46.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-23	44	0.39	60.88	0.00	-3.08	-4.42	0.00	0.00	-6.79	46.59

Segment Leq : 46.59 dBA

↟

Results segment # 2: Springfield (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	4.50	3.90	59.90

ROAD (0.00 + 56.76 + 0.00) = 56.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-79	89	0.39	58.16	0.00	0.00	-1.09	0.00	0.00	-0.42	56.64*
-79	89	0.57	58.16	0.00	0.00	-1.40	0.00	0.00	0.00	56.76

* Bright Zone !

Segment Leq : 56.76 dBA

Total Leq All Segments: 57.16 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.75
(NIGHT): 57.16

STAMSON 5.0 NORMAL REPORT Date: 01-12-2022 11:43:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec7tr.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 7tr

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: BeechwoodAve (day/night)

Angle1 Angle2 : -23.00 deg 44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 4.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -23.00 deg Angle2 : 44.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 18.00 / 18.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

↑
Road data, segment # 2: Springfield (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: Springfield (day/night)
---------------------------------------------
Angle1   Angle2           : -79.00 deg   89.00 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           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -79.00 deg   Angle2 : 89.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  56.00 m
Receiver elevation        :  56.00 m
Barrier elevation         :  56.00 m
Reference angle           :   0.00

↟
Results segment # 1: BeechwoodAve (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 !        4.50 !        2.34 !        58.34

ROAD (0.00 + 49.41 + 0.00) = 49.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -23     44   0.33  68.48   0.00  -2.95  -4.40   0.00   0.00 -11.71  49.41
-------------------------------------------------------------------------------

Segment Leq : 49.41 dBA

↟
```

Results segment # 2: Springfield (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	4.50	3.90	59.90

ROAD (0.00 + 59.69 + 0.00) = 59.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-79	89	0.33	65.75	0.00	0.00	-0.98	0.00	0.00	-5.07	59.69

Segment Leq : 59.69 dBA

Total Leq All Segments: 60.08 dBA

↟
Results segment # 1: BeechwoodAve (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	4.50	2.34	58.34

ROAD (0.00 + 41.82 + 0.00) = 41.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-23	44	0.33	60.88	0.00	-2.95	-4.40	0.00	0.00	-11.71	41.82

Segment Leq : 41.82 dBA

↟
Results segment # 2: Springfield (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 !        4.50 !        3.90 !        59.90

ROAD (0.00 + 52.10 + 0.00) = 52.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -79     89   0.33  58.16   0.00   0.00  -0.98   0.00   0.00  -5.07  52.10
-------------------------------------------------------------------------------

Segment Leq : 52.10 dBA

Total Leq All Segments: 52.49 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 60.08
                           (NIGHT): 52.49
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 07-11-2022 10:48:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec8.te Time Period: Day/Night 16/8 hours
Description: Reception Point 8

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

Angle1 Angle2 : -13.00 deg 63.00 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 : 11.50 / 11.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -13.00 deg Angle2 : 63.00 deg
Barrier height : 10.00 m
Barrier receiver distance : 15.00 / 15.00 m
Source elevation : 56.00 m
Receiver elevation : 56.00 m
Barrier elevation : 56.00 m
Reference angle : 0.00

Results segment # 1: Springfield (day)

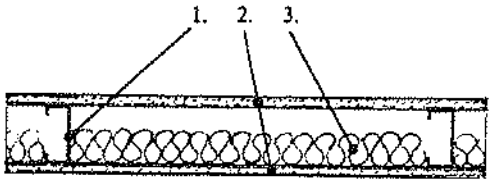
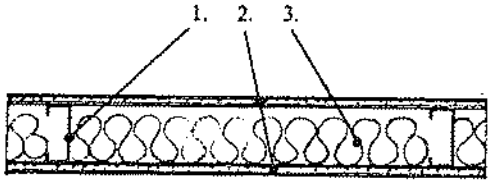
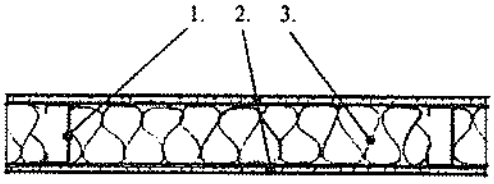
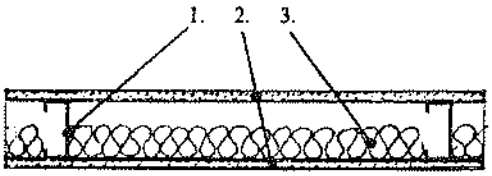
Source height = 1.50 m

Barrier height for grazing incidence

```
-------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       11.50 !        8.50 !        64.50

ROAD (0.00 + 48.45 + 0.00) = 48.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -13     63   0.36  65.75   0.00  -7.11  -4.04   0.00  -0.90   0.00  53.70
   -13     63   0.00  65.75   0.00  -5.23  -3.74   0.00   0.00  -8.33  48.45
-------------------------------------------------------------------------------

Segment Leq : 48.45 dBA

Total Leq All Segments: 48.45 dBA

↟
Results segment # 1: Springfield (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 !       11.50 !        8.50 !        64.50

ROAD (0.00 + 40.85 + 0.00) = 40.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -13     63   0.36  58.16   0.00  -7.11  -4.04   0.00  -0.90   0.00  46.11
   -13     63   0.00  58.16   0.00  -5.23  -3.74   0.00   0.00  -8.33  40.85
-------------------------------------------------------------------------------

Segment Leq : 40.85 dBA

Total Leq All Segments: 40.85 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 48.45
                           (NIGHT): 40.85
↟
↟
```

APPENDIX 3

BUILDING MATERIALS INDUSTRY STANDARDS

Sketch	Brief Description	...	Laboratory Test Number Year Frequencies Tested Source of Data	STC	Section Number
	1. 3 5/8" metal studs, 24"o.c. 2. 5/8" gypsum board screwed to studs. 3. 2" thick sound attenuation blanket.	...	National Research Council of Canada NRC #66 1968 16f National Research Council of Canada	47	1.3.3.1.5.7
	1. 3 5/8" metal studs, 24"o.c. 2. 5/8" type X gypsum board screwed to studs. 3. 3" thick sound attenuation blanket.	...	Owens/Corning Fiberglas OCF 469 1967 16f Owens/Corning Fiberglas	44	1.3.3.1.5.8
	1. 3 5/8" metal studs, 24"o.c. 2. 5/8" gypsum board screwed to studs. 3. 4" thick sound attenuation blanket compressed to fit in stud space.	...	National Research Council of Canada NRC #66 1968 16f National Research Council of Canada	45	1.3.3.1.5.9
	1. 3 5/8" metal studs, 24"o.c. 2. 5/8" type X gypsum board spot-laminated to studs with daubs of adhesive 12"o.c. drywall screws at third points along joints and ends. 3. 2" thick sound attenuation blanket.	...	Riverbank Acoustical Labs. TL66-253 1966 16f Celotex Corp.	51	1.3.3.1.5.10