

REPORT
PROJECT: 113919-5.2.2

ENVIRONMENTAL NOISE IMPACT ASSESSMENT
PROPOSED RESIDENTIAL BUILDING
603 CUMMINGS AVENUE, OTTAWA, ONT.



Prepared for Mr. Anatolij Koniouchine
by IBI Group
November 29, 2017

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Site Plan
Floor Plan

1 INTRODUCTION

On behalf of our client, a study has been prepared to determine the impact of the roadway traffic on the proposed residential development at 603 Cummings Avenue. The proposed three storey building is bounded by Cummings Avenue to the west and residential buildings to the south and west. To the north is a commercial/retail with a gas station facing Montreal Road and to the east is an existing fast food restaurant, as shown on **Figure 1**.

The purpose of this noise assessment is to determine the expected noise levels for the residential units. The results will then be analyzed based on the City of Ottawa criteria to determine whether mitigation is required.

J:\113919_603CummingAv\5.9 Drawings\59civil\current\Noise Figure.dwg Layout Name: FIGURE 1 Plot Scale: 1:5.13 Plotted At: 11/30/2017 Last Saved By: dsjurna Last Saved At: Nov. 29, 17



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Project Title
RESIDENTIAL DEVELOPMENT
603 CUMMINGS AVENUE

Drawing Title
NOISE PLAN

Sheet No.
FIGURE 1

2 BACKGROUND

2.1 Noise Sources

The proposed development is primarily subject to road noise from Cummings Avenue and Montreal Road, the other major road in the area is the Aviation Parkway, however, as it is located more than 100 metres from the site it is not included in the analysis. The existing commercial/retail buildings and fast food restaurant and gas station are not considered stationary noise sources per NPC-300. Aircraft noise from the Ottawa International airport and rail noise are not factors as the airport and rail lines are not in close proximity to the study area.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the City of Ottawa Environmental Noise Control Guidelines and from the Ministry of the Environment Environmental Noise Guideline Publication NPC-300. Noise levels are expressed in the form Leq (T) which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Indoor Sound Level Criterion

Similar to outdoor noise levels, the recommended indoor sound level criteria from Table 2.2b of the guidelines are:

- Bedrooms – 23:00 to 07:00 – 40 dBA Leq (8)
- Other areas – 07:00 to 23:00 – 45 dBA Leq (16)

The sound levels are based on the windows and doors to an indoor space being closed.

For the purpose of assessing indoor sound levels, the outdoor sound levels are observed at the plane of the living room window at 1.5 meters above the ground for daytime noise and at the plane of the bedroom window 4.5 meters above the ground for nighttime noise as per the guidelines.

As per NPC-300 C7.1.3 when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

As per NPC-300 C7.1.2.1 and C7.1.2.2 when the outdoor noise levels at the living room are greater than 55 dBA and less than or equal to 65 dBA and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window then a warning clause is required and forced air heating with provision for central air conditioning is required. Should the outdoor sound levels exceed the criteria central air conditioning is mandatory and a warning clause is required.

2.2.2 Outdoor Sound Level Criterion

As per Table 2.2a of the guidelines the sound level criterion for the outdoor living area (OLA) for the daytime period between 07:00 and 23:00 hours is 55 dBA Leq (16). Sound levels for the OLA are calculated 3 meters from the building face at the center of the unit or within the center of the OLA at a height of 1.5 meters above the ground.

If the Leq sound level is less than or equal to the above criteria then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may either provide a warning clause to prospective purchasers or install physical attenuation. For sound levels greater than 5 dBA above the criteria, control measures are required to reduce the

IBI GROUP REPORT

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noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA a warning clause is also required.

3 ROADWAY NOISE

As stated in Section 2.1, the sources of traffic noise in Cummings Avenue and Montreal Road. Cummings Avenue is a two lane urban collector roadway (2-UAU) while Montreal Road is a four lane urban arterial undivided roadway (4-UAU). Traffic and road parameters are taken from Appendix B of the guidelines. Table 3.1 summarizes the traffic and road parameters used in this report.

TABLE 3.1
TRAFFIC AND ROAD DATA SUMMARY

	CUMMINGS AVENUE	MONTREAL ROAD
Annual Average Daily Traffic (AADT)	8,000	30,000
Posted Speed Limit (km/hr)	50	60
% Medium Trucks	7%	7%
% Heavy Trucks	5%	5%
% Daytime Traffic	92%	92%

3.1 Calculation Methods

Roadway noise was calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

Calculations are conducted at the noise receiver locations. Receiver A is at the living/dining room adjacent to Cummings Avenue and Receiver B is at the kitchen area which is subject to noise from Montreal Road at the higher floors that are above the adjacent commercial/retail building. Receiver C is at the bedrooms which is only subject to noise from Cummings Avenue as there are no windows on the north side of the building. Receiver D is at a small outdoor amenity space located at the east side of the site that is located behind the commercial/retail building. As the amenity space is blocked from noise from Montreal Road and blocked from noise from Cummings Avenue by the proposed building no analysis is required for the outdoor amenity space. Analysis is conducted for Receivers A, B and C at the 3rd Floor level which represents the highest noise levels. Results of the analysis is summarized on Table 3.2.

TABLE 3.2
NOISE LEVELS AT BUILDING FACE

RECEIVER	FLOOR	ROADWAY	DISTANCE SOURCE-RECEIVER (M)	SEGMENT ANGLE		NOISE LEVEL (dBA)	
				LEFT	RIGHT	DAYTIME	NIGHTTIME
A	3 rd	Cummings	13.5	-90	90		
		Montreal	61.1	-90	0	66.36	58.77
B	3 rd	Cummings	18.5	0	60		
		Montreal	57.9	-90	90	64.93	57.33
C	3 rd	Cummings	20.0	-90	0	59.89	52.30

As shown, the noise criteria from Section 2.2.1 is exceeded at all receiver locations.

4 ABATEMENT MEASURES

4.1 Warning Clauses and Ventilation

The daytime sound levels at Receiver A which represents the living/dining room area for all units on the west side of the building exceed 65 dBA for all floors requiring a Type 'D' noise warning clause. Mandatory central air conditioning is also required for these units as well as a review of building components which is addressed in Section 4.2.

At Receiver locations B and C, the daytime noise level exceeds 55 dBA but is less than 65dBA and the nighttime levels are above 50 dBA but less than 60 dBA, requiring a Type 'C' warning clause. Alternative means of ventilation is required which usually consists of a forced air heating system with the ducts sized for future installation of central air conditioning. A review of building components is not required, all components are to comply with the Ontario Building Code.

4.2 Building Components

An analysis of the required building components for the living/dining room on the west side of the building has been conducted using the Sound Transmission Class (STC) Method. Calculations were completed using the highest noise levels from Table 3.2, a calculation was conducted for only the living/dining room and a separate calculation was conducted with the kitchen added as the rooms are not separated by a wall. Calculations are included in the **Appendix**.

With the use of masonry and metal exterior walls, the required STC rating for windows and glazed balcony doors has been determined to be 29.

5 SUMMARY

5.1 Warning Clauses

A clause regarding noise must appear on Agreements of Purchase and Sale and any leases as listed below:

- West side units - Type 'D'
- East side units - Type 'C'

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 city's and the ministry of the environment's noise criteria."
TYPE 'C'	"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: the location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, residential air conditioning devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."

5.2 Ventilation Requirements and Building Components

All west side units require mandatory central air conditioning, while all east side units require alternative means of ventilation. The STC rating for windows and glazed balcony doors for the living and dining rooms of all west side units is 29.

Prepared by:



Lance Erion, P. Eng.
Associate



APPENDIX

Noise Calculations

Site Plan

Floor Plan

STAMSON 5.0 NORMAL REPORT Date: 29-11-2017 11:21:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: recacum.te Time Period: Day/Night 16/8 hours
Description: Receiver A Cummings Avenue

Road data, segment # 1: Cummings Av. (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 : 1 %
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: Cummings Av. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 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 : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cummings Av. (day)

Source height = 1.50 m

ROAD (0.00 + 64.70 + 0.00) = 64.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	65.75	0.00	0.00	-1.05	0.00	0.00	0.00	64.70

Segment Leq : 64.70 dBA

Total Leq All Segments: 64.70 dBA

Results segment # 1: Cummings Av. (night)

Source height = 1.50 m

ROAD (0.00 + 57.11 + 0.00) = 57.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	58.16	0.00	0.00	-1.05	0.00	0.00	0.00	57.11

Segment Leq : 57.11 dBA

Total Leq All Segments: 57.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.70
(NIGHT): 57.11

STAMSON 5.0 NORMAL REPORT Date: 29-11-2017 11:22:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: recamon.te Time Period: Day/Night 16/8 hours
Description: Receiver A Montreal Road

Road data, segment # 1: Montreal Rd. (day/night)

Car traffic volume : 24288/2112 veh/TimePeriod *
Medium truck volume : 1932/168 veh/TimePeriod *
Heavy truck volume : 1380/120 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000
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: Montreal Rd. (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.10 / 61.10 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Montreal Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 60.19 + 0.00) = 60.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.44	73.01	0.00	-8.75	-4.06	0.00	0.00	0.00	60.19

Segment Leq : 60.19 dBA

Total Leq All Segments: 60.19 dBA

Results segment # 1: Montreal Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 52.59 + 0.00) = 52.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.44	65.41	0.00	-8.75	-4.06	0.00	0.00	0.00	52.59

Segment Leq : 52.59 dBA

Total Leq All Segments: 52.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.19
(NIGHT): 52.59

Noise Calculations Receiver A

Cummings Avenue Noise at Building Face

Daytime noise at 15 m - 3rd floor - 64.70 dBA

Daytime noise at 13.5 m

Origin	Distance	d1	15 m
	Noise	n1	64.70 dBA
Receiver	Distance	d2	13.5 m
	Noise (est.)		65.16 dBA

Note: Noise (est.) = $n1 - 10\log(d2/d1)$

Nighttime noise at 15 m - 3rd floor - 57.11 dBA

Nighttime noise at 13.5 m

Origin	Distance	d1	15 m
	Noise	n1	57.11 dBA
Receiver	Distance	d2	13.5 m
	Noise (est.)		57.57 dBA

Combined Cummings and Montreal Road Noise at Receiver A

3rd Floor

Daytime	antilog(L/10)		Nighttime	antilog(L/10)	
Cummings	65.16	3279121.36	Cummings	57.57	571159.61
Montreal	60.19	1044720.22	Montreal	52.59	181551.57
Total		4323841.58	Total		752711.18
10Log		6.635869774	10Log		5.876628366
Combined		66.36 dBA	Combined		58.77 dBA

STAMSON 5.0 NORMAL REPORT Date: 29-11-2017 11:20:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: recb.te Time Period: Day/Night 16/8 hours
Description: Receiver B

Road data, segment # 1: Montreal Rd. (day/night)

Car traffic volume : 24288/2112 veh/TimePeriod *
Medium truck volume : 1932/168 veh/TimePeriod *
Heavy truck volume : 1380/120 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000
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: Montreal Rd. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 57.90 / 57.90 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Cummings (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 : 1 %
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: Cummings (day/night)

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-----
Angle1   Angle2       :    0.00 deg   60.00 deg
Wood depth      :          0       (No woods.)
No of house rows :          0 / 0
Surface         :          1       (Absorptive ground surface)
Receiver source distance : 18.50 / 18.50 m
Receiver height  :    9.00 / 9.00 m
Topography      :          1       (Flat/gentle slope; no barrier)
Reference angle  :    0.00

```

Results segment # 1: Montreal Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 63.54 + 0.00) = 63.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	73.01	0.00	-8.42	-1.05	0.00	0.00	0.00	63.54

Segment Leq : 63.54 dBA

Results segment # 2: Cummings (day)

Source height = 1.50 m

ROAD (0.00 + 59.29 + 0.00) = 59.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	60	0.44	65.75	0.00	-1.31	-5.15	0.00	0.00	0.00	59.29

Segment Leq : 59.29 dBA

Total Leq All Segments: 64.93 dBA

Results segment # 1: Montreal Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 55.94 + 0.00) = 55.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	65.41	0.00	-8.42	-1.05	0.00	0.00	0.00	55.94

Segment Leq : 55.94 dBA

Results segment # 2: Cummings (night)

Source height = 1.50 m

ROAD (0.00 + 51.70 + 0.00) = 51.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	60	0.44	58.16	0.00	-1.31	-5.15	0.00	0.00	0.00	51.70

Segment Leq : 51.70 dBA

Total Leq All Segments: 57.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.93
(NIGHT): 57.33

STAMSON 5.0 NORMAL REPORT Date: 29-11-2017 11:23:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bed4th.te Time Period: Day/Night 16/8 hours
Description: Receiver C

Road data, segment # 1: Cummings Av. (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: Cummings Av. (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cummings Av. (day)

Source height = 1.50 m

ROAD (0.00 + 59.89 + 0.00) = 59.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.44	65.75	0.00	-1.79	-4.06	0.00	0.00	0.00	59.89

Segment Leq : 59.89 dBA

Total Leq All Segments: 59.89 dBA

Results segment # 1: Cummings Av. (night)

Source height = 1.50 m

ROAD (0.00 + 52.30 + 0.00) = 52.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.44	58.16	0.00	-1.79	-4.06	0.00	0.00	0.00	52.30

Segment Leq : 52.30 dBA

Total Leq All Segments: 52.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.89
(NIGHT): 52.30

Living/Dining Room - 3rd Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level	66.36	dBA	Noise source	
	Correction for reflections	3	dBA	Road	▼
	Outdoor sound level	69.36	dBA	Indoor Quarters	
	Indoor sound level (Daytime)	45	dBA	Living	▼
	Required Noise Reduction (NR)	24.36	dB	Subtract indoor from outdoor sound level	
2.0	Sound angle of incidence	0 to 90 degrees	▼	C ₁ Correction from Table 7.7	0 dB
				Sum	24.36 dB

	Component:	Wall	▼	STC	50 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft	▼	C ₄ from Table 7.10	7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling	▼	Correction	-7 dB
4.0	Room floor area	32.5	m ²	52.61538 % of floor area	
	Component Area	17.1	m ²		
	Room absorption category	Intermediate	▼	C ₃ from Table 7.9	-2 dB
				Correction	2 dB
5.0	Noise reduction if only this component transmits sound				45 dB
6.0	Required noise reduction (from Step 1)				24 dB
7.0	Term C ₂ : Subtract the Required NR from the Noise Reduction for this component				21 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy				5 %

	Component:	Window	▼	After step 2	24.36 dB
9.0	Transmits	95 % of total sound energy		C ₂ from Table 7.8	0 dB
10.0	Room floor area	32.5	m ²	59.07692 % of floor area	
	Component Area	19.2	m ²		
	Room absorption category	Intermediate	▼	C ₃ from Table 7.9	-2 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft	▼	C ₄ from Table 7.10	7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling	▼		
	STC=NR+C ₁ +C ₂ +C ₃ +C ₄			Required STC	29

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Living/Dining Room and Kitchen - 3rd Floor

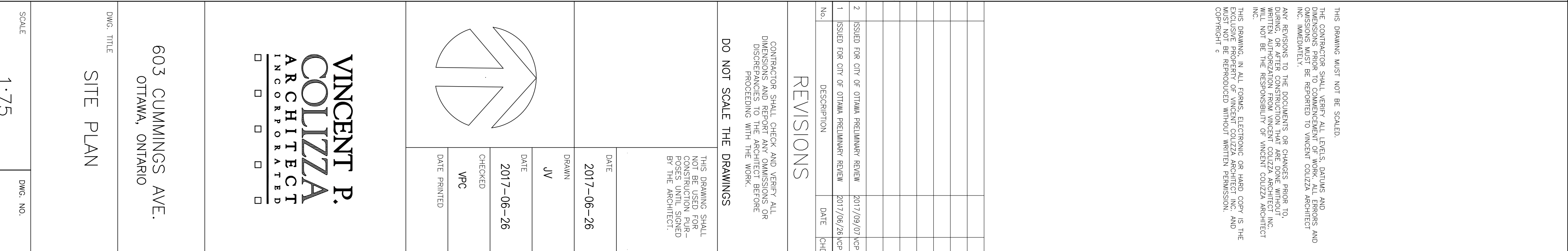
Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level	<u>66.36</u> dBA	Noise source
	Correction for reflections	<u>3</u> dBA	Road
	Outdoor sound level	<u>69.36</u> dBA	Indoor Quarters
	Indoor sound level (Daytime)	<u>45</u> dBA	Living
	Required Noise Reduction (NR)	<u>24.36</u> dB	Subtract indoor from outdoor sound level
2.0	Sound angle of incidence	0 to 90 degrees	C ₁ Correction from Table 7.7 <u>0</u> dB
			Sum <u>24.36</u> dB

	Component:	Wall	STC <u>50</u> dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft	C ₄ from Table 7.10 <u>7</u> dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling	Correction <u>-7</u> dB
4.0	Room floor area	<u>44.4</u> m ²	65.31532 % of floor area
	Component Area	<u>29.0</u> m ²	
	Room absorption category	Intermediate	C ₃ from Table 7.9 <u>-3</u> dB
			Correction <u>3</u> dB
5.0	Noise reduction if only this component transmits sound		<u>46</u> dB
6.0	Required noise reduction (from Step 1)		<u>24</u> dB
7.0	Term C ₂ : Subtract the Required NR from the Noise Reduction for this component		<u>22</u> dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy		<u>5</u> %

	Component:	Window	After step 2 <u>24.36</u> dB
9.0	Transmits	95 % of total sound energy	C ₂ from Table 7.8 <u>0</u> dB
10.0	Room floor area	<u>44.4</u> m ²	46.17117 % of floor area
	Component Area	<u>20.5</u> m ²	
	Room absorption category	Intermediate	C ₃ from Table 7.9 <u>-3</u> dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft	C ₄ from Table 7.10 <u>7</u> dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling	
	STC=NR+C ₁ +C ₂ +C ₃ +C ₄		Required STC <u>28</u>

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE



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1	ISSUED FOR CITY OF OTTAWA PRELIMINARY REVIEW	2017/06/26

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603 CUMMINGS AVE.
OTTAWA, ONTARIO

DWG. TITLE

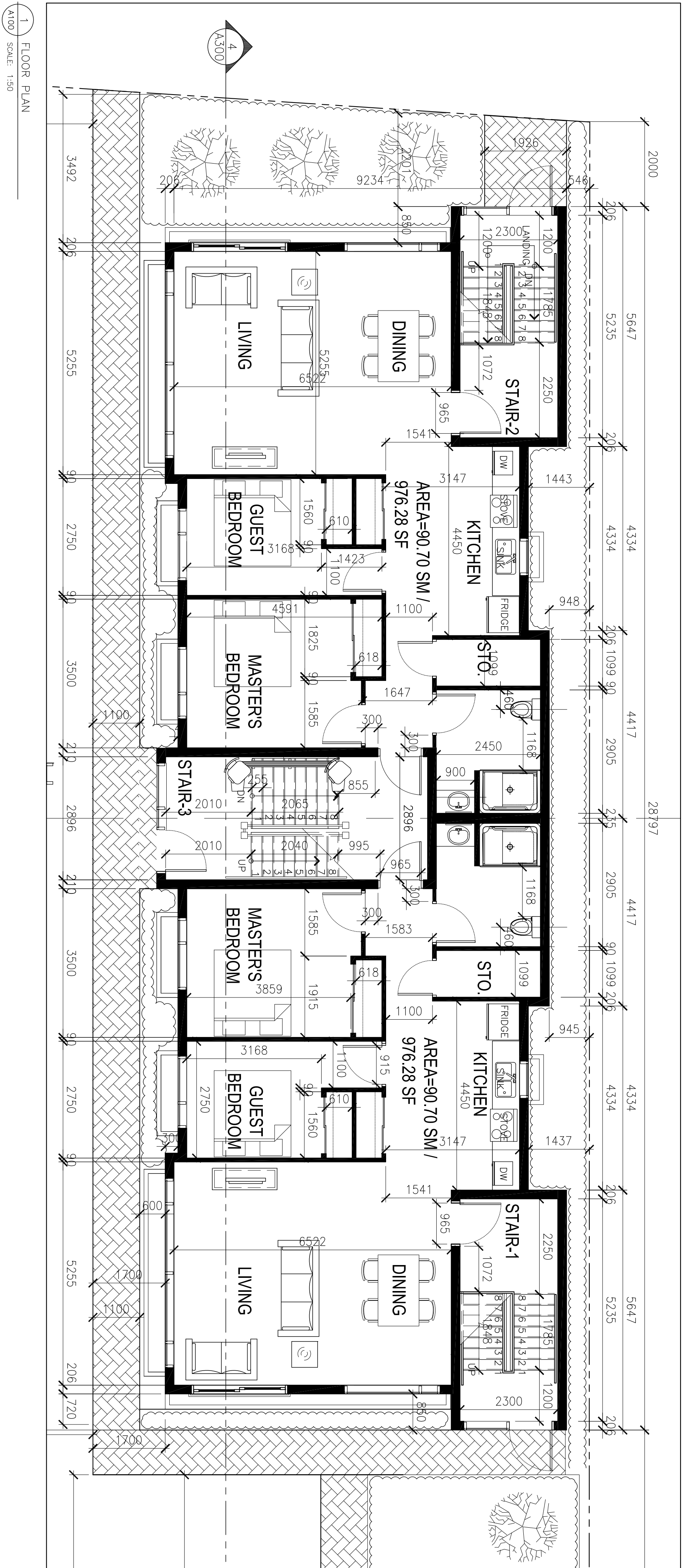
SITE PLAN

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SCALE 1:75 DWG. NO. ()

PROJ. NO.	1217	SP-1
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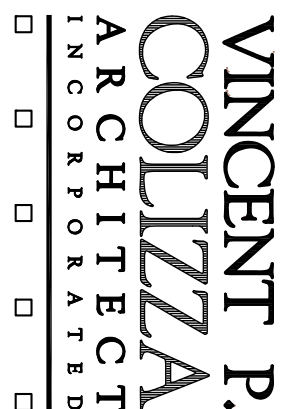
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FLOOR PLAN

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