

Environmental Noise Control Study Proposed Residential Development

56 Capilano Drive
Ottawa, Ontario

Prepared for CSV Architects

Report PG6606-1 Revision 1 dated May 31, 2023

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1.0 Introduction

Paterson Group (Paterson) was commissioned by CSV Architects to conduct an environmental noise control study for the proposed residential development to be located at 56 Capilano Drive, in the City of Ottawa.

The objective of the current study is to:

- Determine the primary noise sources impacting the site and compare the projected sound levels to guidelines set out by the Ministry of Environment and Climate Change (MOECC) and the City of Ottawa.
- Review the projected noise levels and offer recommendations regarding warning classes, construction materials or alternative sound barriers.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes acoustical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

This study has been conducted according to City of Ottawa document - Engineering Noise Control Guidelines (ENCG), dated January 2016, and the Ontario Ministry of the Environment Guideline NPC-300.

2.0 Proposed Development

It is understood that the proposed development will consist of a two (2) storey townhouses with one basement level at the northern part of the site, and a four (4) storey apartment building with one basement level at the southern part of the site. It is anticipated that the townhouses will consist of 4 units and the apartment building will consist of 54 units. The townhouses will rise 6 metres above grade and the apartment building will rise 13 metres above grade. Associated walkways, driveways, parking areas, and landscaped areas are further anticipated. Outdoor living areas – rear yards at the townhouses, rooftop terrace at the apartment building, and at-grade amenity area are identified on the proposed site plan.

3.0 Methodology and Noise Assessment Criteria

The City of Ottawa outlines three (3) sources of environmental noise that must be analyzed separately:

- Surface Transportation Noise
- Stationary Noise
 - new noise-sensitive development applications (noise receptors) in proximity to existing or approved stationary sources of noise, and
 - new stationary sources of noise (noise generating) in proximity to existing or approved noise-sensitive developments
- Aircraft Noise

Surface Transportation Noise

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

The City of Ottawa's Official Plan dictates that the influence area must contain any of following conditions to classify as a surface transportation noise source for a subject site:

- Within 100 m of the right-of-way of an existing or proposed arterial, collector or major collector road; a light rail transit corridor; bus rapid transit, or transit priority corridor
- Within 250 m of the right-of-way for an existing or proposed highway or secondary rail line
- Within 300 m from the right of way of a proposed or existing rail corridor or a secondary main railway line
- Within 500 m of an existing 400 series provincial highway, freeway or principle main railway line.

The Environmental Noise Guidelines for Stationary and Transportation Sources – NPC-300 outlines the limitations of noise levels in relation to the location of the receptors. These can be found in the following tables:

Table 1 – Noise Level Limit for Outdoor Living Areas	
Time Period	L_{eq} Level (dBA)
Daytime, 7:00-23:00	55
<ul style="list-style-type: none"> ➤ Standard taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas – Road and Rail 	

Table 2 – Noise Level Limits for Indoor Living Areas			
Type of Space	Time Period	L_{eq} Level (dBA)	
		Road	Rail
General offices, reception areas, retail stores, etc.	Daytime 7:00-23:00	50	45
Theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	Daytime 7:00-23:00	45	40
Living/dining/den areas of residences , hospitals, nursing/retirement homes, schools, day-care centres	Daytime 7:00-23:00	45	40
Living/dining/den areas of residences , hospitals, nursing/retirement homes etc. (except schools or day-care centres)	Nighttime 23:00-7:00	45	40
Sleeping quarters of hotels/motels	Nighttime 23:00-7:00	45	40
Sleeping quarters of residences , hospitals, nursing/retirement homes, etc.	Nighttime 23:00-7:00	40	35
<ul style="list-style-type: none"> ➤ Standards taken from Table 2.2b, Sound Level Limit for Indoor Living Areas – Road and Rail and Table 2.2c, Supplementary Sound Level Limits for Indoor Spaces – Road and Rail 			

Predicted noise levels at the pane of window dictate the action required to achieve recommended noise levels. It is noted in ENCG that the limits outlined in Table 2 are for the noise levels on the interior of the window glass pane. An open window is considered to provide a 10 dBA noise reduction, while a standard closed window is capable to provide a minimum 20 dBA noise reduction. The noise level limits of residential building are 45 dBA daytime and 40 dBA nighttime. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, central air conditioning will be required, and the building components will require higher levels of sound attenuation.

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

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

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

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

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

Table 3 – Warning Clauses for Outdoor Living Areas		
Leq (dBA)	Warning Clause	Description
$55 \text{ dBA} < L_{eq(16)} \leq 60 \text{ dBA}$	Warning Clause Type A	"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."
$60 \text{ dBA} < L_{eq(16)}$	Warning Clause Type B	"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."
<ul style="list-style-type: none"> ➤ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300 		

Table 4 – Warning Clauses for Indoor Living Areas		
Leq (dBA)	Warning Clause	Description
$55 \text{ dBA} < L_{\text{eq}(16)} \leq 65 \text{ dBA}$ $50 \text{ dBA} < L_{\text{eq}(8)} \leq 60 \text{ dBA}$	Warning Clause Type C	"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
$65 \text{ dBA} < L_{\text{eq}(16)}$ $60 \text{ dBA} < L_{\text{eq}(8)}$	Warning Clause Type D	"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
<p>➤ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines for Stationary and Transportation Sources - NPC-300</p>		

Stationary Noise

Stationary noise sources include sources or facilities that are fixed or mobile and can cause a combination of sound and vibration levels emitted beyond the property line. These sources may include commercial air conditioner units, generators and fans. Facilities that may contribute to stationary noise may include car washes, snow disposal sites, transit stations and manufacturing facilities.

The subject site is not in proximity to existing or approved stationary sources of noise. Therefore, a stationary noise analysis will not be required.

Aircraft / Airport Noise

Aircraft noise is distinct as compared to surface transportation noise or stationary noise, as it is typically a lower frequency for longer durations. The sound level may also differ between different types of aircraft creating an unknown spectrum of noise. Due to these differences, the analysis of aircraft noise is performed separately from both the surface traffic noise and stationary noise studies. For aircraft noise, the levels are defined by the Noise Exposure Forecast (NEF), which measures the sound produced by all types of aircraft at an airport, taking into consideration the number of flights, the duration of the noise, the time of day and the frequency components of the sound (pure tones). The Noise Exposure Projection (NEP) is similar to the NEF, but takes into consideration a long term projection beyond 10 years. Annex 10 - Land Use Constraints Due to Aircraft Noise located with the City of Ottawa's Official Plan outlines the NEF/NEP boundaries in addition to the Airport Vicinity Development Zone (AVDZ).

The limitation for the aircraft/airport noise is dictated by the local airport in collaboration with the City of Ottawa. It is stated within the ENCG that there is no development within the 30 NEF/NEP contour, but that a detailed noise analysis with respect to aircraft/airport noise study is required any time the property is located within the AVDZ. The NPC-300 stipulates that the aircraft/airport noise analysis is required where the sensitive land use is located at or above the NEF/NEP contour of 25.

The following table outlines the limitations for indoor Aircraft Noise:

Table 5 - Indoor Aircraft Noise Limits (Applicable over 24 hours)	
Type of Space	Indoor NEF/NEP
Living/dining/den areas of residences, hospital, schools, nursing/retirement homes, daycare centres, etc	5
Sleeping quarters	0

Due to the location of the proposed development, an analysis of building materials will be required to ensure adequate noise protection from aircraft and airport noise.

4.0 Analysis

4.1 Surface Transportation Noise

The subject development is bordered to the north by Capilano Drive followed by residential dwellings, Kerry Crescent, and Gilbey Drive, to the east by parking area, residential dwellings, and Birchwood Drive, to the south by parking area and recreational building, and to the west by parking areas and commercial buildings. Capilano Drive, Kerry Crescent, Gilbey Drive and Birchwood Drive are identified within the 100 m radius of proposed development.

Based on the City of Ottawa's Official Plan, Schedule E, Capilano Drive 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 source of traffic noise is due to the Capilano Drive north of the proposed development.

All noise sources are presented in Drawing PG6606-3 - 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 6 – Traffic and Road Parameters						
Segment	Roadway Classification	AADT Veh/Day	Speed Limit (km/h)	Day/Night Split %	Medium Truck %	Heavy Truck %
Capilano Drive	2-UCU	8000	40	92/8	7	5
➤ Data obtained from the City of Ottawa document ENCG						

Three (3) levels of reception points at townhouses, three (3) levels of reception points at the apartment building, and one (1) level of receptor point at the at-grade amenity area at the middle portion of the site were selected for this analysis. The following elevations were selected from the heights provided on the survey plan for the subject buildings.

Table 7 – Elevations of Reception Points			
Floor Number	Elevation at Centre of Window (m)	Floor Use	Daytime / Nighttime Analysis
Townhouses:			
First Floor	1.5	Living Area/Bedroom	Daytime / Nighttime
Second Floor	4.5	Living Area/Bedroom	Daytime / Nighttime
Rear Yard	1.5	--	Outdoor Living Area
Apartment Building:			
First Floor	1.5	Living Area/Bedroom	Daytime / Nighttime
Fourth Floor	11.0	Living Area/Bedroom	Daytime / Nighttime
Rooftop Terrace	14.5	--	Outdoor Living Area
At-Grade Amenity Area:			
Amenity Area	1.5	--	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 rear yards are identified at the townhouses. Additional outdoor living areas were identified as a rooftop terrace at the apartment building and an at-grade amenity area at the middle portion of the site. Two receptors (REC 4 and REC 5) were selected in the centre of rear yards of townhouses at an elevation of 1.5 m. One receptor (REC 9) was selected in the centre of rooftop terrace of apartment building at an elevation of 14.5 m. One receptor (REC 10) was selected in the centre of at-grade amenity area at the middle portion of the site at an elevation of 1.5 m. Reception points are detailed on Drawing PG6606-2 - 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 PG6606-3A to 3E, PG6606-4A to 4D, PG6606-5A - Site Geometry in Appendix 1. The subject site is generally levelled and at grade with the neighbouring roads within the 100 m radius.

Table 9 - 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 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.

4.2 Aircraft / Airport Noise

Due to the proximity to the Ottawa International Airport, an aircraft/airport noise study will be required. The site at 56 Capilano Drive falls within the airport zoning regulations but just outside of the 25 NEF/NEP boundary as stated on the Ottawa Official Plan Annex 10 - Land Use Constraints Due to Aircraft Noise. As a conservative approach, the analysis has been completed with an NEF/NEP of 25.

ENCG states criteria to mitigate the impact of aircraft noise on residential communities proposed between the 25 NEF/NEP and the Ottawa Airport Operating Influence Zone (OAOIZ). A document released by the Ottawa MacDonal-Cartier International Airport July 1998 entitled “Prescribed Measures to Address Aircraft Noise Residential Development 25 NEF/NEP to OAOIZ” was reviewed with respect to this development.

The aforementioned document provides the minimum prescribed measures for building components provided the residential units are between the 25 NEF/NEO and the OAOIZ and will consist of low to medium rise residential unit measures. The minimum prescribed measures are outlined below.

Prescribed Measures - Building Components

a) Exterior Wall

- 12.7 mm gypsum board;
- vapour barrier;
- 38 mm x 139 mm studs at 400 mm o.c.;
- batt/blown insulation in the inter-stud cavities;
- 7.9 mm exterior sheathing;
- building paper;
- wood siding; vinyl siding; or metal siding with fibre backer board; or 20 mm stucco

b) Windows and Patio Doors

- double glazed, well fitted, weather stripped units with dimensions to fit 25 mm

c) Roof – Ceiling

- asphalt shingles;
- sheathing;
- typical (pre-engineered) wood trusses at 600 mm o.c. with ventilated attic;
- 75 mm (or thicker) batts/blown insulation;
- vapour barrier;
- 12.7 mm gypsum board

d) Exterior Doors

- 44 mm steel door with foam or glass fibre/polyurethane insulated core with unlimited glazing; or,
- 44 mm glass fibre reinforced plastic door with foam or glass fibre insulated core

5.0 Results

Surface Transportation Noise

The primary descriptors are the 16-hour daytime (7:00-23:00) and the 8-hour nighttime (23:00-7:00) equivalent sound levels, $L_{eq(16)}$ and $L_{eq(8)}$ for City roads.

The exterior noise levels due to roadway traffic sources were analyzed with the STAMSON version 5.04 software at all reception points. The input and output data of the STAMSON modeling can be found in Appendix 2, and the summary of the results can be found in Table 8.

Table 8: 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)
Townhouses				
REC 1-1	1.5	Northern Elevation, 1st Floor	62	55
REC 1-2	4.5	Northern Elevation, 2nd Floor	63	55
REC 2-1	1.5	Western Elevation, 1st Floor	59	52
REC 2-2	4.5	Western Elevation, 2nd Floor	60	52
REC 3-1	1.5	Eastern Elevation, 1st Floor	59	52
REC 3-2	4.5	Eastern Elevation, 2nd Floor	60	52
REC 4	1.5	Rear Yard - West	50	--
REC 5	1.5	Rear Yard - East	50	--
Apartment Building				
REC 6-1	1.5	Northern Elevation, 1st Floor	55	47
REC 6-4	11.0	Northern Elevation, 4th Floor	57	49
REC 7-1	1.5	Western Elevation, 1st Floor	48	41
REC 7-4	11.0	Western Elevation, 4th Floor	50	42
REC 8-1	1.5	Eastern Elevation, 1st Floor	49	42
REC 8-4	11.0	Eastern Elevation, 4th Floor	51	43
REC 9	14.5	Rooftop Terrace	50	--
At-Grade Amenity Area				
REC 10	1.5	At-Grade Amenity Area (After Townhouses Construction)	52	--

Aircraft / Airport Noise

It is understood that the proposed construction materials match or the proposed details outlined in subsection 4.2. The e-mail discussions with Mr. Alex Sargent regarding the construction of proposed exterior walls, roof-ceilings, doors, and windows are included in Appendix 3. Therefore, there is adequate noise protection from aircraft/airport noise and no further analysis will be required.

6.0 Discussion and Recommendations

6.1 Outdoor Living Areas

Outdoor living areas – rear yards at the townhouses, rooftop terrace at the apartment building, and at-grade amenity area at the middle portion of the site are anticipated at the proposed development. Two receptors (REC 4 and REC 5) were selected in the centre of rear yards of townhouses at an elevation of 1.5 m. One receptor (REC 9) was selected in the centre of rooftop terrace of apartment building at an elevation of 14.5 m. One receptor (REC 10) was selected in the centre of at-grade amenity area at an elevation of 1.5 m.

It is assumed that the rear yards will only be utilized as outdoor living areas provided that the proposed townhouses are constructed. Utilizing the exteriors of proposed townhouses as noise barriers, the proposed $Leq(16)$ at the rear yards will be 50 dBA, which are below the 55 dBA threshold value specified by the ENCG. Therefore, no further noise attenuation measures are required.

It is assumed that the rooftop terrace will only be utilized as outdoor living area provided that the proposed apartment building is constructed. Utilizing the exteriors of proposed apartment building as noise barriers, the proposed $Leq(16)$ at the rooftop terrace will be 50 dBA, which is below the 55 dBA threshold value specified by the ENCG. Therefore, no further noise attenuation measures are required.

It is assumed that the at-grade amenity area will only be utilized as outdoor living area provided that the proposed buildings are constructed. Utilizing the exteriors of proposed townhouses as noise barriers, the proposed $Leq(16)$ at the at-grade amenity area will be 52 dBA, which is below the 55 dBA threshold value specified by the ENCG. Therefore, no further noise attenuation measures are required.

6.2 Indoor Living Areas and Ventilation

The results of the STAMSON modeling indicate that the noise levels at proposed townhouses will range between 59 dBA and 63 dBA during the daytime period (07:00-23:00) and between 52 dBA and 55 dBA during the nighttime period (23:00-07:00). The anticipated noise levels on the northern, western, and eastern elevations of townhouses will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. Therefore, all townhouse units should be designed with the provision of a central air conditioning unit, along with the warning clause Type C, as outlined in Table 3.

The results of the STAMSON modeling indicate that the noise levels at proposed apartment building will range between 48 dBA and 57 dBA during the daytime period (07:00-23:00) and between 41 dBA and 49 dBA during the nighttime period (23:00-07:00). The anticipated noise level on the northern elevation of apartment building will exceed the limit for the exterior of the pane of glass (55 dBA) specified by the ENCG. Therefore, the units on the northern elevation of apartment building should be designed with the provision of a central air conditioning unit, along with the warning clause Type C, as outlined in Table 3.

It is also noted that the results of STAMSON modeling indicate that the noise levels at the townhouses and the apartment building will be below 65 dBA, and therefore standard building materials are acceptable to provide adequate soundproofing.

6.3 Aircraft and Airport Noise Recommendations

Due to the location of the subject site within the 25 NEF/NEP and the OAOIZ limits, a warning clause should be included on all Offers of Purchase and Sale and/or lease agreements. The warning clause should state:

“Purchasers/building occupants are forewarned that this property/dwelling unit is located in a noise sensitive area due to its proximity to Ottawa International Airport. In order to reduce the impact of aircraft noise in the indoor spaces, the unit has been designed and built to meet provincial standards for noise control by the use of components and building systems that provide sound attenuation. In addition to the building components (i.e. walls, windows, doors, ceiling-roof), since the benefit of sound attenuation is lost when windows or doors are left open, this unit has been fitted with a forced air heating system, all components of which are sized to accommodate the future installation of central air conditioning by the owner/occupant.

Despite the inclusion of noise control features within the dwelling unit, noise due to aircraft operations may continue to interfere with some indoor activities and with outdoor activities, particularly during the summer months. The purchaser/building occupant is further advised that the Airport is open and operates 24 hours a day, and that changes to operations or expansion of the airport facilities, including the construction of new runways, may affect the living environment of the residents of this property/area.

The Ottawa International Airport Authority, its acoustical consultants and the Municipality are not responsible if, regardless of the implementation of noise control features, the purchaser/occupant of this dwelling finds that the indoor noise levels due to aircraft operations continue to be of concern or are offensive.”

7.0 Summary of Findings

The subject site is located at 56 Capilano Drive, in the City of Ottawa. It is understood that the proposed development will consist of two (2) storey townhouses with one level of basement at the northern part of the site, and a four (4) storey apartment building with one level of basement at the southern part of the site. The townhouses will rise 6 metres above grade and the apartment building will rise 13 metres above grade. There is one major source of surface transportation noise to the proposed development: Capilano Drive.

Outdoor living areas – rear yards at the townhouses, rooftop terrace at the apartment building, and at-grade amenity area are identified at the proposed development. Utilizing the exteriors of townhouses and apartment building as noise barriers, the results of STAMSON modeling indicate that the noise levels at the rear yards of townhouses, the rooftop terrace of apartment building, and the amenity area at the middle portion of site are expected to be below the 55 dBA threshold value specified by the ENCG. Therefore, no further noise attenuation measures are required.

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

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

" 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."

The building components were reviewed with respect to the aircraft/airport noise and was determined to be adequate for the proposed noise levels. However, the following warning clause is to be included on all Offers of Purchase and Sale and/or lease agreements:

“Purchasers/building occupants are forewarned that this property/dwelling unit is located in a noise sensitive area due to its proximity to Ottawa International Airport. In order to reduce the impact of aircraft noise in the indoor spaces, the unit has been designed and built to meet provincial standards for noise control by the use of components and building systems that provide sound attenuation. In addition to the building components (i.e. walls, windows, doors, ceiling-roof), since the benefit of sound attenuation is lost when windows or doors are left open, this unit has been fitted with a forced air heating system, all components of which are sized to accommodate the future installation of central air conditioning by the owner/occupant.

Despite the inclusion of noise control features within the dwelling unit, noise due to aircraft operations may continue to interfere with some indoor activities and with outdoor activities, particularly during the summer months. The purchaser/building occupant is further advised that the Airport is open and operates 24 hours a day, and that changes to operations or expansion of the airport facilities, including the construction of new runways, may affect the living environment of the residents of this property/area.

The Ottawa International Airport Authority, its acoustical consultants and the Municipality are not responsible if, regardless of the implementation of noise control features, the purchaser/occupant of this dwelling finds that the indoor noise levels due to aircraft operations continue to be of concern or are offensive.”

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 CSV Architects or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.



Yolanda Tang, M.A.Sc



Stephanie A. Boisvenue, P.Eng.

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- CSV Architects (email copy)
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APPENDIX 1

Table 9 - Summary of Reception Points and Geometry

Drawing PG6606-1 - Site Plan

Drawing PG6606-2 - Receptor Location Plan

Drawing PG6606-3 - Site Geometry (Townhouses)

Drawing PG6606-3A - Site Geometry - REC 1-1 and REC 1-2

Drawing PG6606-3B - Site Geometry - REC 2-1 and REC 2-2

Drawing PG6606-3C - Site Geometry - REC 3-1 and REC 3-2

Drawing PG6606-3D - Site Geometry - REC 4

Drawing PG6606-3E - Site Geometry - REC 5

Drawing PG6606-4 - Site Geometry (Apartment Building)

Drawing PG6606-4A - Site Geometry - REC 6-1 and REC 6-4

Drawing PG6606-4B - Site Geometry - REC 7-1 and REC 7-4

Drawing PG6606-4C - Site Geometry - REC 8-1 and REC 8-4

Drawing PG6606-4D - Site Geometry - REC 9

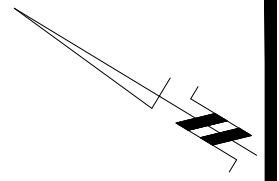
Drawing PG6606-5 - Site Geometry (Amenity Area)

Drawing PG6606-5A - Site Geometry - REC 10

Drawing PG6606-6 - Aircraft Noise Limitations

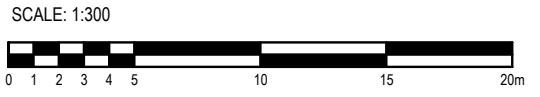
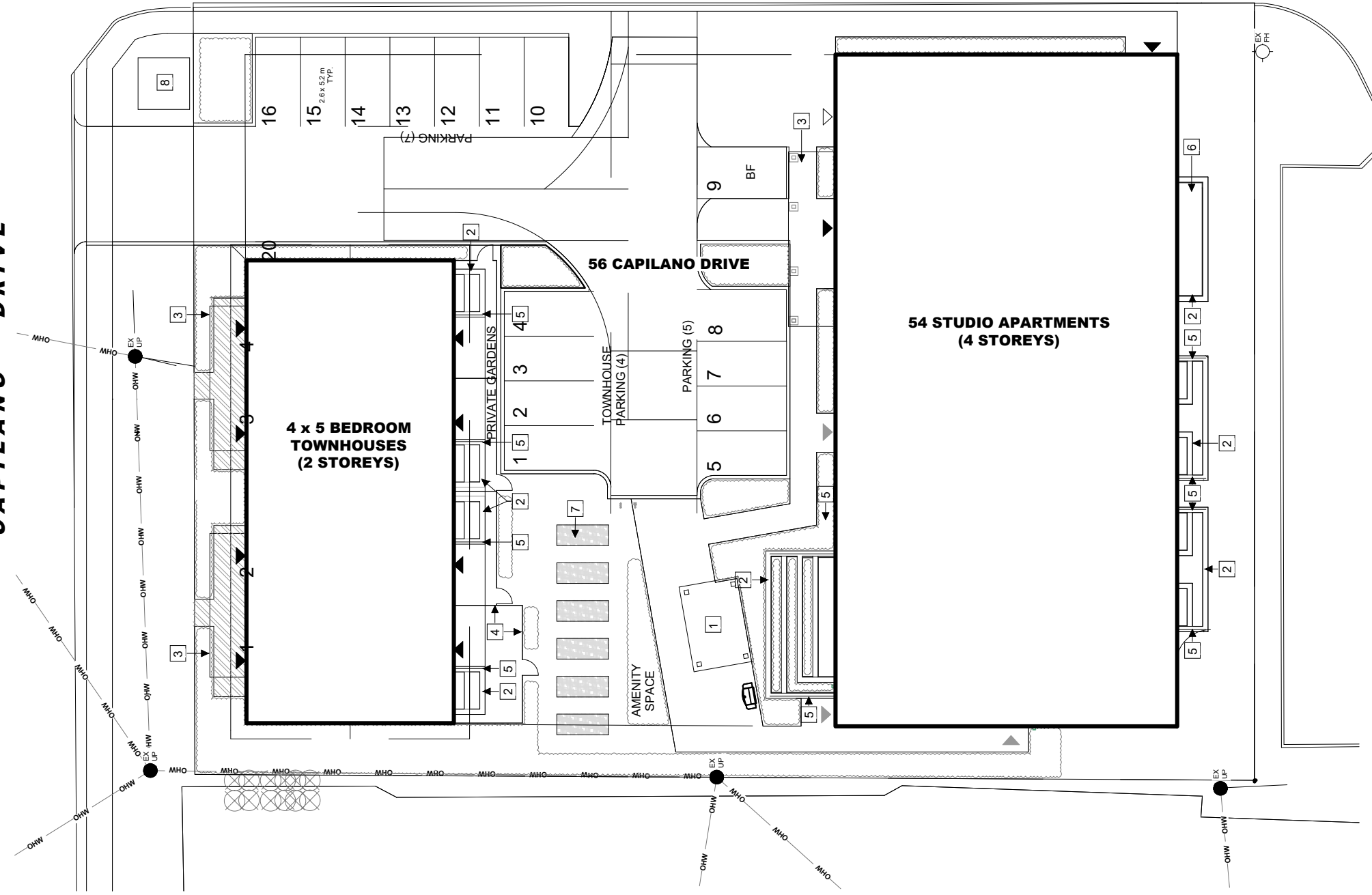
Table 9 - Summary of Reception Points and Geometry
56 Capilano Drive

Point of Reception	Location	Leq Day (dBA)	Capilano Drive											
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Number of Rows of Houses	Density (%)						
REC 1-1	Townhouses, Northern Elevation, 1st Floor	62	15	1.5	15.1	-90, 88	n/a	n/a						
REC 1-2	Townhouses, Northern Elevation, 2nd Floor	63	15	4.5	15.7	-90, 88	n/a	n/a						
REC 2-1	Townhouses, Western Elevation, 1st Floor	59	15	1.5	15.1	-88, 0	n/a	n/a						
REC 2-2	Townhouses, Western Elevation, 2nd Floor	60	15	4.5	15.7	-88, 0	n/a	n/a						
REC 3-1	Townhouses, Eastern Elevation, 1st Floor	59	15	1.5	15.1	0, 84	n/a	n/a						
REC 3-2	Townhouses, Eastern Elevation, 2nd Floor	60	15	4.5	15.7	0, 84	n/a	n/a						
REC 4	Townhouse (West) - Rear Yard	50	18	1.5	18.1	-84, -63	n/a	n/a						
REC 5	Townhouse (East) - Rear Yard	50	18	1.5	18.1	61, 79	n/a	n/a						
REC 6-1	Apartment Building, Northern Elevation, 1st Floor	55	40	1.5	40.0	-74, 70	n/a	n/a						
REC 6-4	Apartment Building, Northern Elevation, 4th Floor	57	40	11.0	41.5	-74, 70	n/a	n/a						
REC 7-1	Apartment Building, Western Elevation, 1st Floor	48	50	1.5	50.0	-66, 0	1	40						
REC 7-4	Apartment Building, Western Elevation, 4th Floor	50	50	11	51.2	-66, 0	1	40						
REC 8-1	Apartment Building, Eastern Elevation, 1st Floor	49	50	1.5	50.0	0, 61	1	20						
REC 8-4	Apartment Building, Eastern Elevation, 4th Floor	51	50	11	51.2	0, 61	1	20						
REC 9	Apartment Building - Rooftop Terrace	50	50	14.5	52.1	-70, 66	n/a	n/a						
REC 10	At-Grade Amenity Area	52	30	1.5	1.5	-80, -20	1	20						
						64, 75	n/a	n/a						



CAPILANO DRIVE

ACCESS ROAD



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

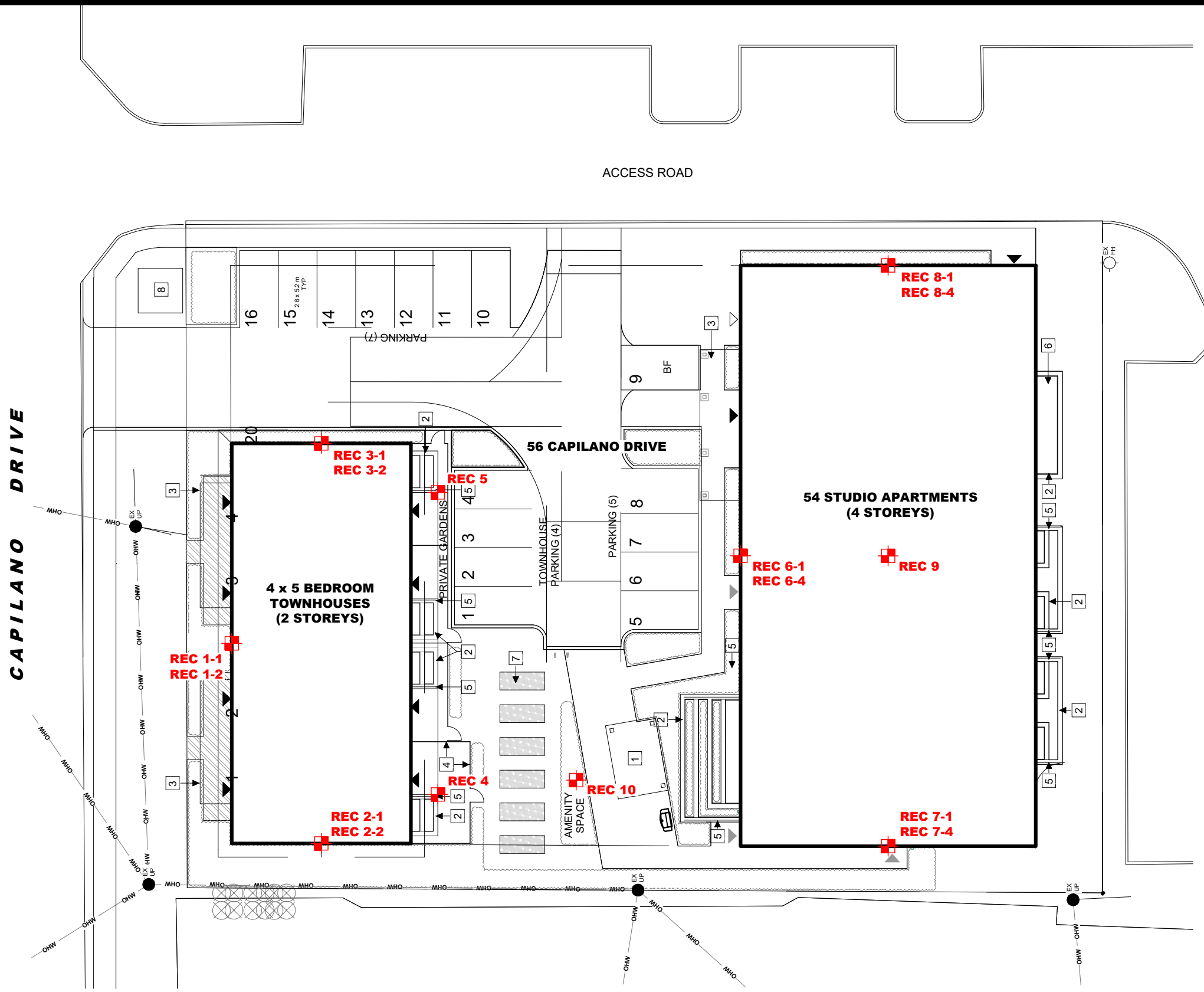
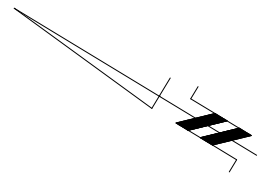
NO.	REVISIONS	DATE	INITIAL

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE

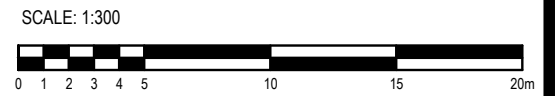
OTTAWA, ONTARIO

SITE PLAN

Scale:	1:300	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-1
Approved by:	SB	Revision No.:	



LEGEND:
 RECEPTOR LOCATION




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

NO.	REVISIONS	DATE	INITIAL

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE
ONTARIO

OTTAWA,
 Title:

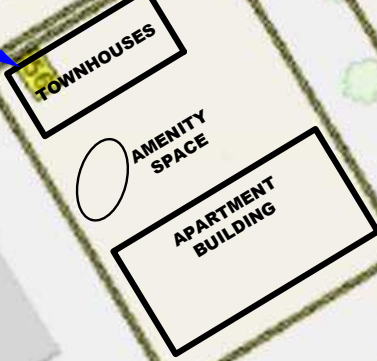
RECEPTOR LOCATION PLAN

Scale:	1:300	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-2
Approved by:	SB	Revision No.:	



**SITE : 56 CAPILANO DRIVE
(TOWNHOUSES)
APPROX. ELEVATION : 96 m
APPROX. HEIGHT : 6 m**

**CAPILANO DRIVE
2-LANE URBAN COLLECTOR
ROAD (2-UCU)
AADT : 8,000
SPEED : 40 KM / HR**



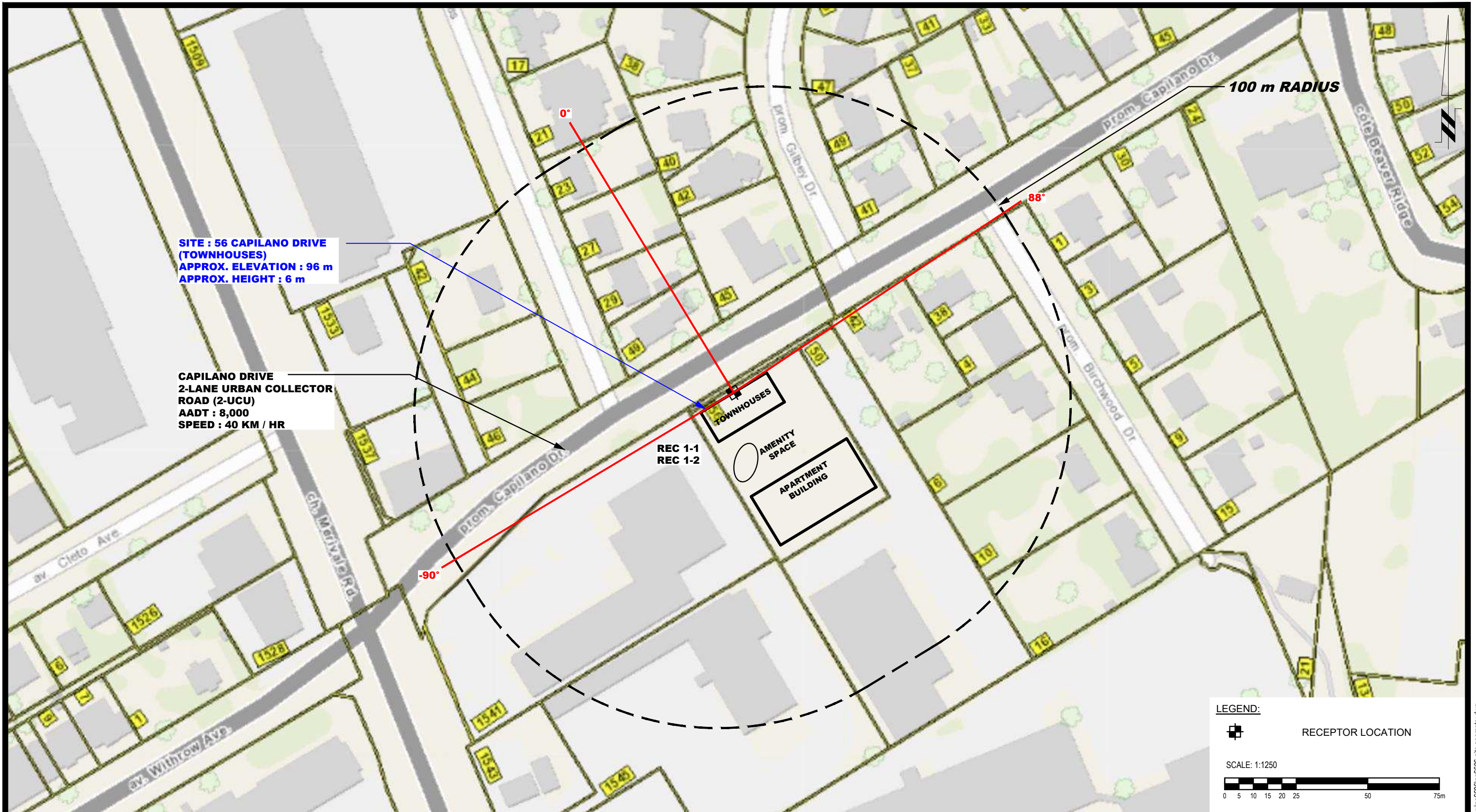
NO.	REVISIONS	DATE	INITIAL

OTTAWA, ONTARIO

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE

SITE GEOMETRY (TOWNHOUSES)

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-3
Approved by:	SB	Revision No.:	



**SITE : 56 CAPILANO DRIVE
(TOWNHOUSES)
APPROX. ELEVATION : 96 m
APPROX. HEIGHT : 6 m**

**CAPILANO DRIVE
2-LANE URBAN COLLECTOR
ROAD (2-UCU)
AADT : 8,000
SPEED : 40 KM / HR**

100 m RADIUS

**REC 1-1
REC 1-2**

**AMENITY SPACE
APARTMENT BUILDING**

LEGEND:



RECEPTOR LOCATION

SCALE: 1:1250



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

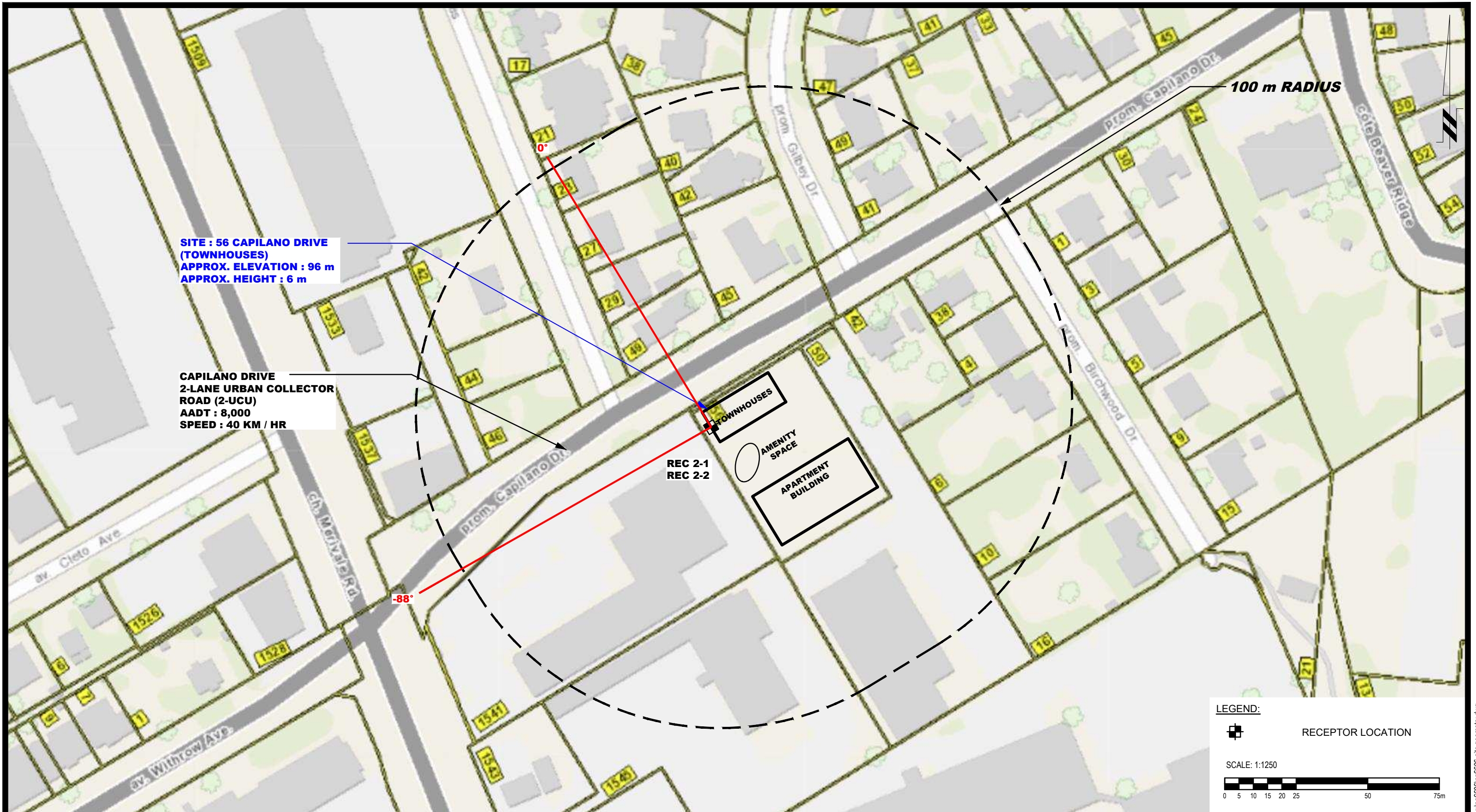
NO.	REVISIONS	DATE	INITIAL

**CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE**

OTTAWA, ONTARIO

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

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-3A
Approved by:	SB	Revision No.:	



**SITE : 56 CAPILANO DRIVE
(TOWNHOUSES)
APPROX. ELEVATION : 96 m
APPROX. HEIGHT : 6 m**

**CAPILANO DRIVE
2-LANE URBAN COLLECTOR
ROAD (2-UCU)
AADT : 8,000
SPEED : 40 KM / HR**

**REC 2-1
REC 2-2**

TOWNHOUSES

AMENITY SPACE

APARTMENT BUILDING

100 m RADIUS

LEGEND:



RECEPTOR LOCATION

SCALE: 1:1250



9 AURIGA DRIVE
OTTAWA, ON
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NO.	REVISIONS	DATE	INITIAL

OTTAWA,
Title:

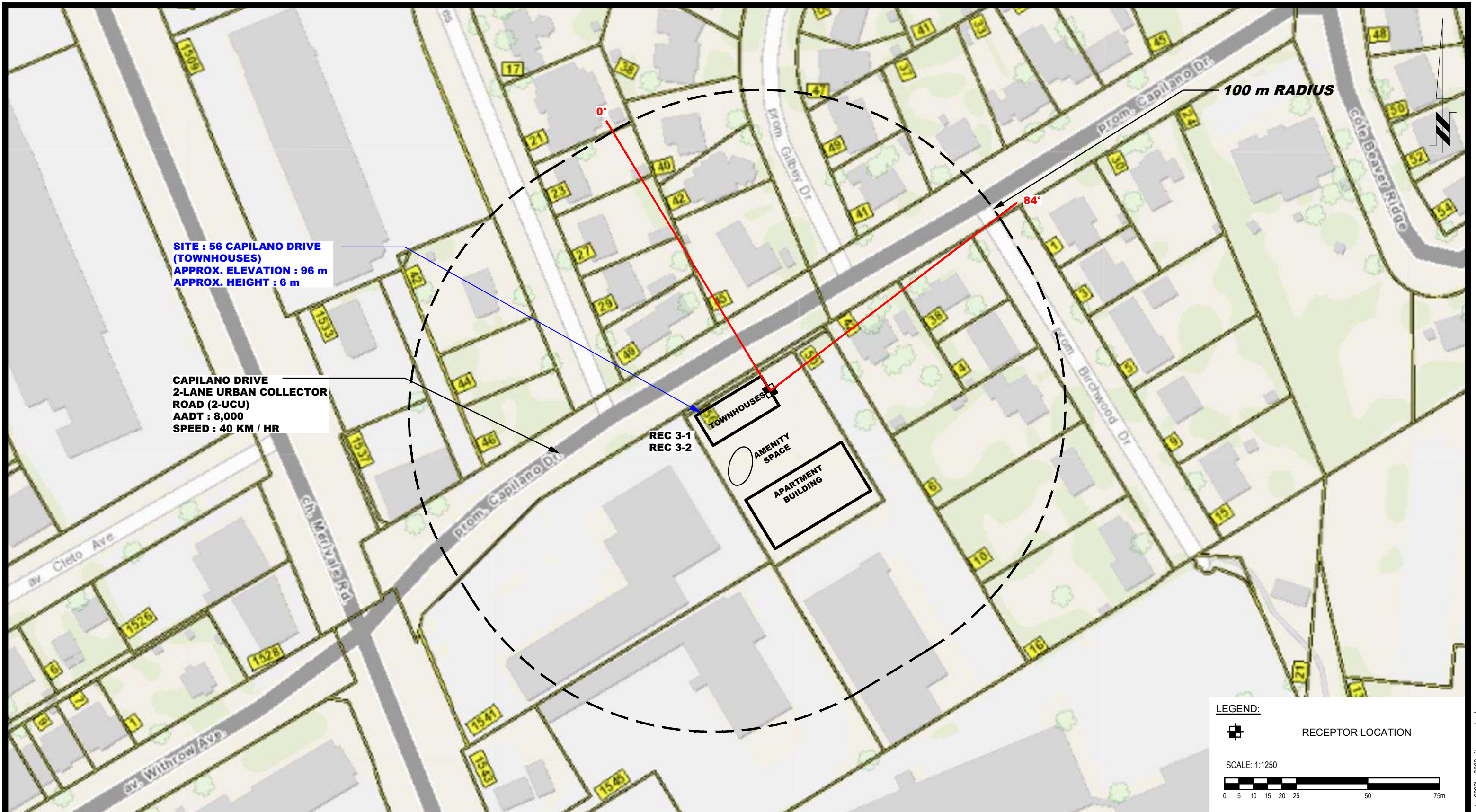
**CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE**

ONTARIO

SITE GEOMETRY - REC 2-1 AND REC 2-2

Scale: 1:1250
Drawn by: YA
Checked by: YT
Approved by: SB

Date: 03/2023
Report No.: PG6606-1
Dwg. No.: **PG6606-3B**
Revision No.:




**SITE : 56 CAPILANO DRIVE
(TOWNHOUSES)
APPROX. ELEVATION : 96 m
APPROX. HEIGHT : 6 m**


**CAPILANO DRIVE
2-LANE URBAN COLLECTOR
ROAD (2-UCU)
AADT : 8,000
SPEED : 40 KM / HR**

**REC 3-1
REC 3-2**

TOWNHOUSES
AMENITY SPACE
APARTMENT BUILDING

100 m RADIUS

LEGEND:
 RECEPTOR LOCATION

SCALE: 1:1250




9 AURIGA DRIVE
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TEL: (613) 226-7381

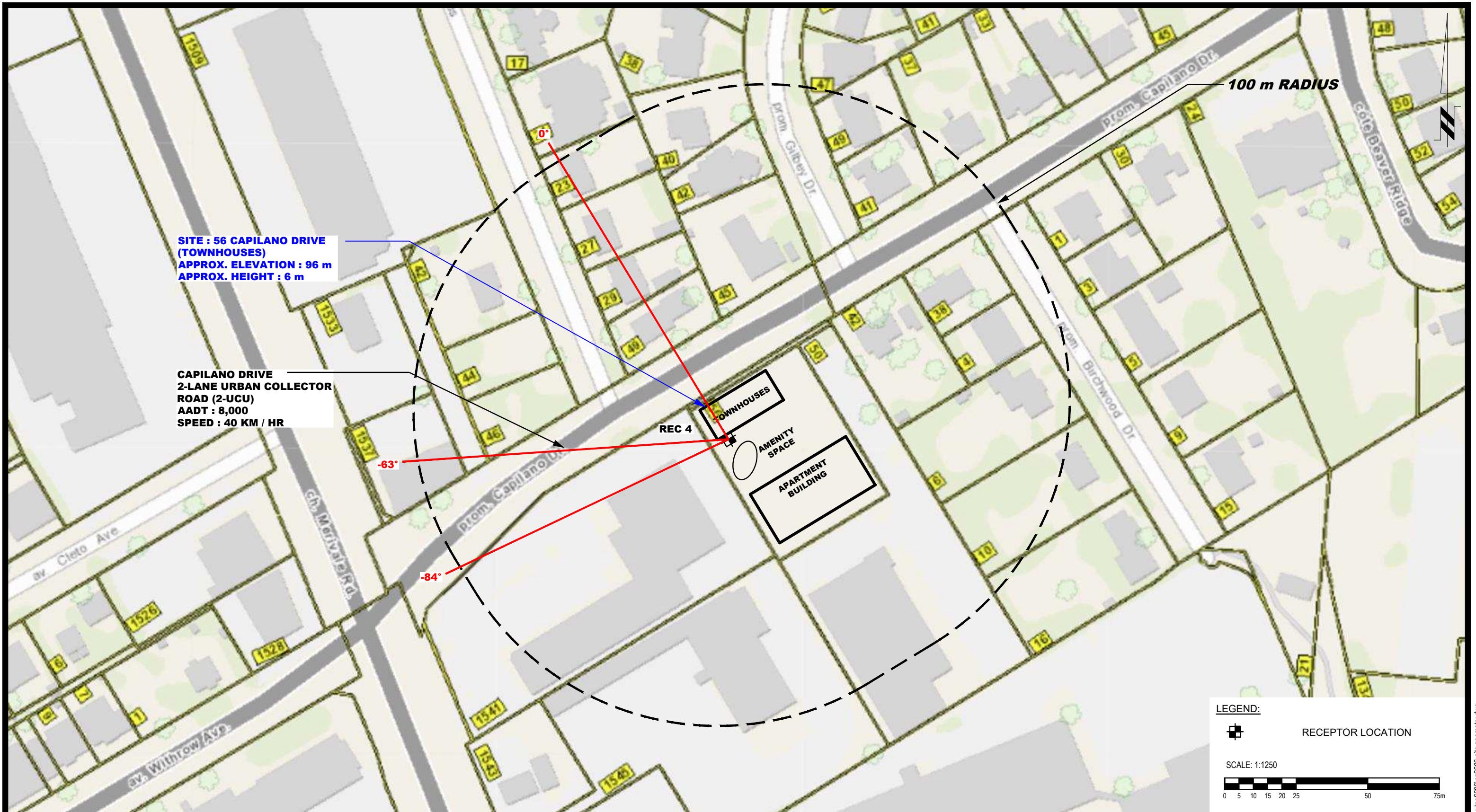
NO.	REVISIONS	DATE	INITIAL

OTTAWA, ONTARIO

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE

SITE GEOMETRY - REC 3-1 AND REC 3-2

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-3C
Approved by:	SB	Revision No.:	



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

NO.	REVISIONS	DATE	INITIAL

OTTAWA,
 Title:

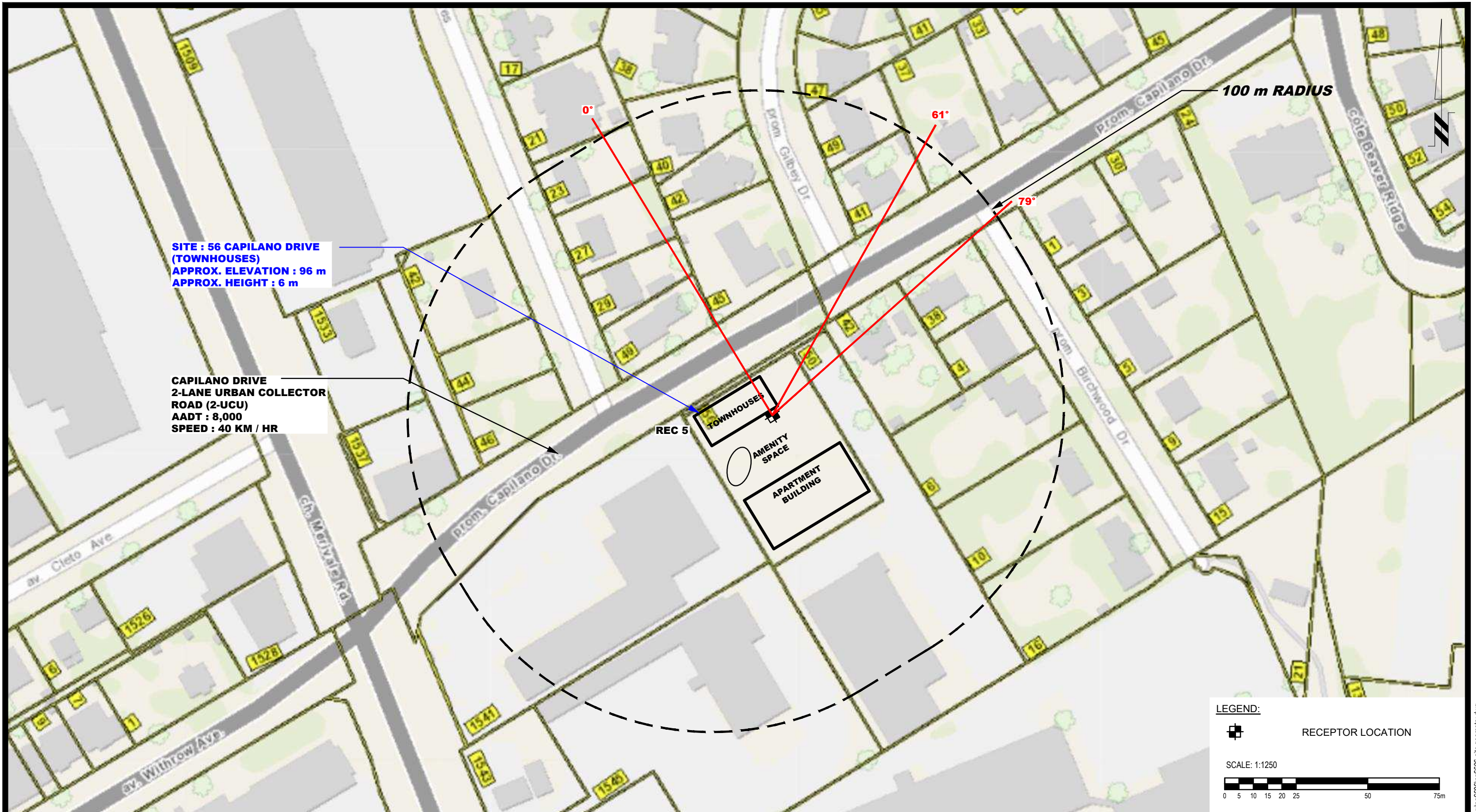
CSV ARCHITECTS
 NOISE ATTENUATION STUDY
 PROPOSED RESIDENTIAL DEVELOPMENT
 56 CAPILANO DRIVE

ONTARIO

SITE GEOMETRY - REC 4

Scale: 1:1250
 Drawn by: YA
 Checked by: YT
 Approved by: SB

Date: 03/2023
 Report No.: PG6606-1
 Dwg. No.: **PG6606-3D**
 Revision No.:



LEGEND:

RECEPTOR LOCATION

SCALE: 1:1250

0 5 10 15 20 25 50 75m

PATERSON GROUP

9 AURIGA DRIVE
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 K2E 7T9
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NO.	REVISIONS	DATE	INITIAL

CSV ARCHITECTS
 NOISE ATTENUATION STUDY
 PROPOSED RESIDENTIAL DEVELOPMENT
 56 CAPILANO DRIVE
 OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 5**

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-3E
Approved by:	SB	Revision No.:	



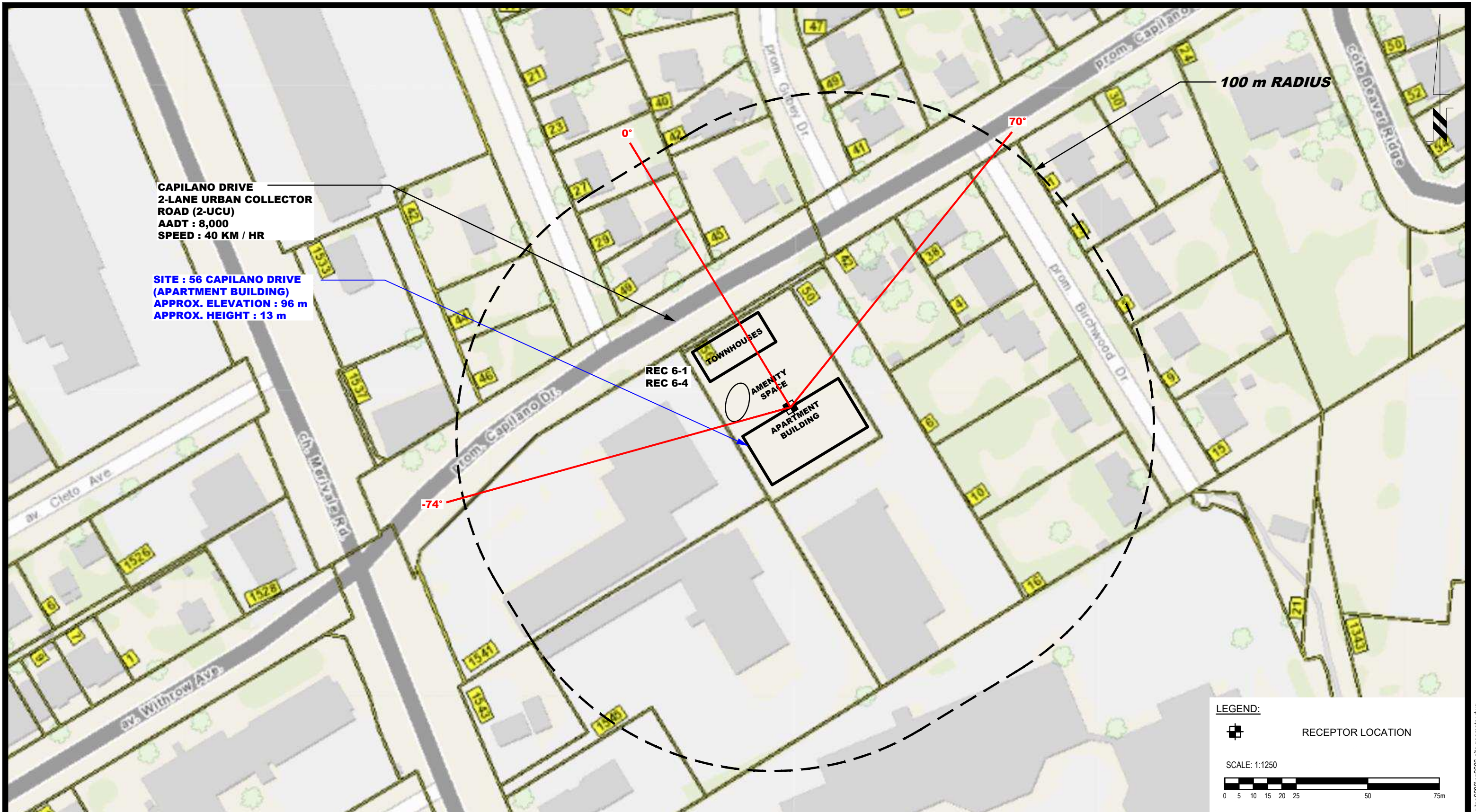
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE
ONTARIO

OTTAWA,
Title: **SITE GEOMETRY (APARTMENT BUILDING)**

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-4
Approved by:	SB	Revision No.:	



CAPILANO DRIVE
 2-LANE URBAN COLLECTOR
 ROAD (2-UCU)
 AADT : 8,000
 SPEED : 40 KM / HR

SITE : 56 CAPILANO DRIVE
 (APARTMENT BUILDING)
 APPROX. ELEVATION : 96 m
 APPROX. HEIGHT : 13 m

TOWNHOUSES
 REC 6-1
 REC 6-4
 AMENITY SPACE
 APARTMENT BUILDING

100 m RADIUS

LEGEND:

☒ RECEPTOR LOCATION

SCALE: 1:1250

0 5 10 15 20 25 50 75m

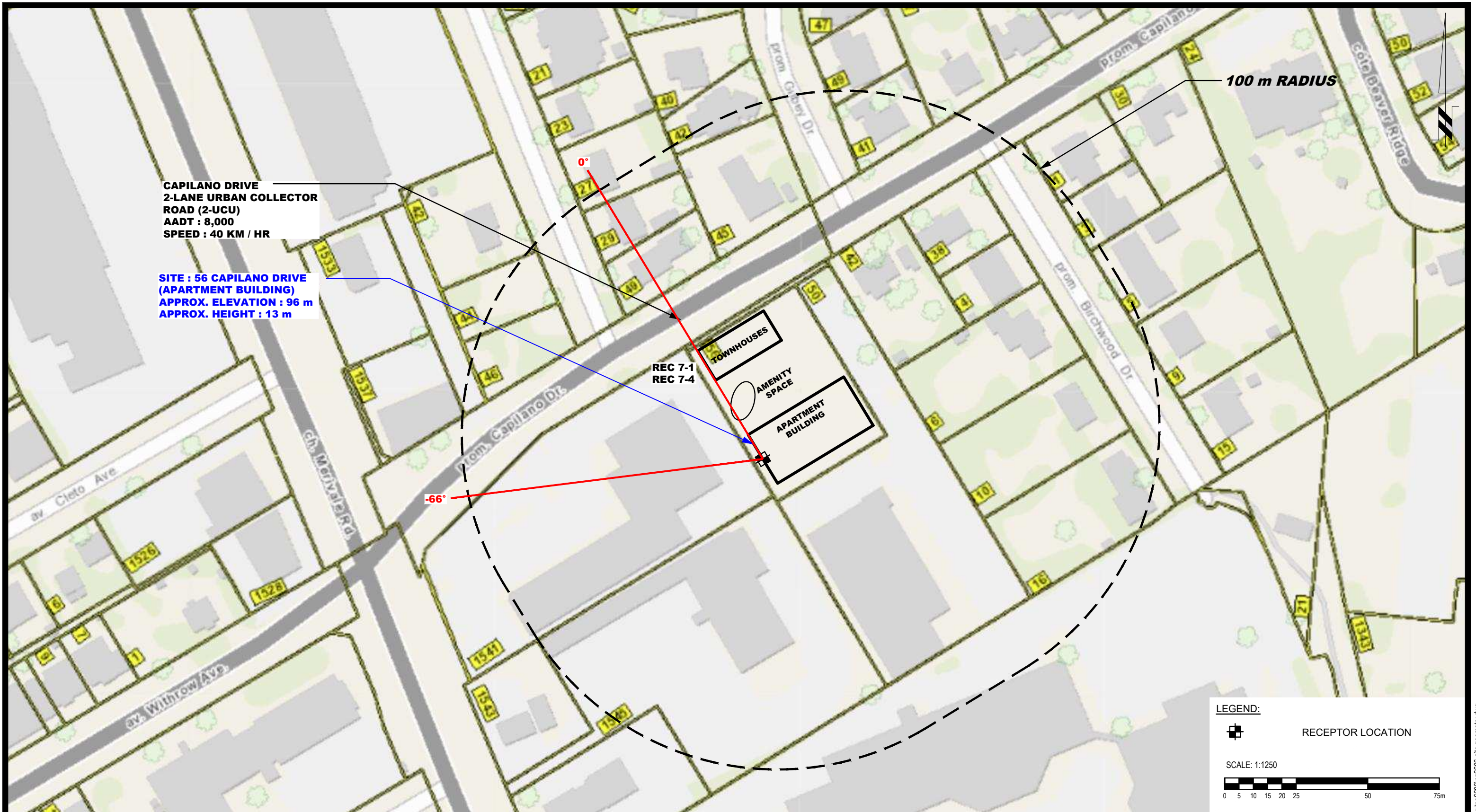
9 AURIGA DRIVE
 OTTAWA, ON
 K2E 7T9
 TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

CSV ARCHITECTS
 NOISE ATTENUATION STUDY
 PROPOSED RESIDENTIAL DEVELOPMENT
 56 CAPILANO DRIVE
 OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 6-1 AND REC 6-4**

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-4A
Approved by:	SB	Revision No.:	



9 AURIGA DRIVE
OTTAWA, ON
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

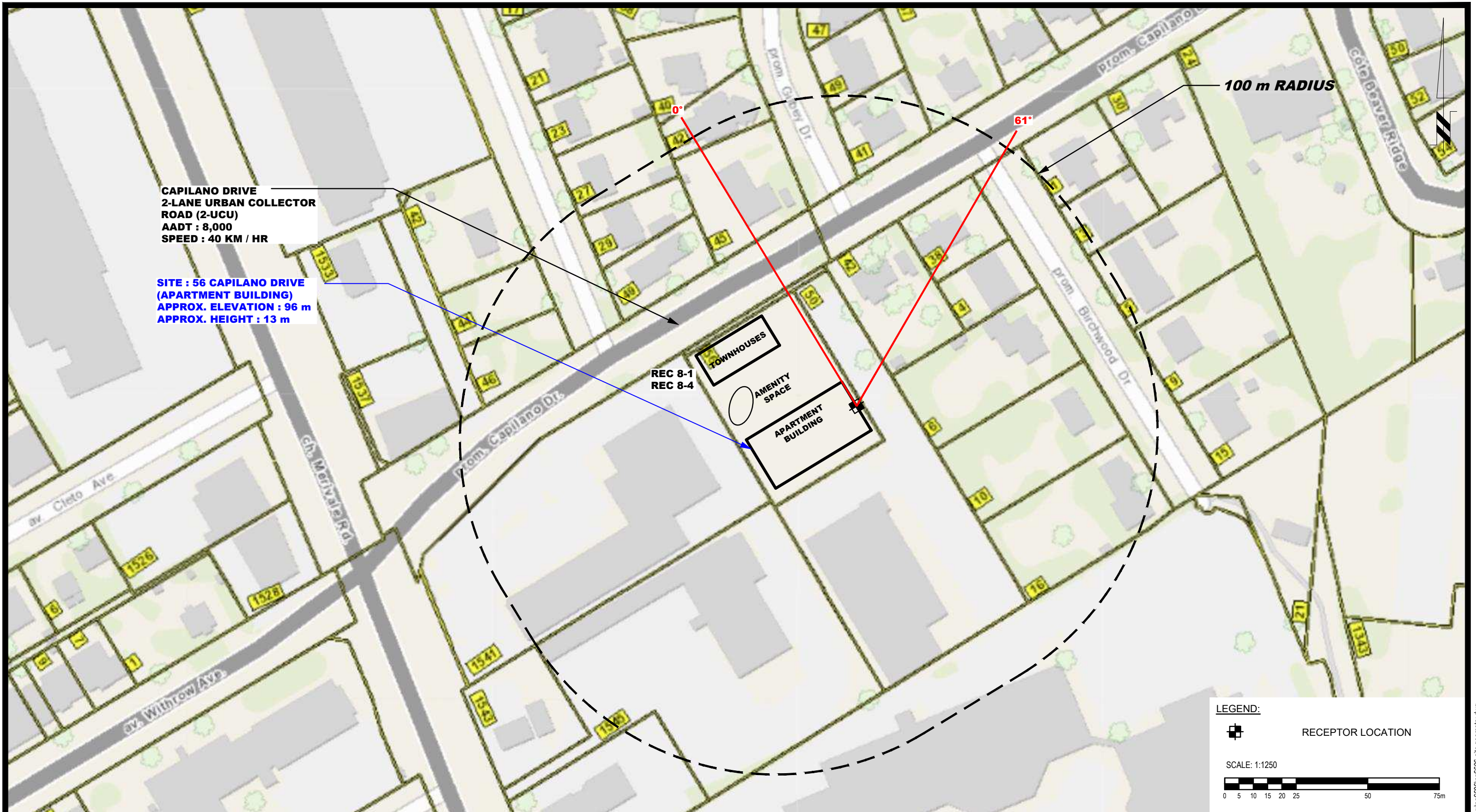
OTTAWA,
Title:

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE
ONTARIO

SITE GEOMETRY - REC 7-1 AND REC 7-4

Scale: 1:1250
Drawn by: YA
Checked by: YT
Approved by: SB

Date: 03/2023
Report No.: PG6606-1
Dwg. No.: **PG6606-4B**
Revision No.:



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

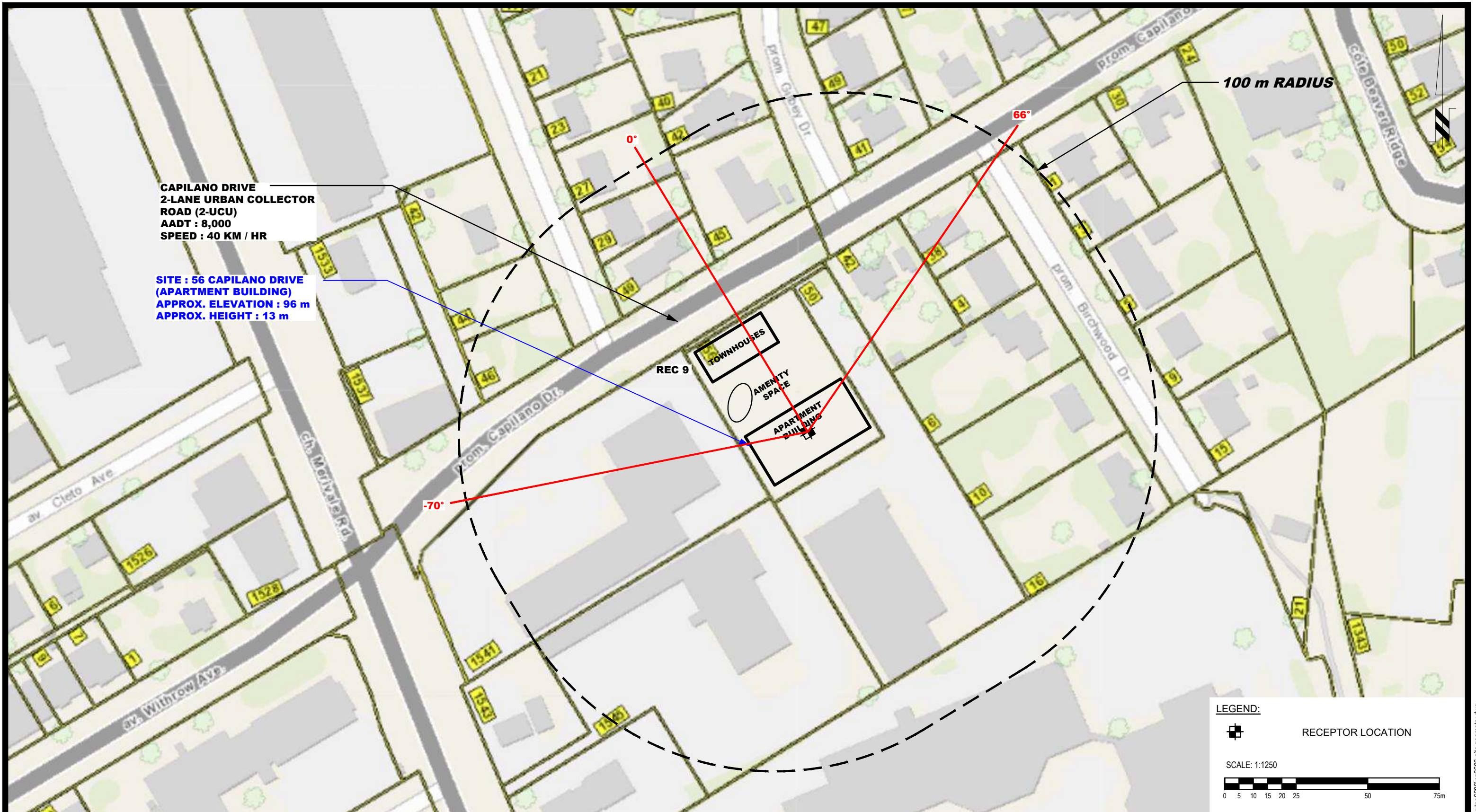
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CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE

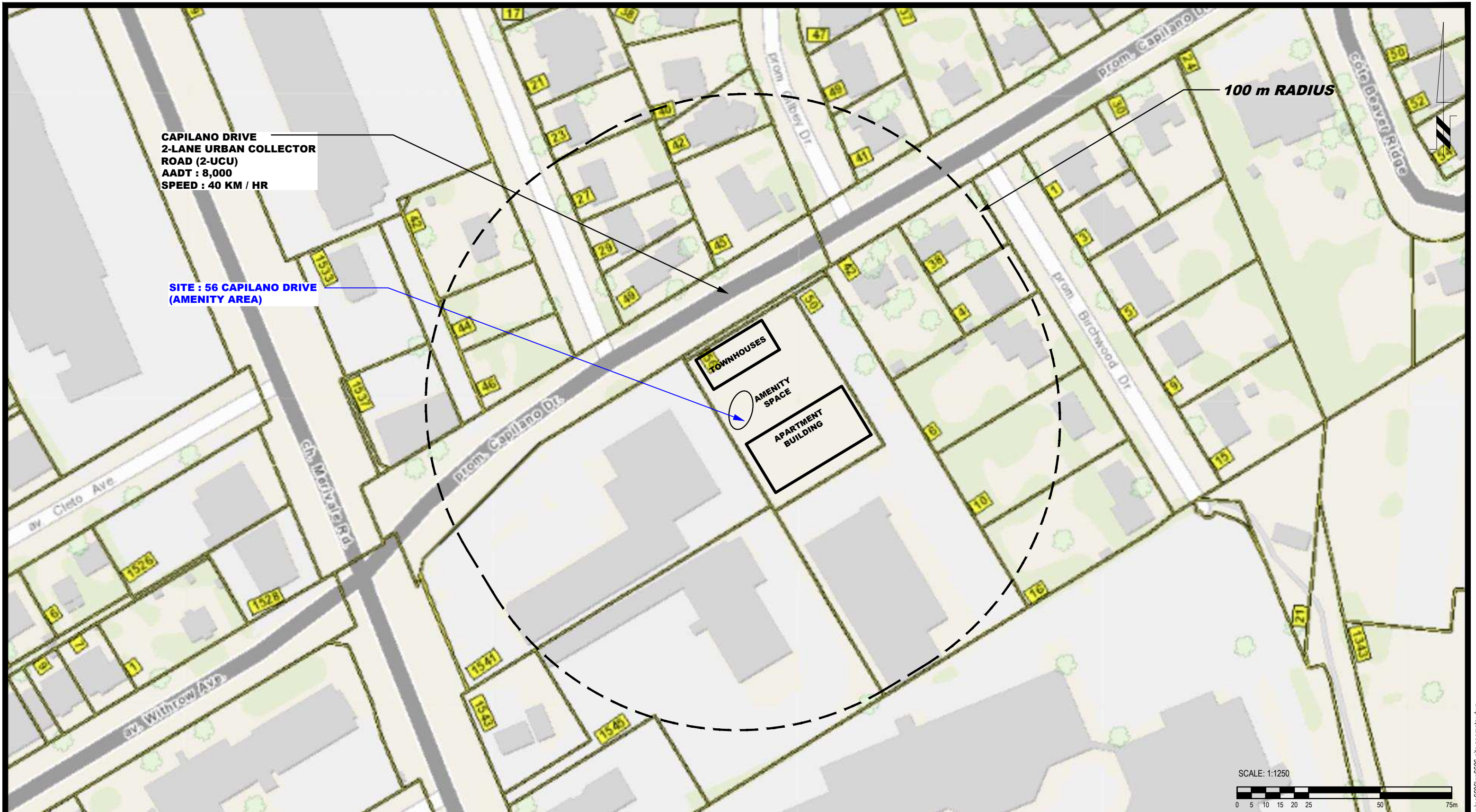
OTTAWA, ONTARIO

Title: **SITE GEOMETRY - REC 8-1 AND REC 8-4**

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-4C
Approved by:	SB	Revision No.:	



NO.	REVISIONS	DATE	INITIAL



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

NO.	REVISIONS	DATE	INITIAL

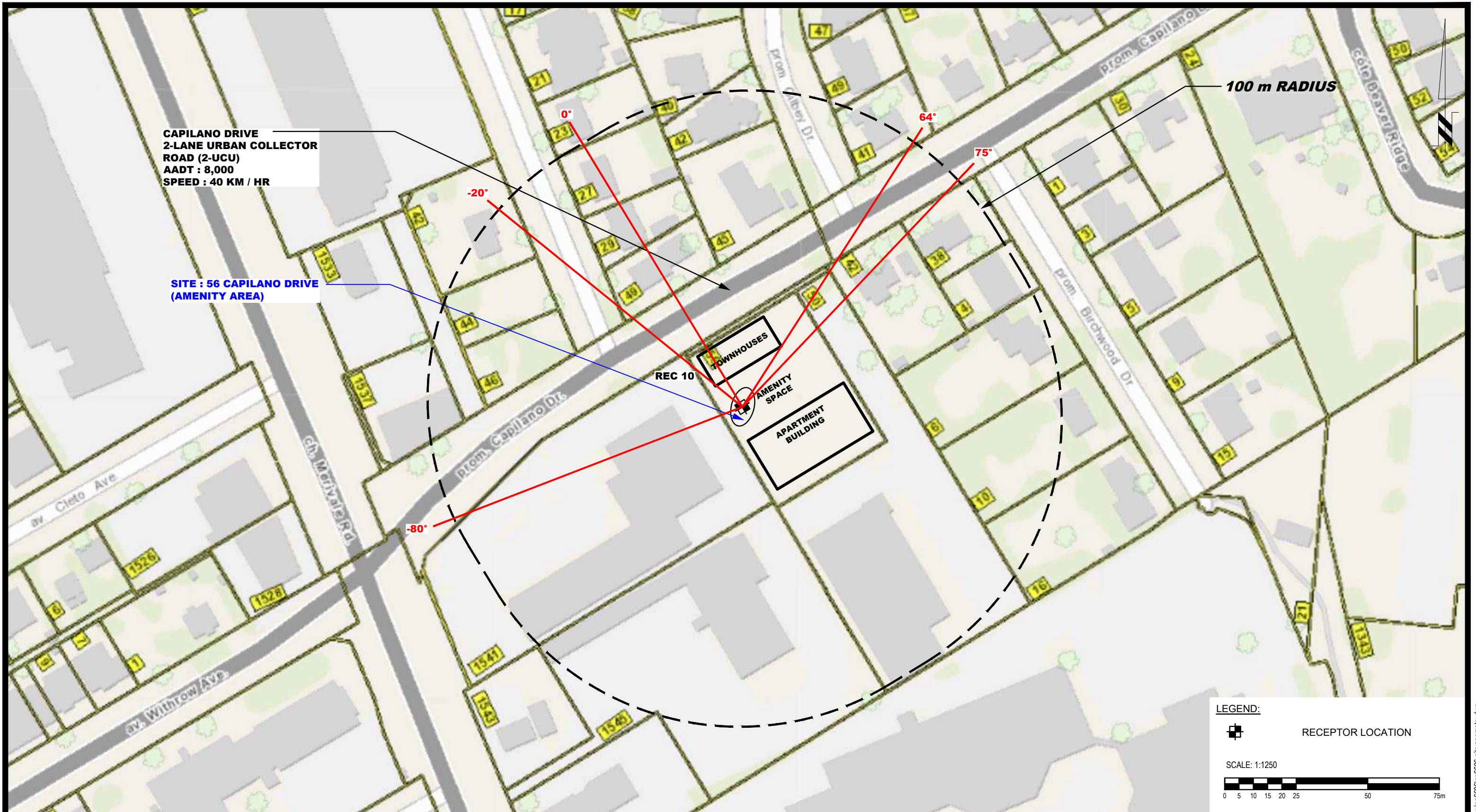
OTTAWA,
Title:

**CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE**

ONTARIO

SITE GEOMETRY (AMENITY AREA)

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-5
Approved by:	SB	Revision No.:	



LEGEND:

RECEPTOR LOCATION

SCALE: 1:1250

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

NO.	REVISIONS	DATE	INITIAL

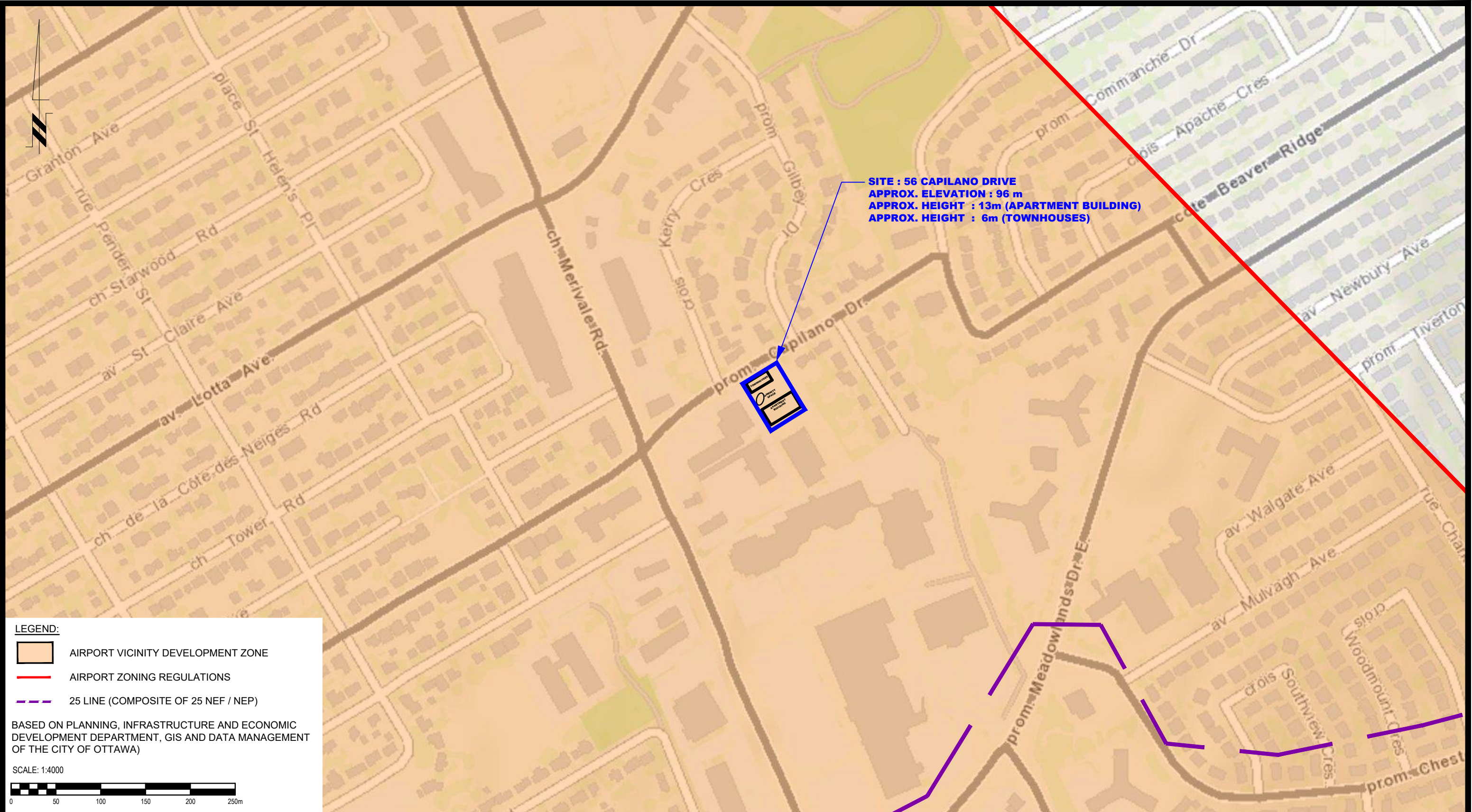
OTTAWA,
Title:

**CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE**

ONTARIO

SITE GEOMETRY - REC 10

Scale:	1:1250	Date:	03/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-5A
Approved by:	SB	Revision No.:	



LEGEND:

- AIRPORT VICINITY DEVELOPMENT ZONE
- AIRPORT ZONING REGULATIONS
- 25 LINE (COMPOSITE OF 25 NEF / NEP)

BASED ON PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, GIS AND DATA MANAGEMENT OF THE CITY OF OTTAWA)

SCALE: 1:4000

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

NO.	REVISIONS	DATE	INITIAL

CSV ARCHITECTS
NOISE ATTENUATION STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
56 CAPILANO DRIVE

OTTAWA, ONTARIO

Title: **AIRCRAFT NOISE LIMITATIONS**

Scale:	1:4000	Date:	05/2023
Drawn by:	YA	Report No.:	PG6606-1
Checked by:	YT	Dwg. No.:	PG6606-6
Approved by:	SB	Revision No.:	

APPENDIX 2

STAMSON RESULTS

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

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

```
-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume  : 368/32    veh/TimePeriod *
Posted speed limit  : 40 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Capilano Dr (day/night)

```
-----
Angle1  Angle2      : -90.00 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: Capilano Dr (day)

Source height = 1.50 m

```
ROAD (0.00 + 62.49 + 0.00) = 62.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90    88     0.66  63.96  0.00  0.00  -1.46  0.00  0.00  0.00  62.49
-----
```

Segment Leq : 62.49 dBA

Total Leq All Segments: 62.49 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 54.90 + 0.00) = 54.90 dBA

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

-90	88	0.66	56.36	0.00	0.00	-1.46	0.00	0.00	0.00	54.90
-----	----	------	-------	------	------	-------	------	------	------	-------

Segment Leq : 54.90 dBA

Total Leq All Segments: 54.90 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 62.49

(NIGHT): 54.90

↑

↑

Filename: rec12.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 1-2

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : -90.00 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 : 4.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 62.65 + 0.00) = 62.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	88	0.57	63.96	0.00	0.00	-1.31	0.00	0.00	0.00	62.65

Segment Leq : 62.65 dBA

Total Leq All Segments: 62.65 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 55.05 + 0.00) = 55.05 dBA

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

-90	88	0.57	56.36	0.00	0.00	-1.31	0.00	0.00	0.00	55.05
-----	----	------	-------	------	------	-------	------	------	------	-------

Segment Leq : 55.05 dBA

Total Leq All Segments: 55.05 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 62.65

(NIGHT): 55.05

↑

↑

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

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : -88.00 deg 0.00 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: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 59.48 + 0.00) = 59.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-88	0	0.66	63.96	0.00	0.00	-4.48	0.00	0.00	0.00	59.48

Segment Leq : 59.48 dBA

Total Leq All Segments: 59.48 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 51.89 + 0.00) = 51.89 dBA

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

-88	0	0.66	56.36	0.00	0.00	-4.48	0.00	0.00	0.00	51.89
-----	---	------	-------	------	------	-------	------	------	------	-------

Segment Leq : 51.89 dBA

Total Leq All Segments: 51.89 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 59.48

(NIGHT): 51.89

↑

↑

Filename: rec22.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 2-2

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

```
-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume  : 368/32    veh/TimePeriod *
Posted speed limit  : 40 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Capilano Dr (day/night)

```
-----
Angle1  Angle2      : -88.00 deg  0.00 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         : 1          (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

↑
 Results segment # 1: Capilano Dr (day)

Source height = 1.50 m

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-88	0	0.57	63.96	0.00	0.00	-4.33	0.00	0.00	0.00	59.63

Segment Leq : 59.63 dBA

Total Leq All Segments: 59.63 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 52.04 + 0.00) = 52.04 dBA

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

-88	0	0.57	56.36	0.00	0.00	-4.33	0.00	0.00	0.00	52.04
-----	---	------	-------	------	------	-------	------	------	------	-------

Segment Leq : 52.04 dBA

Total Leq All Segments: 52.04 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 59.63

(NIGHT): 52.04

↑

↑

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

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : 0.00 deg 84.00 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: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 59.43 + 0.00) = 59.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.66	63.96	0.00	0.00	-4.52	0.00	0.00	0.00	59.43

Segment Leq : 59.43 dBA

Total Leq All Segments: 59.43 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 51.84 + 0.00) = 51.84 dBA

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

0	84	0.66	56.36	0.00	0.00	-4.52	0.00	0.00	0.00	51.84
---	----	------	-------	------	------	-------	------	------	------	-------

Segment Leq : 51.84 dBA

Total Leq All Segments: 51.84 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 59.43

(NIGHT): 51.84

↑

↑

Filename: rec32.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 3-2

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

```
-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume : 368/32     veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient      : 0 %
Road pavement     : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth          : 0.00
Number of Years of Growth            : 0.00
Medium Truck % of Total Volume       : 7.00
Heavy Truck % of Total Volume        : 5.00
Day (16 hrs) % of Total Volume       : 92.00
```

Data for Segment # 1: Capilano Dr (day/night)

```
-----
Angle1  Angle2      : 0.00 deg  84.00 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         : 1          (Flat/gentle slope; no barrier)
Reference angle    : 0.00
```

↑
 Results segment # 1: Capilano Dr (day)

Source height = 1.50 m

ROAD (0.00 + 59.57 + 0.00) = 59.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.57	63.96	0.00	0.00	-4.38	0.00	0.00	0.00	59.57

Segment Leq : 59.57 dBA

Total Leq All Segments: 59.57 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 51.98 + 0.00) = 51.98 dBA

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

0	84	0.57	56.36	0.00	0.00	-4.38	0.00	0.00	0.00	51.98
---	----	------	-------	------	------	-------	------	------	------	-------

Segment Leq : 51.98 dBA

Total Leq All Segments: 51.98 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 59.57

(NIGHT): 51.98

↑

↑

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

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

```
-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume : 368/32    veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient      : 0 %
Road pavement     : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Capilano Dr (day/night)

```
-----
Angle1 Angle2      : -84.00 deg -63.00 deg
Wood depth          : 0 (No woods.)
No of house rows   : 0 / 0
Surface            : 1 (Absorptive ground surface)
Receiver source distance : 18.00 / 18.00 m
Receiver height     : 1.50 / 1.50 m
Topography          : 1 (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

↑
 Results segment # 1: Capilano Dr (day)

Source height = 1.50 m

```
ROAD (0.00 + 49.62 + 0.00) = 49.62 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
-84 -63 0.66 63.96 0.00 -1.31 -13.02 0.00 0.00 0.00 49.62
-----
```

Segment Leq : 49.62 dBA

Total Leq All Segments: 49.62 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 42.03 + 0.00) = 42.03 dBA

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

-84	-63	0.66	56.36	0.00	-1.31	-13.02	0.00	0.00	0.00	42.03
-----	-----	------	-------	------	-------	--------	------	------	------	-------

Segment Leq : 42.03 dBA

Total Leq All Segments: 42.03 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 49.62

(NIGHT): 42.03

↑

↑

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

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : 61.00 deg 79.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 18.00 / 18.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 49.52 + 0.00) = 49.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
61	79	0.66	63.96	0.00	-1.31	-13.12	0.00	0.00	0.00	49.52

Segment Leq : 49.52 dBA

Total Leq All Segments: 49.52 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 41.93 + 0.00) = 41.93 dBA

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

61	79	0.66	56.36	0.00	-1.31	-13.12	0.00	0.00	0.00	41.93
----	----	------	-------	------	-------	--------	------	------	------	-------

Segment Leq : 41.93 dBA

Total Leq All Segments: 41.93 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 49.52

(NIGHT): 41.93

↑

↑

Filename: rec61.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 6-1

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : -74.00 deg 70.00 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: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 55.07 + 0.00) = 55.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	70	0.66	63.96	0.00	-7.07	-1.81	0.00	0.00	0.00	55.07

Segment Leq : 55.07 dBA

Total Leq All Segments: 55.07 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 47.48 + 0.00) = 47.48 dBA

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

-74	70	0.66	56.36	0.00	-7.07	-1.81	0.00	0.00	0.00	47.48
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 47.48 dBA

Total Leq All Segments: 47.48 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 55.07

(NIGHT): 47.48

↑

↑

Filename: rec64.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 6-4

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : -74.00 deg 70.00 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 : 11.00 / 11.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 56.63 + 0.00) = 56.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	70	0.38	63.96	0.00	-5.86	-1.47	0.00	0.00	0.00	56.63

Segment Leq : 56.63 dBA

Total Leq All Segments: 56.63 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 49.03 + 0.00) = 49.03 dBA

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

-74	70	0.38	56.36	0.00	-5.86	-1.47	0.00	0.00	0.00	49.03
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 49.03 dBA

Total Leq All Segments: 49.03 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 56.63

(NIGHT): 49.03

↑

↑

Filename: rec71.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 7-1

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

```
-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume  : 368/32    veh/TimePeriod *
Posted speed limit  : 40 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume     : 92.00
```

Data for Segment # 1: Capilano Dr (day/night)

```
-----
Angle1  Angle2      : -66.00 deg  0.00 deg
Wood depth          : 0          (No woods.)
No of house rows   : 1 / 1
House density       : 40 %
Surface            : 1          (Absorptive ground surface)
Receiver source distance : 50.00 / 50.00 m
Receiver height     : 1.50 / 1.50 m
Topography          : 1          (Flat/gentle slope; no barrier)
Reference angle     : 0.00
```

↑
 Results segment # 1: Capilano Dr (day)

Source height = 1.50 m

ROAD (0.00 + 48.19 + 0.00) = 48.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-66	0	0.66	63.96	0.00	-8.68	-5.05	0.00	-2.03	0.00	48.19

Segment Leq : 48.19 dBA

Total Leq All Segments: 48.19 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 40.60 + 0.00) = 40.60 dBA

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

-66 0 0.66 56.36 0.00 -8.68 -5.05 0.00 -2.03 0.00 40.60

Segment Leq : 40.60 dBA

Total Leq All Segments: 40.60 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 48.19
(NIGHT): 40.60

↑

↑

Filename: rec74.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 7-4

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : -66.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 40 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 50.00 / 50.00 m
 Receiver height : 11.00 / 11.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 49.97 + 0.00) = 49.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-66	0	0.38	63.96	0.00	-7.19	-4.76	0.00	-2.03	0.00	49.97

Segment Leq : 49.97 dBA

Total Leq All Segments: 49.97 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 42.37 + 0.00) = 42.37 dBA

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

-66 0 0.38 56.36 0.00 -7.19 -4.76 0.00 -2.03 0.00 42.37

Segment Leq : 42.37 dBA

Total Leq All Segments: 42.37 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 49.97

(NIGHT): 42.37

↑

↑

Filename: rec81.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 8-1

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

```
-----
Car traffic volume : 6477/563   veh/TimePeriod *
Medium truck volume : 515/45    veh/TimePeriod *
Heavy truck volume  : 368/32    veh/TimePeriod *
Posted speed limit  : 40 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00
```

Data for Segment # 1: Capilano Dr (day/night)

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

↑
 Results segment # 1: Capilano Dr (day)

Source height = 1.50 m

ROAD (0.00 + 49.09 + 0.00) = 49.09 dBA

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

Segment Leq : 49.09 dBA

Total Leq All Segments: 49.09 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 41.50 + 0.00) = 41.50 dBA

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

0	61	0.66	56.36	0.00	-8.68	-5.28	0.00	-0.90	0.00	41.50
---	----	------	-------	------	-------	-------	------	-------	------	-------

Segment Leq : 41.50 dBA

Total Leq All Segments: 41.50 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 49.09

(NIGHT): 41.50

↑

↑

Filename: rec84.te Time Period: Day/Night 16/8 hours
 Description: Receptor Point 8-4

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

 Car traffic volume : 6477/563 veh/TimePeriod *
 Medium truck volume : 515/45 veh/TimePeriod *
 Heavy truck volume : 368/32 veh/TimePeriod *
 Posted speed limit : 40 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

 Angle1 Angle2 : 0.00 deg 61.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1 / 1
 House density : 20 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 50.00 / 50.00 m
 Receiver height : 11.00 / 11.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

↑
 Results segment # 1: Capilano Dr (day)

 Source height = 1.50 m

ROAD (0.00 + 50.83 + 0.00) = 50.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	61	0.38	63.96	0.00	-7.19	-5.04	0.00	-0.90	0.00	50.83

Segment Leq : 50.83 dBA

Total Leq All Segments: 50.83 dBA

↑

Results segment # 1: Capilano Dr (night)

Source height = 1.50 m

ROAD (0.00 + 43.23 + 0.00) = 43.23 dBA

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

0	61	0.38	56.36	0.00	-7.19	-5.04	0.00	-0.90	0.00	43.23
---	----	------	-------	------	-------	-------	------	-------	------	-------

Segment Leq : 43.23 dBA

Total Leq All Segments: 43.23 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 50.83

(NIGHT): 43.23

↑

↑

Filename: rec9.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 9

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Capilano Dr (day/night)

Angle1 Angle2 : -70.00 deg 66.00 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 : 14.50 / 14.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -70.00 deg Angle2 : 66.00 deg
Barrier height : 13.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 96.00 m
Receiver elevation : 96.00 m
Barrier elevation : 96.00 m
Reference angle : 0.00

↑
Results segment # 1: Capilano Dr (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	14.50	11.90	107.90

ROAD (0.00 + 50.19 + 0.00) = 50.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	66	0.00	63.96	0.00	-5.23	-1.22	0.00	0.00	-7.32	50.19

Segment Leq : 50.19 dBA

Total Leq All Segments: 50.19 dBA

↑
Results segment # 1: Capilano Dr (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	14.50	11.90	107.90

ROAD (0.00 + 42.60 + 0.00) = 42.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	66	0.00	56.36	0.00	-5.23	-1.22	0.00	0.00	-7.32	42.60

Segment Leq : 42.60 dBA

Total Leq All Segments: 42.60 dBA

↑
TOTAL Leq FROM ALL SOURCES (DAY): 50.19
(NIGHT): 42.60

↑
↑

Filename: rec10.te Time Period: Day/Night 16/8 hours
Description: Receptor Point 10

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: CapilanoDr A (day/night)

Angle1 Angle2 : -80.00 deg -20.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
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: CapilanoDr B (day/night)

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000

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

Data for Segment # 2: CapilanoDr B (day/night)

 Angle1 Angle2 : 64.00 deg 75.00 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

↑
 Results segment # 1: CapilanoDr A (day)

Source height = 1.50 m

ROAD (0.00 + 51.81 + 0.00) = 51.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	-20	0.66	63.96	0.00	-5.00	-6.25	0.00	-0.90	0.00	51.81

Segment Leq : 51.81 dBA

↑
 Results segment # 2: CapilanoDr B (day)

Source height = 1.50 m

ROAD (0.00 + 43.80 + 0.00) = 43.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
64	75	0.66	63.96	0.00	-5.00	-15.16	0.00	0.00	0.00	43.80

Segment Leq : 43.80 dBA

Total Leq All Segments: 52.45 dBA

↑
 Results segment # 1: CapilanoDr A (night)

Source height = 1.50 m

ROAD (0.00 + 44.22 + 0.00) = 44.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	-20	0.66	56.36	0.00	-5.00	-6.25	0.00	-0.90	0.00	44.22

Segment Leq : 44.22 dBA

↑
Results segment # 2: CapilanoDr B (night)

Source height = 1.50 m

ROAD (0.00 + 36.20 + 0.00) = 36.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
64	75	0.66	56.36	0.00	-5.00	-15.16	0.00	0.00	0.00	36.20

Segment Leq : 36.20 dBA

Total Leq All Segments: 44.86 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 52.45
(NIGHT): 44.86

↑
↑

APPENDIX 3

**Correspondence
Industry Standards**

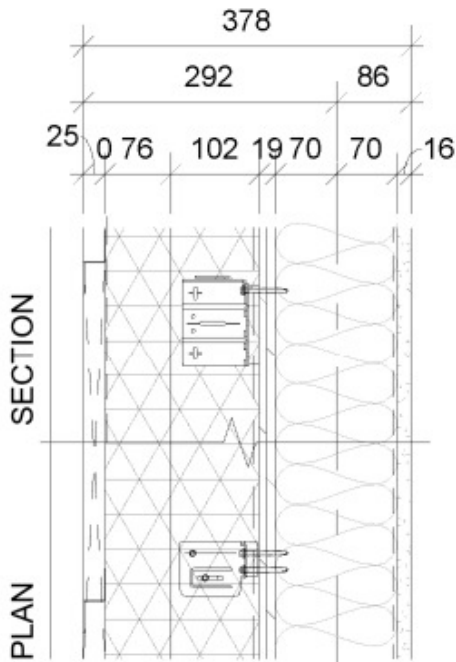
Yolanda Tang

From: Alex Sargent <sargent@csv.ca>
Sent: Tuesday, May 23, 2023 8:05 AM
To: Darryl Hood; Stephanie Boisvenue; Scott Dennis
Cc: Kevin Pickard; Mrunmayi Anvekar; Kate Vanderwater; Yolanda Tang
Subject: RE: 190291 - Salus 56 Capilano (PG6606)

Hi Stephanie,

I have included screenshots of our typical exterior assemblies below which should exceed the performance of the prescribed assemblies you have listed. The apartment building does not have a typical residential roof (asphalt shingle/ventilated attic) but we suspect that the 6-12" of outboard rigid insulation should be fairly resistant to noise. Our windows and doors will be of equally high-performance construction (minimum double glazed, rated for extremely low air infiltration, etc.).

Typical Exterior Wall:



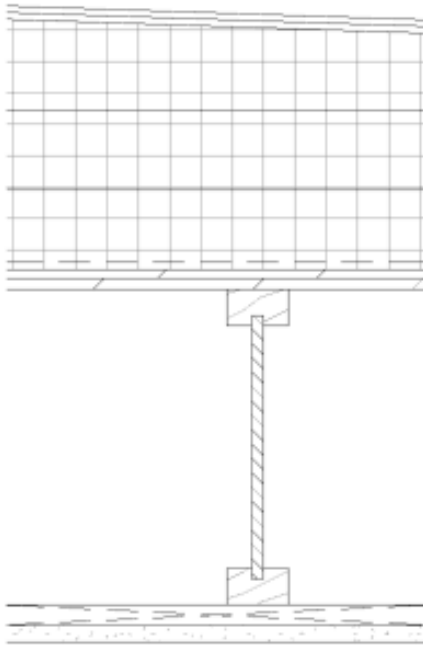
W3B.1 - TYPICAL CLAD EXTERIOR WALL

U- 0.132 W/m²K, RSI-7.59 (R-43)

60min FRR PER SB-2 (SEE BELOW)

- CLADDING PER ELEVATION
- 25mm METAL STRAPPING ORIENTED TO SUIT CLADDING
- 178mm SEMI-RIGID STONE WOOL INSULATION
-c/w ISO CLIPS SPACED 915mm VERTICALLY AND 812mm STAGGERED ROWS (ALTERNATING STUDS IN EACH H WITH 133mm DEEP CONTINUOUS METAL ANGLES SPACING ORIENTED TO SUIT CLADDING.
- SELF-ADHERED AIR BARRIER
- 19mm OSB SHEATHING PER STRUCTURAL **(20min FR)**
- 38x140mm WOOD STUDS @ 406mm O.C. PER STRUCTURAL
-c/w 140mm STONE WOOL BATT INSULATION
- AIR AND VARIABLE PERMEABILITY VAPOUR CONTROL
- 16mm TYPE X GYPSUM BOARD **(40min FR)**

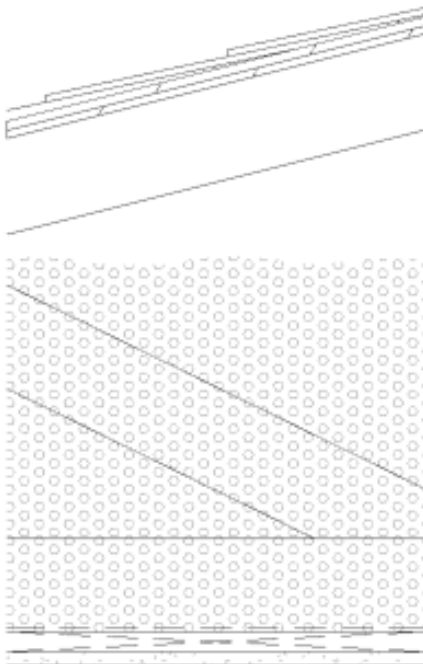
Typical Roofs:



R3A.1 - FLAT ROOFS

U- 0.118 W/m²K, RSI-8.47 (R-48) - (AVE

- 2 PLY HIGH ALBEDO MODIFIED BITUMEN ROOFING
- 6mm PROTECTION BOARD ADHERED TO;
- 0-152mm TAPERED POLYISOCYANURATE INSULATION
- 2 LAYERS OF 76mm THICK POLYISOCYANURATE INSULATION
- SELF-ADHERED AIR/VAPOUR BARRIER
- 16mm PLYWOOD SHEATHING PER STRUCTURE
- 241 or 406mm ENGINEERED ROOF JOISTS PER STRUCTURE
- 19x89mm WOOD STRAPPING @ 406mm O.C.
- 16mm GYPSUM BOARD. (PER REFLECTED CEILING)



R3B.1 - TOWNHOUSE ROOF

- HIGH ALBEDO ASPHALT SHINGLE
- ICE AND WATER PROTECTION MEMBRANE
- 16mm PLYWOOD SHEATHING PER STRUCTURE
- PRE-ENG WOOD TRUSSES AT 610mm O.C.
-c/w 355mm CELLULOSE INSULATION
- AIR AND VARIABLE PERMEABILITY VAPOUR CONTROL LAYER
- 19x89mm WOOD STRAPPING @ 406mm O.C.
- 13mm GYPSUM BOARD CEILING

Let me know if you need anything else.

Thanks,

Alex Sargent

Associate | GGP, Dip. Arch. Tech

CSV ARCHITECTS

190 O'Connor Street, Suite 100
Ottawa, ON K2P 2R3

T 613-564-8118 x 157

www.csv.ca | sustainable design

From: Darryl Hood <hood@csv.ca>

Sent: Tuesday, May 23, 2023 7:01 AM

To: Stephanie Boisvenue <SBoisvenue@patersongroup.ca>; Scott Dennis <SDennis@patersongroup.ca>; Alex Sargent <sargent@csv.ca>

Cc: Kevin Pickard <KPickard@patersongroup.ca>; Mrunmayi Anvekar <manvekar@Patersongroup.ca>; Kate Vanderwater <vanderwater@csv.ca>; Yolanda Tang <YTang@patersongroup.ca>

Subject: RE: 190291 - Salus 56 Capilano (PG6606)

Hi Stephanie,

Our wall and roof construction far exceed those descriptions. Alex or Kate, please forward the assemblies sheet to Stephanie this morning for confirmation. Cheers.

Darryl Hood

Principal | B.Arch, B.A., OAA, MRAIC, LEED® AP BD+C, GGP, CPHD

CSV ARCHITECTS

190 O'Connor Street, Suite 100
Ottawa, ON K2P 2R3

T 613-564-8118 x 115

www.csv.ca | sustainable design

Please note: My working day may not be your working day. Please do not feel obliged to reply to this email outside of your normal working hours.

From: Stephanie Boisvenue <SBoisvenue@patersongroup.ca>

Sent: Friday, May 19, 2023 3:29 PM

To: Scott Dennis <SDennis@patersongroup.ca>; Alex Sargent <sargent@csv.ca>

Cc: Kevin Pickard <KPickard@patersongroup.ca>; Mrunmayi Anvekar <manvekar@Patersongroup.ca>; Darryl Hood <hood@csv.ca>; Kate Vanderwater <vanderwater@csv.ca>; Yolanda Tang <YTang@patersongroup.ca>

Subject: RE: 190291 - Salus 56 Capilano (PG6606)

Good afternoon Alex,

Upon review, your site is just on the edge of the designated airport zone. Therefore, an airport study will be required, as flagged by the City reviewer. However, the Airport Authority has attempted to make these studies simple for low rise residential development (which your development would be considered). The Airport Authority states that if your building abides by the following minimum prescribed measures, then a full study is not required. If you could confirm that the following construction details are being followed we would appreciate it.

The prescribed measures for exterior walls are as follows:

- 12.7 mm gypsum board (1/2")
- Vapour barrier
- 38 mm x 139 mm studs at 400 mm o.c.
- Batt/blown insulation in the inter-stud cavities
- 7.9 mm exterior sheathing
- Building paper
- Wood siding/vinyl siding/metal siding with fibre backer board, or 20 mm stucco

The prescribed measures for roof-ceiling are as follows:

- Asphalt shingles
- Sheathing
- Typical (pre-engineered) wood trusses at 600 mm o.c. with ventilated attic
- 75 mm (or thicker) batts / blown insulation
- vapour barrier
- 12.7 gypsum board

They also stipulate that windows and patio doors are to be double glazed, and that the doors are to 44 mm steel or fiberglass with foam or fiberglass insulated core

If you could forward the proposed construction of the exterior walls, windows and patio doors, roof-ceiling, exterior doors, as well as the proposed construction of ventilation system, or if you could confirm that the aforementioned building components are acceptable, we would be able to update the report promptly.

Best Regards,



STEPHANIE BOISVENUE, P.ENG.
GROUP MANAGER – NOISE AND VIBRATION
TEL: (613) 226-7381 ext. 219
DIRECT: (613) 701-5238
CELL: (613) 513-7952
9 AURIGA DRIVE
OTTAWA ON K2E 7T9
patersongroup.ca

TEMPORARY SHORING DESIGN SERVICES ARE NOW AVAILABLE, PLEASE CONTACT US TO SEE HOW WE CAN HELP!

From: Scott Dennis <SDennis@patersongroup.ca>

Sent: Friday, May 19, 2023 10:29 AM

To: Alex Sargent <sargent@csv.ca>; Stephanie Boisvenue <SBoisvenue@patersongroup.ca>

Cc: Kevin Pickard <KPickard@patersongroup.ca>; Mrunmayi Anvekar <manvekar@Patersongroup.ca>; Darryl Hood <hood@csv.ca>; Kate Vanderwater <vanderwater@csv.ca>

Subject: RE: 190291 - Salus 56 Capilano (PG6606)

Alex,

We should have the corrosion results on Tuesday, so we'll have the updated Geotechnical Report ready for end of day Tuesday.

I'll let my colleague Stephanie respond regarding the Noise Study comments.

Thanks,



SCOTT DENNIS, P.Eng., ing.
Senior Project Manager – Geotechnical
TEL: (613) 226-7381 ext. 332
9 AURIGA DRIVE
OTTAWA ON K2E 7T9
patersongroup.ca

Noise / Acoustics

- Noise separation becomes an important design issue when the building is located next to a source such as an airport or busy highway. Typical concrete elements are sufficiently massive to form effective elements in a sound insulation design.
- The sound transmission of a wall is largely determined by the performance of the windows and doors, and by the air tightness of the assembly. Windows and doors can be designed for improved sound insulation, but only if they are kept closed.
- An air barrier system will have a positive effect on the sound insulation of the assembly.
- A 100-mm (4-inch) thick concrete wall panel has an STC (sound transmission class) of 50, which is the minimum STC required between dwelling units by the National Building Code (NBC).
- Adding insulation and gypsum board raises the STC further, such that a precast concrete assembly can easily be designed to exceed this value.

Durability

- Concrete resists weathering, and prefabrication provides an opportunity for precast panels to be designed for long term durability.
- Durability issues to be considered include:
- freeze/thaw resistance of the concrete
 - weathering of the finish
 - corrosion of the reinforcing steel
 - joint sealant performance
 - glass etching from water runoff
 - access for maintenance

Wall & Floor Assembly Guide

Insulation for Sound & Fire Rated Assemblies

Sound Transmission Loss of Exterior Doors and Windows

Door	Weather Strip	Normally closed STC
Wood, flush solid core(1)	Brass	27
Wood, flush solid core(1)	Plastic	27
Steel, flush(2)	Magnetic	28

Door Construction Detail

(1) Flush solid core wood door	Width	1-3/4"
	Weight	78lb, 3.9 lb/sq ft
(2) Flush steel door	Width	1-3/4"
	Faces	0.028" steel, separated by plastic perimeter strip
	Core	Rigid polyurethane, 2 2-1/2" lb/cu.ft, foamed in place
	Weight	64lb, 3.2 lb/sq ft

Sound Transmission Loss of Windows

Material	Type	Size	Glazing¹	Sealed STC	Locked STC	Unlocked STC
Wood	Double hung	3'x5'	ss	29		23
			ss-d	29		
			ds	29		
			ds-d	30		
	Fixed picture	6'x5'	ln-7/16"	28	26	22
			ss-d	28		
Wood-plastic	Double hung		ds	29		
			in-1"	34	STC	STC
			ss	29	26	26
			in-3/8"	26	26	25
	Storm sash		ds	30	27	
			in-3/8"	28	24	
	Fixed casement		ds	31		
			Operable casement	ds		30
Sliding glass door			lam-3/16"	31	26	26
Aluminum	Sliding		ss	28	24	
	Operable casement		ds	31	21	17
	Single hung		in-7/16"	30	27	25
Single pane 1/4" laminated glass						34

¹ ss	=	single strength
ds	=	double strength
d	=	divided lights
in	=	insulating glass of indicated overall thickness
lam	=	laminated safety glass of indicated overall thickness

Taken from the U.S. Department of Commerce National Bureau of Standards Building Science Series 77.

* Information received in imperial units only

Insulating Glass (Table 2)

Glass Makeup			Frequency in Hertz (Hz)																STC		
			100	125	160	200	250	315	400	500	650	800	1000	1250	1600	2000	2500	3150		4000	5000
			Sound Transmission Loss (dB)																		
Glass Ply	Air Space	Glass Ply																			
1/8" 3 mm	1/4" 6 mm	1/8" 3 mm	26	21	23	23	26	21	19	24	27	30	33	36	40	44	46	39	34	45	28
1/8" 3 mm	3/8" 9 mm	1/8" 3 mm	26	23	23	20	23	19	23	27	29	32	35	39	44	47	48	41	36	43	31
1/4" 6 mm	1/2" 13 mm	1/4" 6 mm	27	24	29	22	22	25	30	33	35	38	40	42	42	37	37	43	46	49	35
1/4" 6 mm	1/2" 13 mm	5/16" 8 mm	28	29	33	29	29	32	36	37	40	43	42	43	42	37	40	44	48	53	40
1/4" 6 mm	1/2" 13 mm	3/8" 10 mm	28	26	32	29	29	31	35	37	38	39	41	43	41	40	41	44	47	49	39
5/16" 8 mm	1/2" 13 mm	5/16" 8 mm	26	24	25	31	24	32	32	35	37	39	39	38	36	38	42	44	46	49	37
1/4" 6 mm	3/4" 19 mm	1/4" 6 mm	27	23	28	21	27	29	34	35	37	41	43	45	44	39	39	46	49	52	38
1/4" 6 mm	1" 25 mm	1/4" 6 mm	22	19	27	23	31	30	35	35	36	39	41	42	41	36	37	46	51	56	37

Laminated Insulating Glass (Table 3)

Glass Makeup					Frequency in Hertz (Hz)																STC		
					100	125	160	200	250	315	400	500	650	800	1000	1250	1600	2000	2500	3150		4000	5000
					Sound Transmission Loss (dB)																		
Glass Ply	Air Space	Glass Ply	PVB*	Glass Ply																			
3/16" 5 mm	3/8" 9 mm	1/8" 3 mm	.030" .76 mm	1/8" 3 mm	27	27	26	24	22	28	32	35	38	38	39	40	42	43	41	45	52	57	37
3/16" 5 mm	1/2" 13 mm	1/8" 3 mm	.030" .76 mm	1/8" 3 mm	26	23	25	23	27	31	34	36	38	39	41	43	45	46	43	49	55	55	39
1/4" 6 mm	1/2" 13 mm	1/8" 3 mm	.030" .76 mm	1/8" 3 mm	28	20	29	24	26	30	34	36	39	42	43	44	44	41	40	47	52	56	39
1/4" 6 mm	1/2" 13 mm	1/4" 6 mm	.030" .76 mm	1/8" 3 mm	28	17	28	29	33	34	38	40	40	41	41	41	41	40	43	49	54	58	40
1/4" 6 mm	1/2" 13 mm	3/16" 5 mm	.060" 1.52 mm	3/16" 5 mm	30	29	31	28	31	34	37	39	41	42	44	46	45	44	47	52	55	60	42
1/4" 6 mm	1/2" 13 mm	1/4" 6 mm	.030" .76 mm	1/4" 6 mm	31	29	32	30	32	35	38	40	40	42	44	46	47	46	47	52	56	61	43
5/16" 8 mm	5/8" 16 mm	3/16" 5 mm	.060" 1.52 mm	3/16" 5 mm	28	28	34	36	33	40	41	42	43	43	42	40	40	43	49	53	57	61	43
1/4" 6 mm	3/4" 19 mm	3/16" 5 mm	.060" 1.52 mm	3/16" 5 mm	28	26	32	30	35	37	40	41	43	44	45	47	47	44	47	53	57	60	44
1/4" 6 mm	3/4" 19 mm	1/4" 6 mm	.060" 1.52 mm	1/4" 6 mm	28	29	36	32	34	39	41	41	41	43	44	45	45	46	47	52	56	61	44
3/8" 10 mm	3/4" 19 mm	1/4" 6 mm	.060" 1.52 mm	1/4" 6 mm	25	31	38	33	37	39	42	43	43	42	40	40	41	56	50	55	58	61	43

Data based on testing -36" x 84" glass in an acoustical wall. Glass size and glazing system will affect STC rating.
*PVB (polyvinyl butyral) interlayer

Wall & Floor Assembly Guide

Insulation for Sound & Fire Rated Assemblies

Sound Transmission Loss of Exterior Walls

<i>Exterior finish</i>	<i>Cavity Insulation</i>	<i>Resilient channel</i>	<i>STC</i>
Wood siding (1)	None	No	37
	3-1/2" PINK™ FIBERGLAS® Batt Insulation	No	39
	None	Yes	43
	3-1/2" PINK™ FIBERGLAS® Batt Insulation	Yes	47
Stucco (2)	3-1/2" PINK™ FIBERGLAS® Batt Insulation	No	46
	None	Yes	49
	3-1/2" PINK™ FIBERGLAS® Batt Insulation	Yes	57
Brick veneer (3)	3-1/2" PINK™ FIBERGLAS® Batt Insulation	No	56
	None	Yes	54
	3-1/2" PINK™ FIBERGLAS® Batt Insulation	Yes	58
Concrete block	None	No	45

Wall construction details

Wood siding (1)	Framing	2"x4" wood studs, (16" o.c.)
	Sheathing	1/2" wood fiberboard insulation nailed to studs
	Siding	5/8"x10" redwood nailed through sheathing into studs
	Interior	1/2" gypsum board screwed to studs or to metal resilient channels which were attached to the studs
Stucco (2)	Framing	2"x4" woods studs, (16" o.c.)
	Sheathing	None
	Stucco	No. 15 felt building and 1" wire mesh nailed to studs. Stucco Applied in 3 coats to 7/8" total thickness. Dry weight of Stucco 7.9 lb/sq ft
	Interior	1/2" gypsum board screwed to studs or resilient channel
Brick veneer (3)	Framing	2"x4" wood studs, (16" o.c.)
	Sheathing	3/4" wood fiberboard insulation
	Brick	standard face brick 3-1/2" wide, spaced 1/2" out from sheathing with metal ties nailed through sheathing into studs. Dry weight of brick and mortar 41 lb/sq ft .
	Interior	1/2" gypsum board screwed to studs or resilient channel

Taken from the U.S. Department of Commerce National Bureau of Standards Building Science Series 77.

* Information received in imperial units only