Noise Assessment Report
Detailed Study -
6102 Renaud Road – Chapel Hill Housing

Project # 160401467

Prepared for:
1702599 Ontario Inc

Prepared by:
Stantec Consulting Ltd.

January 30, 2020

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1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

Stantec Consulting Ltd. has been retained by 1702599 Ontario Inc to prepare an environmental noise assessment for the proposed residential development at 6102 Renaud Road, located in the City of Ottawa. The development consists of high-density residential units, back-to-back stacked terrace homes and back to back townhomes. A site plan control application is being prepared and a Noise Assessment Study is required to address City policies regarding a residential development adjacent to collector roads.

The purpose of this report is to:

- outline the Ontario Ministry of the Environment, Conservation, and Parks (MECP) and City of Ottawa guidelines and criteria for noise levels and residential land use;
- apply the noise level standards of the Ontario Ministry of the Environment Conservation and Parks NPC-300 to the site in conjunction with the City of Ottawa document "Environmental Noise Control Guidelines" dated January 2016;
- determine the extent to which noise levels will be of concern to future residents of the proposed development, using the computerized version (STAMSON 5.03) of the MECP's noise model;
- outline recommendations for noise attenuation, as necessary, to achieve acceptable noise levels for future residents of the proposed development.

1.2 LOCATION

The site is located at the southeast corner at the intersection of Saddleridge Drive and Renaud Road. The proposed site is illustrated in **Figure 1**. The proposed development consists of 3 blocks of 3 storey back to back townhomes and 1 block of stacked back to back terrace homes for a total of 44 units. The development also includes an outdoor amenity space and a parking lot. This report will focus on the rooms with exposure to Saddleridge Drive, Renaud Road and Page Road.

Surrounding land uses are as follows:

- north – existing residential, existing Renaud Road;
- west – existing residential, existing Saddleridge Drive;
- south – existing and future residential, existing Rolling Meadow Crescent;
- east – existing residential.

The main potential noise source that may impact the subject site is vehicular traffic from Saddleridge Drive, Renaud Road and Page Road. The traffic volumes for these roadways are based on the City of Ottawa document "Environmental Noise Control Guidelines".

Figure 1 – 6102 Renaud Road Development

2.0 NOISE LEVEL CRITERIA

2.1 GUIDELINES

The City of Ottawa has produced guidelines for noise levels for use in noise assessment and land use planning based on MECP Publication NPC-300 guidelines. Noise level criteria for residential land use are summarized in **Table 1** below. Noise levels higher than the guidelines presented are acceptable under certain conditions and with certain provisions.

Table 1 Noise Criteria for Residential and Office Land Use

Location	Leq (16hr) (dBa) (7 a.m. – 11 p.m.)	Leq (8hr) (dBa)(11 p.m. – 7 a.m.)
Outdoor Living Areas	55 dBA	N/A
Indoor Living Areas	45 dBA	40 dBA
General offices, reception areas, retail stores, etc.	50 dBA	N/A

(Source: Ministry of the Environment Conservation and Parks, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016)

Table 2 and **Table 3** set out the required controls and warning clauses that can be applied to allow residential activity in locations where noise levels are expected to exceed the criteria in **Table 1**.

Table 2 Combination of Road and Rail Noise Daytime Outdoor, Ventilation and Warning Clause Recommendations

Location	Leq (16hr) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
Outdoor Living Area	Leq_{16hr} less than or equal to 55 dBA	N/A	None required	Not required
	Leq (16hr) greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) may not be required but should be considered	Required if resultant Leq exceeds 55 dBA Generic Clause or Extensive Mitigation Clause for outdoor amenity area
	Leq (16hr) greater than 60 dBA	N/A	Control measures (barriers) required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible	Required if resultant Leq exceeds 55 dBA Extensive Mitigation Clause for outdoor amenity area
Plane of Living Room Window	Leq (16hr) less than or equal to 55 dBA	None required	N/A	Not required
	Leq (16hr) greater than 55 dBA to less than or equal to 65 dBA	Provision for central air conditioning	N/A	Required Extensive Mitigation Clause for indoor area
	Leq (16hr) greater than 65 dBA	Central air conditioning	N/A	Required Extensive Mitigation Clause for indoor areas (Supplied Central Air Conditioning)

(Source: Ministry of the Environment and Climate Change, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016)

Table 3 Combination of Road and Rail Noise, Night-Time Ventilation and Warning Clause Requirements

Location	Leq (8hr) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
Plane of Bedroom Window	Leq_{8hr} greater than 50 dBA to less or equal to 60 dBA	Provision for central air conditioning	N/A	Required Extensive Mitigation Clause for indoor areas
	Leq_{8hr} greater than 60 dBA	Central air conditioning	N/A	Required Extensive mitigation of indoor and outdoor amenity area clause (Supplied Central Air Conditioning)

(Source: Ministry of the Environment Conservation and Parks, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016))

The MECP also specifies building component requirements where indoor noise levels are expected to exceed the Table 1 criteria. These requirements are summarized in **Table 4.**

Table 4 Road and Rail Noise – Building Component Requirements

Location		Leq (16hr) (dBA)	Building Component Requirements
Plane of Living Room Window-Daytime	Road	Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
		Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
Location		**Leq (8hr) (dBA)**	**Building Component Requirements**
Plane of Bedroom Window-Nighttime	Road	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
		Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

(Source: Ministry of the Environment Conservation and Parks, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016)

3.0 CALCULATIONS

3.1 NOISE LEVEL PREDICTIONS

Noise predictions in this report were conducted in accordance with the methods defined in Ontario Roads Noise Analysis Method for Environment and Transportation (ORNAMENT). The analysis was preformed using the computerized version (STAMSON 5.03) of the methods contained in ORNAMENT. The program accepts variables related to noise sources and receivers, road traffic volumes, and the nature and extent of noise mitigation features, if required.

3.2 ROAD TRAFFIC VOLUMES

Traffic volume parameters are outlined in the City of Ottawa document "Environmental Noise Control Guidelines" dated January 2016. The document indicates that the average annual daily traffic volume for Renaud Road, a 2-lane undivided major collector road, shall be estimated to generate 12,000 vehicles per day. Saddle Ridge Drive and Page Road are both identified as a 2-lane undivided urban collector that are estimated to generate traffic volume of 8,000 vehicles per day. Additional assumptions and ratios for day/night traffic and car/ truck traffic are summarized as follows:

- heavy truck traffic for this segment is estimated to be 5% of total traffic volume;
- medium truck traffic for this segment is estimated to be 7% of total traffic volume; the rest is assumed to be car traffic;
- daytime (7 am – 11 pm) traffic is assumed to be 92%, with the remaining 8% at night (11 pm – 7 am); and
- the speed limit for Renaud Road and Saddleridge Drive is 50km/hr, and Page Road is 40km/hr.

Table 5 and Table 6 summarize the traffic volumes used for calculations in this report.

Table 5 Traffic Volumes – Renaud Road, 2-Lane Undivided Major Collector

	Day	Night	Total
Car	9,715	845	10,560
Medium Truck	773	67	840
Heavy Truck	552	48	600
TOTAL	11,040	960	12,000
Speed Limit	50 km/hr		
Gradient	Approx. 1%		
Surface	Asphalt		

Table 6 Traffic Volumes – Saddleridge Drive and Page Road, 2-Lane Urban Collector

	Day	Night	Total
Car	6,477	563	7,040
Medium Truck	515	45	560
Heavy Truck	368	32	400
TOTAL	7,360	640	8,000
Speed Limit	Saddleridge Drive 50 km/hr , Page Road 40 km/hr		
Gradient	Approx. 1%		
Surface	Asphalt		

3.3 PROJECTED NOISE LEVELS

Using the MECP noise model, ORNAMENT, noise levels were calculated for daytime and nighttime conditions at the points representing the anticipated building locations based on the site plan prepared by Rosaline J. Hill Architect Inc. The resulting receiver sites are illustrated in **Figure 2**.

The receiver heights for indoor, daytime, and nighttime noise level calculations for the proposed buildings were completed at the mid-height of the assessed floor. For the back to back townhomes the designated living space was on the second floor, according to the floor and elevation plans found in **Appendix B**. The daytime receiver height was set to 4.9m. The

bedrooms are situated on the top floor and therefore the nighttime receiver height was set to 7.9m.

The same exercise was completed for the back to back terrace homes for both lower and upper units to determine whether there was a notable difference in noise levels at varying heights. The receiver locations were set to the worst-case scenario for each block for conservatism. The floor plans and elevations used to determine receiver locations can be found in **APPENDIX B**.

Predicted noise levels for the designated outdoor amenity area were measured at the central point of the designated area. The receiver height for the area was set to the height of 1.5m as identified in the City of Ottawa Noise Control Guidelines (January 2016).

To account for the distance from the receivers along Renaud Road that were under 15 meters to noise sources, the methodology outlined in Section 5.5 of the Ornament Technical Document, displayed in **Appendix C**, was applied. This distance adjustment factor is based on a reference 15.0 m receiver-source distance and applied to generate the output for typical receivers. The adjustment factor is then added to the resultant noise level to suit actual site conditions. The adjustment factor calculation is as follows:

Table 7 Distance Adjustment Factor

Equation:		
$A_d = 10 (1 + a) \log (D_{ref} / D)$ $a = 0.75 (1 – h_{eff} / 25)$		
Inputs:		
$D_{ref} = 15.0$	D = 14.3	
Adjustment Factors		
	R1= 0.39 dBA	R1A= 0.36 dBA

The unattenuated receiver noise levels have been summarized in **Table 8**, and modeled noise level results are provided in **Appendix A** for both daytime and nighttime at building face and for the outdoor amenity space.

Table 8 Summary of Projected Unattenuated Noise Levels

Receiver Site	Location	Elevation (m)	Daytime-Building Face (dBA)	Nighttime-Building Face (dBA)
R1	Back to Back Terrace home Block 4	2.2	68.4	60.8
R1A	Back to Back Terrace home Block 4 (Upper Unit)	5.5	68.6	61.3
R2	Back to Back Townhome Block 3	7.9	64.4	57.1
R3	Back to Back Townhome Block 2	7.9	62.3	55.1
R4	Back to Back Townhome Block 1	7.9	62.3	55.0
RO1	Outdoor Amenity Area	1.5	55.0	-

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ORIGINAL SHEET - ANSI B

July, 2019
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6102 RENAUD ROAD

Figure No.
2.0

Title
INDOOR NOISE LEVELS
NOISE ASSESSMENT REPORT

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Figure No.
3.0

Title
OUTDOOR NOISE LEVELS
NOISE ASSESSMENT REPORT

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 OUTDOOR NOISE IMPACTS

Predicted noise levels lie within City of Ottawa and MECP criteria at the outdoor living area with potential exposure to Renaud Road, Saddle Ridge and Page Road.

The following summarizes the measures required by the City of Ottawa and MECP criteria for the development to occur within accepted standards:

- The predicted noise level for the designated outdoor amenity area is 54.99 dBA. This falls within the accepted noise level standards of 55dBA and below. Therefore, there are no additional measures required for outdoor noise mitigation.

4.2 NOISE IMPACTS AND WARNING CLAUSES

Predicted noise levels are above City of Ottawa and MECP criteria for the daytime building face and the nighttime building face for proposed units with exposure to Renaud Road, Saddleridge Drive and Page Road.

In accordance with the City of Ottawa and MECP guidelines, the following control measures and warning clauses are required for the proposed development.

- The provision for adding central air conditioning is to be included for Townhome Blocks 1 to 3. Noise Warning Clause "generic indoor" is to be included in all offers of purchase and sale.

- A forced air heating and central air conditioning system is to be installed for all stacked back to back terrace units in Block 4. Noise Warning Clause "*extensive mitigation of indoor area*" is to be included in all offers of purchase and sale.

Noise warning clauses are provided in **Appendix C**.

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NOISE WARNING CLAUSE GENERIC MITIGATION INDOOR – GI

NOISE WARNING CLAUSE EXTENSIVE MITIGATION INDOOR – MI

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6102 RENAUD ROAD

Figure No.
4.0

Title
POTENTIAL NOISEWALL LOCATIONS AND WARNING CLAUSES

4.3 INDOOR NOISE MITIGATION – AIF METHOD

The following building components will apply based on calculations per the Acoustical Insulation Factor (AIF) method, as per "Environmental Noise Assessment in Land Use Planning Manual", 1999.

Table 9 summarizes the AIF values and minimum building components that must be applied to the proposed development, and **Appendix B** provides the floor plans and complete AIF calculations.

Table 9 AIF Summary

Block 4 - Back to Back Terrace Homes						
Units	**Space**	**Wall**	**AIF Value**	**Type of Window Glazing**	**Type of exterior wall**	**Type of Door**
End Units	Basement Floor - Lower Unit - West Facing	1	32	2 (6) 2	EW1	-
		4	32	2 (6) 2	EW1	-
	Main Floor - Lower Unit - West Facing	1	33	2 (18) 2	EW1	D2
		4	33	2 (15) 2	EW1	-
	Second Floor - Upper Unit - West Facing	1	33	2 (22) 2	EW1	-
		4	33	2 (15) 2	EW1	-
	Third Floor - Upper Unit - West Facing	1	32	2 (6) 2	EW1	-
		4	32	2 (6) 2	EW1	-
	Basement Floor - Lower Unit - East Facing	4	29	2 (6) 2	EW1	-
	Main Floor - Lower Unit - East Facing	4	29	2 (6) 2	EW1	-
	Second Floor - Upper Unit - East Facing	4	29	2 (6) 2	EW1	-
	Third Floor - Upper Unit - East Facing	4	29	2 (6) 2	EW1	-
Interior Units	Basement Floor - Lower Unit - West Facing	1	29	2 (6) 2	EW1	-
	Main Floor - Lower Unit - West Facing	1	31	2 (6) 2	EW1	D2
	Second Floor - Upper Unit - West Facing	1	31	2 (15) 2	EW1	-
	Third Floor - Upper Unit - West Facing	1	29	2 (6) 2	EW1	-

As the noise levels exceed the MECP Criteria, building components including walls and windows are to be designed so the indoor sound levels comply with MECP noise criteria by using EW1 exterior wall construction and the specified window glazing as illustrated above. In this situation, double glazed windows with 2mm thickness and various spacing outlined above would be required. The building windows with an equivalent AIF may be substituted for the recommended thickness, glazing and spacing. E.g. a double glazed 3mm pane with 6mm spacing may be substituted for double glazed 2mm panes with 15mm spacing. It should be noted that the sliding glass balcony doors were treated as windows within the AIF calculations for applicability of window glazing/spacing recommendations given they are predominantly glass.

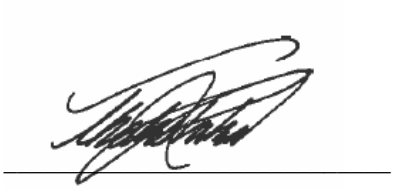
EW1 construction consists of:

- 12.7 mm gypsum board, vapour barrier, and 38x89 studs with 50 mm mineral wool or glass fibre batts in inner stud cavities. As well as sheathing and wood siding or metal siding and fibre backer board.

Should the actual floor plans differ from the plans shown in **Appendix B**, updated calculations must be performed prior to the issuance of building permits.

The application of these noise mitigation measures and warning clauses will allow the proposed residential development to meet MECP and City of Ottawa criteria with respect to environmental noise.

Respectfully submitted by:



Thakshika Rathnasooriya, P.Eng.,
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Dustin Thiffault, P.Eng.,
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Appendix A : NOISE LEVEL CALCULATIONS

A.1 INDOOR RECEIVER STAMSON REPORTS

```
STAMSON 5.0        NORMAL REPORT        Date: 24-07-2019 13:25:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te                Time Period: Day/Night 16/8 hours
Description: INDOOR RECEIVER 1


Road data, segment # 1: SADDLERIDGE (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: SADDLERIDGE (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  :  16.12 / 16.12  m
Receiver height           :   2.20 / 0.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: RENAUD ROAD (day/night)
-----------------------------------------------
Car traffic volume  :  9605/835   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   662/58    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  12000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   6.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: RENAUD ROAD (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           :   2.20 / 0.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 3: PAGE ROAD (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 # 3: PAGE ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -26.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 131.94 / 131.94 m
Receiver height           :   2.20 / 0.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: SADDLERIDGE (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.82 + 0.00) = 63.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -90     90   0.64  65.75   0.00  -0.51  -1.42   0.00   0.00   0.00
63.82
```

```
---------------------------------------------------------------------------
---

Segment Leq : 63.82 dBA


Results segment # 2: RENAUD ROAD (day)
--------------------------------------

Source height = 1.56 m

ROAD (0.00 + 66.59 + 0.00) = 66.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
---------------------------------------------------------------------------
---
   -90     90   0.64  68.01   0.00   0.00  -1.42   0.00   0.00   0.00
66.59
---------------------------------------------------------------------------
---

Segment Leq : 66.59 dBA


Results segment # 3: PAGE ROAD (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 39.98 + 0.00) = 39.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
---------------------------------------------------------------------------
---
   -26      0   0.64  63.96   0.00 -15.48  -8.50   0.00   0.00   0.00
39.98
---------------------------------------------------------------------------
---

Segment Leq : 39.98 dBA

Total Leq All Segments: 68.44 dBA


Results segment # 1: SADDLERIDGE (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.18 + 0.00) = 56.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
---------------------------------------------------------------------------
---
   -90     90   0.66  58.16   0.00  -0.52  -1.46   0.00   0.00   0.00
56.18
---------------------------------------------------------------------------
---

Segment Leq : 56.18 dBA


Results segment # 2: RENAUD ROAD (night)
----------------------------------------

Source height = 1.57 m

ROAD (0.00 + 58.98 + 0.00) = 58.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
---------------------------------------------------------------------------
---
   -90     90   0.66  60.43   0.00   0.00  -1.46   0.00   0.00   0.00
58.98
---------------------------------------------------------------------------
---

Segment Leq : 58.98 dBA


Results segment # 3: PAGE ROAD (night)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 32.18 + 0.00) = 32.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
---------------------------------------------------------------------------
---
   -26      0   0.66  56.36   0.00 -15.68  -8.50   0.00   0.00   0.00
32.18
---------------------------------------------------------------------------
---

Segment Leq : 32.18 dBA

Total Leq All Segments: 60.82 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 68.44
                         (NIGHT): 60.82
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-07-2019 13:27:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1a.te               Time Period: Day/Night 16/8 hours
Description: INDOOR RECEIVER 1A


Road data, segment # 1: SADDLERIDGE (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: SADDLERIDGE (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  :  16.12 / 16.12  m
Receiver height           :   5.53 / 8.82   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: RENAUD ROAD (day/night)
-----------------------------------------------
Car traffic volume  :  9605/835   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   662/58    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  12000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   6.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: RENAUD ROAD (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           :   5.53 / 8.82   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 3: PAGE ROAD (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 # 3: PAGE ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -26.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 131.94 / 131.94 m
Receiver height           :   5.53 / 8.82   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: SADDLERIDGE (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.02 + 0.00) = 64.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
```

```
   -90     90   0.54  65.75   0.00  -0.48  -1.25   0.00   0.00   0.00
64.02
----------------------------------------------------------------------
---

Segment Leq : 64.02 dBA


Results segment # 2: RENAUD ROAD (day)
--------------------------------------

Source height = 1.56 m

ROAD (0.00 + 66.77 + 0.00) = 66.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
----------------------------------------------------------------------
---
   -90     90   0.54  68.01   0.00   0.00  -1.24   0.00   0.00   0.00
66.77
----------------------------------------------------------------------
---

Segment Leq : 66.77 dBA


Results segment # 3: PAGE ROAD (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 40.94 + 0.00) = 40.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
----------------------------------------------------------------------
---
   -26      0   0.54  63.96   0.00 -14.53  -8.48   0.00   0.00   0.00
40.94
----------------------------------------------------------------------
---

Segment Leq : 40.94 dBA

Total Leq All Segments: 68.63 dBA


Results segment # 1: SADDLERIDGE (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.65 + 0.00) = 56.65 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  -0.45  -1.06   0.00   0.00   0.00
56.65
----------------------------------------------------------------------
---

Segment Leq : 56.65 dBA


Results segment # 2: RENAUD ROAD (night)
----------------------------------------

Source height = 1.57 m

ROAD (0.00 + 59.38 + 0.00) = 59.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
----------------------------------------------------------------------
---
   -90     90   0.44  60.43   0.00   0.00  -1.06   0.00   0.00   0.00
59.38
----------------------------------------------------------------------
---

Segment Leq : 59.38 dBA


Results segment # 3: PAGE ROAD (night)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 34.29 + 0.00) = 34.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
----------------------------------------------------------------------
---
   -26      0   0.44  56.36   0.00 -13.60  -8.47   0.00   0.00   0.00
34.29
----------------------------------------------------------------------
---

Segment Leq : 34.29 dBA

Total Leq All Segments: 61.25 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 68.63
                         (NIGHT): 61.25
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2019 09:52:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te                Time Period: Day/Night 16/8 hours
Description: INDOOR RECEIVER 2


Road data, segment # 1: SADDLERIDGE (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: SADDLERIDGE (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  :  16.91 / 16.91  m
Receiver height           :   4.90 / 7.90   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: RENAUD ROAD (day/night)
-----------------------------------------------
Car traffic volume  :  9605/835   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   662/58    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  12000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   6.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: RENAUD ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -81.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  42.63 / 42.63  m
Receiver height           :   4.90 / 7.90   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: SADDLERIDGE (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.66 + 0.00) = 63.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -90     90   0.56  65.75   0.00  -0.81  -1.28   0.00   0.00   0.00
63.66
--------------------------------------------------------------------------
---

Segment Leq : 63.66 dBA


Results segment # 2: RENAUD ROAD (day)
--------------------------------------

Source height = 1.56 m

ROAD (0.00 + 56.53 + 0.00) = 56.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -81      0   0.56  68.01   0.00  -7.06  -4.42   0.00   0.00   0.00
56.53
--------------------------------------------------------------------------
---

Segment Leq : 56.53 dBA

Total Leq All Segments: 64.43 dBA


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

```
Source height = 1.50 m

ROAD (0.00 + 56.28 + 0.00) = 56.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -90     90   0.47  58.16   0.00  -0.76  -1.11   0.00   0.00   0.00
56.28
--------------------------------------------------------------------------
---

Segment Leq : 56.28 dBA


Results segment # 2: RENAUD ROAD (night)
----------------------------------------

Source height = 1.57 m

ROAD (0.00 + 49.50 + 0.00) = 49.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -81      0   0.47  60.43   0.00  -6.65  -4.29   0.00   0.00   0.00
49.50
--------------------------------------------------------------------------
---

Segment Leq : 49.50 dBA

Total Leq All Segments: 57.11 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 64.43
                         (NIGHT): 57.11
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2019 09:55:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3.te                Time Period: Day/Night 16/8 hours
Description: INDOOR RECEIVER 3


Road data, segment # 1: SADDLERIDGE (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: SADDLERIDGE (day/night)
---------------------------------------------
Angle1   Angle2           : -76.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.19 / 21.19  m
Receiver height           :   4.90 / 7.90   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: RENAUD ROAD (day/night)
-----------------------------------------------
Car traffic volume  :  9605/835   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   662/58    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  12000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   6.00
    Day (16 hrs) % of Total Volume     :  92.00
```

```
Data for Segment # 2: RENAUD ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -56.00 deg   -8.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  73.25 / 73.25  m
Receiver height           :   4.90 / 7.90   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: SADDLERIDGE (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.00 + 0.00) = 62.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -76     90   0.56  65.75   0.00  -2.34  -1.42   0.00   0.00   0.00
62.00
--------------------------------------------------------------------------
---

Segment Leq : 62.00 dBA


Results segment # 2: RENAUD ROAD (day)
--------------------------------------

Source height = 1.56 m

ROAD (0.00 + 51.07 + 0.00) = 51.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -56     -8   0.56  68.01   0.00 -10.72  -6.22   0.00   0.00   0.00
51.07
--------------------------------------------------------------------------
---

Segment Leq : 51.07 dBA

Total Leq All Segments: 62.34 dBA

Results segment # 1: SADDLERIDGE (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.68 + 0.00) = 54.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -76     90   0.47  58.16   0.00  -2.20  -1.27   0.00   0.00   0.00
54.68
--------------------------------------------------------------------------
---

Segment Leq : 54.68 dBA


Results segment # 2: RENAUD ROAD (night)
-----------------------------------------

Source height = 1.57 m

ROAD (0.00 + 44.19 + 0.00) = 44.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -56     -8   0.47  60.43   0.00 -10.10  -6.15   0.00   0.00   0.00
44.19
--------------------------------------------------------------------------
---

Segment Leq : 44.19 dBA

Total Leq All Segments: 55.05 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 62.34
                         (NIGHT): 55.05
```

```
STAMSON 5.0        NORMAL REPORT        Date: 26-07-2019 09:56:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R4.te                Time Period: Day/Night 16/8 hours
Description: INDOOR RECEIVER 4


Road data, segment # 1: SADDLERIDGE (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: SADDLERIDGE (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  :  21.30 / 21.30  m
Receiver height           :   4.90 / 7.90   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: RENAUD ROAD (day/night)
-----------------------------------------------
Car traffic volume  :  9605/835   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   662/58    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  12000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   6.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: RENAUD ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -40.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 103.58 / 103.58 m
Receiver height           :   4.90 / 7.90   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: SADDLERIDGE (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 62.10 + 0.00) = 62.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -90     90   0.56  65.75   0.00  -2.37  -1.28   0.00   0.00   0.00
62.10
--------------------------------------------------------------------------
---

Segment Leq : 62.10 dBA


Results segment # 2: RENAUD ROAD (day)
--------------------------------------

Source height = 1.56 m

ROAD (0.00 + 48.22 + 0.00) = 48.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -40      0   0.56  68.01   0.00 -13.06  -6.73   0.00   0.00   0.00
48.22
--------------------------------------------------------------------------
---

Segment Leq : 48.22 dBA

Total Leq All Segments: 62.27 dBA


Results segment # 1: SADDLERIDGE (night)
-----------------------------------------

Source height = 1.50 m
```

```
ROAD (0.00 + 54.81 + 0.00) = 54.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -90     90   0.47  58.16   0.00  -2.24  -1.11   0.00   0.00   0.00
54.81
--------------------------------------------------------------------------
---

Segment Leq : 54.81 dBA


Results segment # 2: RENAUD ROAD (night)
----------------------------------------

Source height = 1.57 m

ROAD (0.00 + 41.43 + 0.00) = 41.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -40      0   0.47  60.43   0.00 -12.30  -6.70   0.00   0.00   0.00
41.43
--------------------------------------------------------------------------
---

Segment Leq : 41.43 dBA

Total Leq All Segments: 55.00 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 62.27
                         (NIGHT): 55.00
```

A.2 OUTDOOR RECEIVER STAMSON REPORT

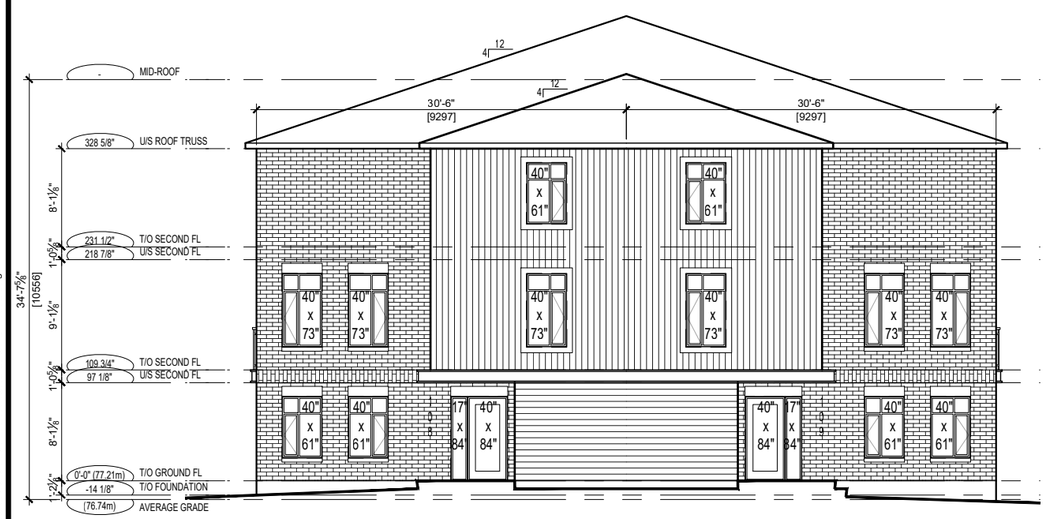
```
STAMSON 5.0        NORMAL REPORT        Date: 23-07-2019 14:25:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: RO1.te               Time Period: Day/Night 16/8 hours
Description: OUTDOOR RECEIVER 1


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

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

    24 hr Traffic Volume (AADT or SADT):  12000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: RENAUD ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -18.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  56.36 / 56.36  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: PAGE ROAD (day/night)
---------------------------------------------
Car traffic volume  :  6403/557   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   442/38    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     :   6.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: PAGE ROAD (day/night)
---------------------------------------------
Angle1   Angle2           : -64.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 114.58 / 114.58 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: RENAUD ROAD (day)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.56 + 0.00) = 54.56 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -18     90   0.66  67.51   0.00  -9.54  -3.41   0.00   0.00   0.00
54.56
--------------------------------------------------------------------------
---

Segment Leq : 54.56 dBA


Results segment # 2: PAGE ROAD (day)
------------------------------------

Source height = 1.57 m

ROAD (0.00 + 44.73 + 0.00) = 44.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -64      0   0.66  64.50   0.00 -14.64  -5.14   0.00   0.00   0.00
44.73
--------------------------------------------------------------------------
---

Segment Leq : 44.73 dBA

Total Leq All Segments: 54.99 dBA
```

```
Results segment # 1: RENAUD ROAD (night)
----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 47.60 + 0.00) = 47.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -18     90   0.57  59.91   0.00  -9.03  -3.28   0.00   0.00   0.00
47.60
--------------------------------------------------------------------------
---

Segment Leq : 47.60 dBA


Results segment # 2: PAGE ROAD (night)
--------------------------------------

Source height = 1.56 m

ROAD (0.00 + 37.98 + 0.00) = 37.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
--------------------------------------------------------------------------
---
   -64      0   0.57  56.88   0.00 -13.85  -5.05   0.00   0.00   0.00
37.98
--------------------------------------------------------------------------
---

Segment Leq : 37.98 dBA

Total Leq All Segments: 48.05 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 54.99
                         (NIGHT): 48.05
```

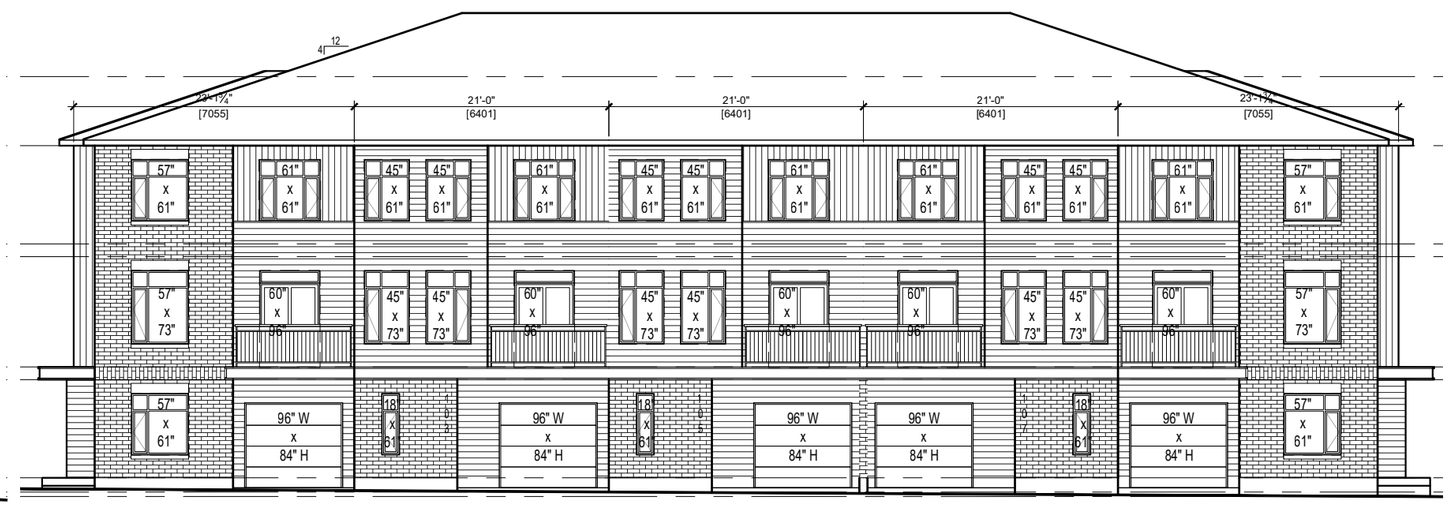
Appendix B : FLOOR PLANS AND AIF CALCULATIONS

BLOCK No.1 - NORTH ELEVATION

BLOCK No.1 - EAST ELEVATION



BLOCK No.1 - SOUTH ELEVATION



BLOCK No.1 - WEST ELEVATION

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CHAPEL HILL HOUSING

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JULY 12, 2019 SCALE: 1:150

ELEVATIONS - BLOCK No.1

Drawing name: Z:\1820 Chapel Hill South\1820 dwgs\1820 AutoCAD\1820 EL01 ELEVATIONS-SECT-DETAILS.dwg
PLOTTED Fri, 12 Jul 2019

BLOCK No.2 - NORTH ELEVATION

BLOCK No.2 - EAST ELEVATION

BLOCK No.2 - SOUTH ELEVATION

BLOCK No.2 - WEST ELEVATION

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ELEVATIONS - BLOCK No.2

Drawing name: Z:\1820 Chapel Hill South\1820 dwgs\1820 AutoCAD\1820 EL01 ELEVATIONS-SECT-DETAILS.dwg
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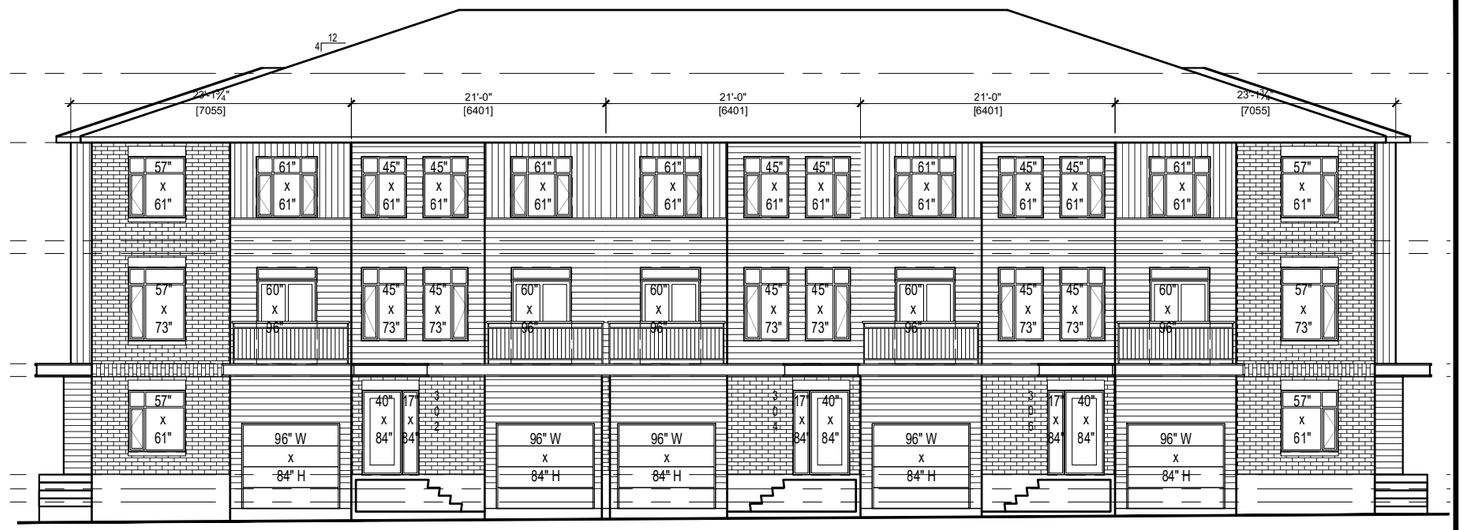
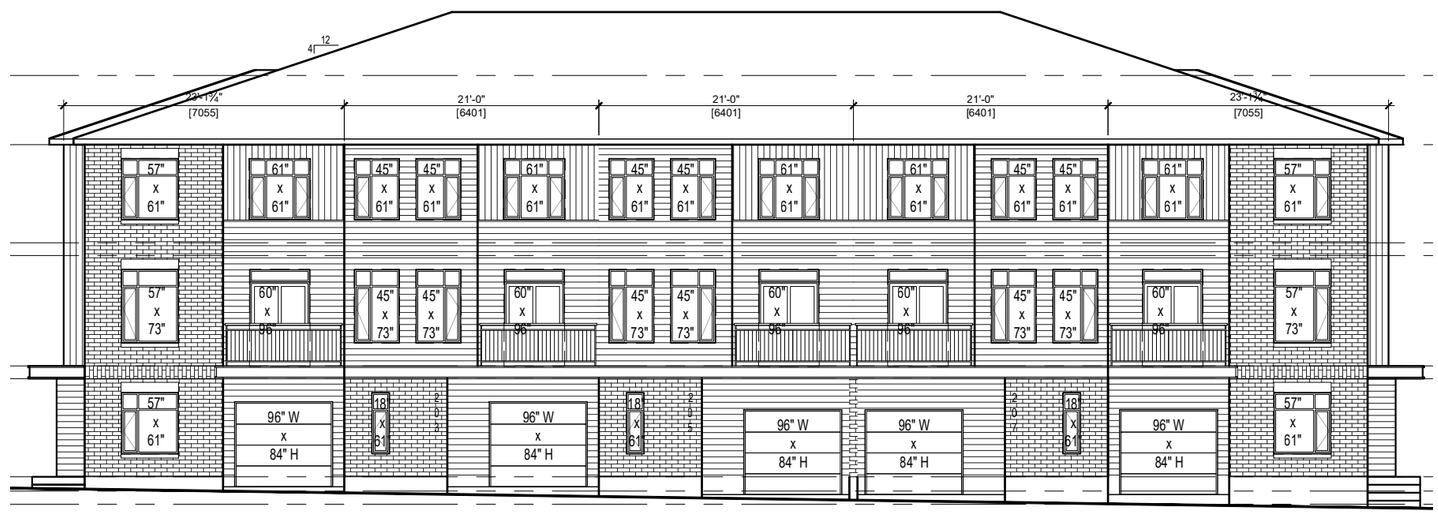
BLOCK No.3 - NORTH ELEVATION



BLOCK No.3 - EAST ELEVATION

BLOCK No.3 - SOUTH ELEVATION



BLOCK No.3 - WEST ELEVATION

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JULY 12, 2019 SCALE: 1:150

ELEVATIONS - BLOCK No.3

Drawing name: Z:\1820 Chapel Hill South\1820 dwgs\1820 AutoCAD\1820 EL01 ELEVATIONS-SECT-DETAILS.dwg
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BLOCK No.4 - NORTH ELEVATION

BLOCK No.4 - EAST ELEVATION

BLOCK No.4 - SOUTH ELEVATION

BLOCK No.4 - WEST ELEVATION

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ELEVATIONS - BLOCK No.4

Drawing name: Z:\1820 Chapel Hill South\1820 dwgs\1820 AutoCAD\1820 EL01 ELEVATIONS-SECT-DETAILS.dwg
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EXISTING CONDITIONS:

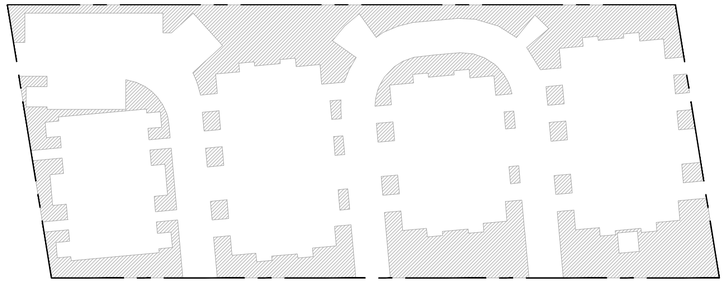
- LOT AREA = 5744.2 sq.m.
- ZONING DESIGNATION "DR"
- AREA 'C' ON SCHEDULE 1
- EXISTING HOUSE AND BARN TO BE DEMOLISHED

PROPOSED ZONING:

- R4M (TO PERMIT TOWNS, STACKED TOWNS & PUD)

ZONING REQUIREMENTS	PROPOSED
3m FRONT AND CORNER SIDE YARD SETBACKS REQ'D	25m
PARKING IS NOT PERMITTED IN A FRONT OR CORNER SIDE YARD	PARKING IN FRONT YD
NO VISITOR PARKING REQUIRED FOR TOWNS (102.4)	0
STACKED TOWNS ARE REQUIRED TO HAVE 1.2 PARKING SPACES PER D.U.	1.0/D.U.
STACKED TOWNS ARE REQUIRED TO HAVE 0.2 VISITOR PKG SPACES PER D.U.	0.2/D.U.
1.5m LANDSCAPE BUFFER REQUIRED BETWEEN PARKING LOT AND SIDE YARD	1.5m
15% OF THE AREA OF THE PARKING LOT MUST BE LANDSCAPING	28%
OUTDOOR REFUSE COLLECTION AREAS WITHIN PARKING LOTS MUST BE 9m FROM A LOT LINE ABUTTING A STREET AND 3m FROM OTHER LOTS LINES	16m 1.5m

ZONING REQUIREMENTS	PROPOSED
STACKED TOWNHOUSES ARE REQUIRED TO HAVE 0.5 BIKE PARKING SPACES PER D.U.	0.5/D.U.=8
A PRIVATE WAY IS REQUIRED TO BE A MIN. 6m WIDE	6m
5.2m MIN. SETBACK REQUIRED FROM GARAGE DOOR TO PRIVATE WAY	5.3m
11m BUILDING HEIGHT LIMIT FOR TOWNHOUSES WITH SLOPED ROOF	11m
11m BUILDING HEIGHT LIMIT FOR STACKED TOWNS	11m
STACKS ARE REQUIRED 6sq.m. OF AMENITY SPACE PER D.U. WITH AT LEAST 50% OF THIS COMMUNAL (16x6sq.m./2=48sq.m.)	200sq.m. COMMUNAL
30% MIN. LANDSCAPED AREA	31%
BALCONIES PERMITTED TO PROJECT 2m INTO A REQ'D YARD BUT NO CLOSER THAN 1m TO A PROPERTY LINE	2m +1m



LANDSCAPED AREA CALCULATION: 31% of site

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4.	19-07-12	FOR COORDINATION
4.	19-07-09	FOR COORDINATION
3.	19-06-24	FOR COORDINATION
2.	19-06-13	FOR COORDINATION
1.	19-05-09	FOR COORDINATION

Consultants:

SITE SERVICING AND GRADING:
Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4
Phone: 613 724-4337
Fax: 613 722-2799
kris.kilborn@stantec.com

PLANNING:
Paquette Planning Associates Ltd.
56 Hutchison Avenue
Ottawa, Ontario, K1Y 4A3
Phone: 613-722-7217
Fax: 613-722-0762
paquetteplanning@sympatico.ca

MECHANICAL & ELECTRICAL ENGINEERING:
Quadrant Engineering Ltd.
2283 St. Laurent Blvd., Unit 203
Ottawa, Ontario, K1G 5A2
Phone: 613-5671487
lwerner@quadrantengineering.ca

LANDSCAPE ARCHITECT:
James B. Lennox & Associates Inc.
Landscape Architects
3332 Carling Ave.
Ottawa, Ontario K2H 5A8
Phone: 613-722-5168
Fax: 1-866-343-3942

It is the responsibly of the appropriate contractor to check & verify all dimensions on site and report all errors &/or omissions to the architect. All contractors must comply with all pertinent codes & by-laws, & use proprietary products as directed by the manufacturer. Do not scale drawings. This drawing may not be used for construction until issued as such. Copyright reserved.

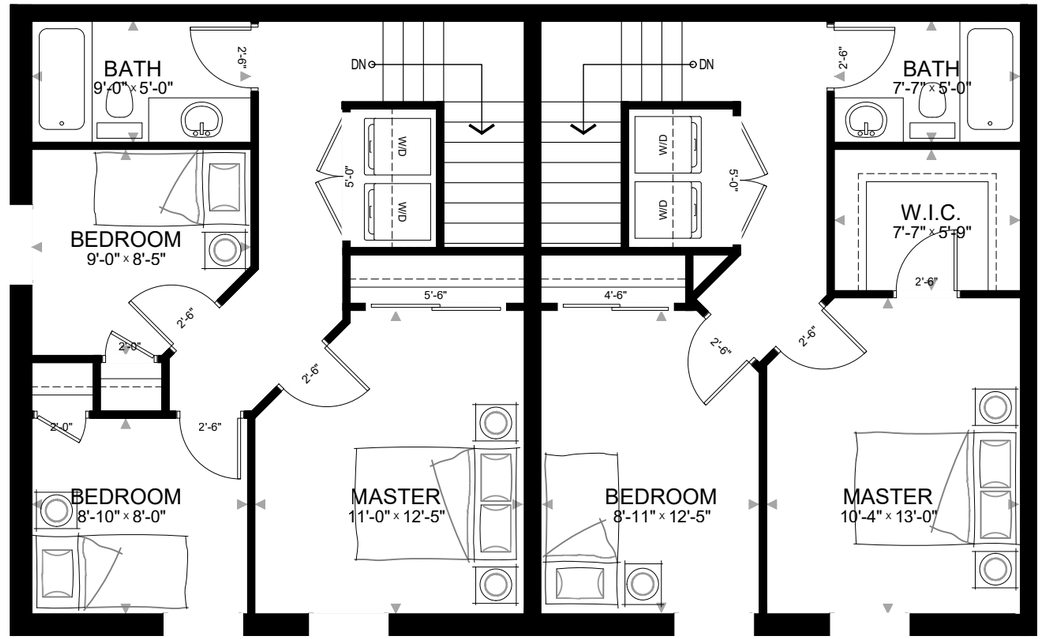
CHAPEL HILL HOUSING

6102 Renaud Road, Ottawa Ont, K1W 1E9

SITE PLAN

Drawn By:	Date:	
RJH	MAY 2019	A1.0
Project No: 1820	Scale: 1:300	

THIRD FLOOR END UNIT

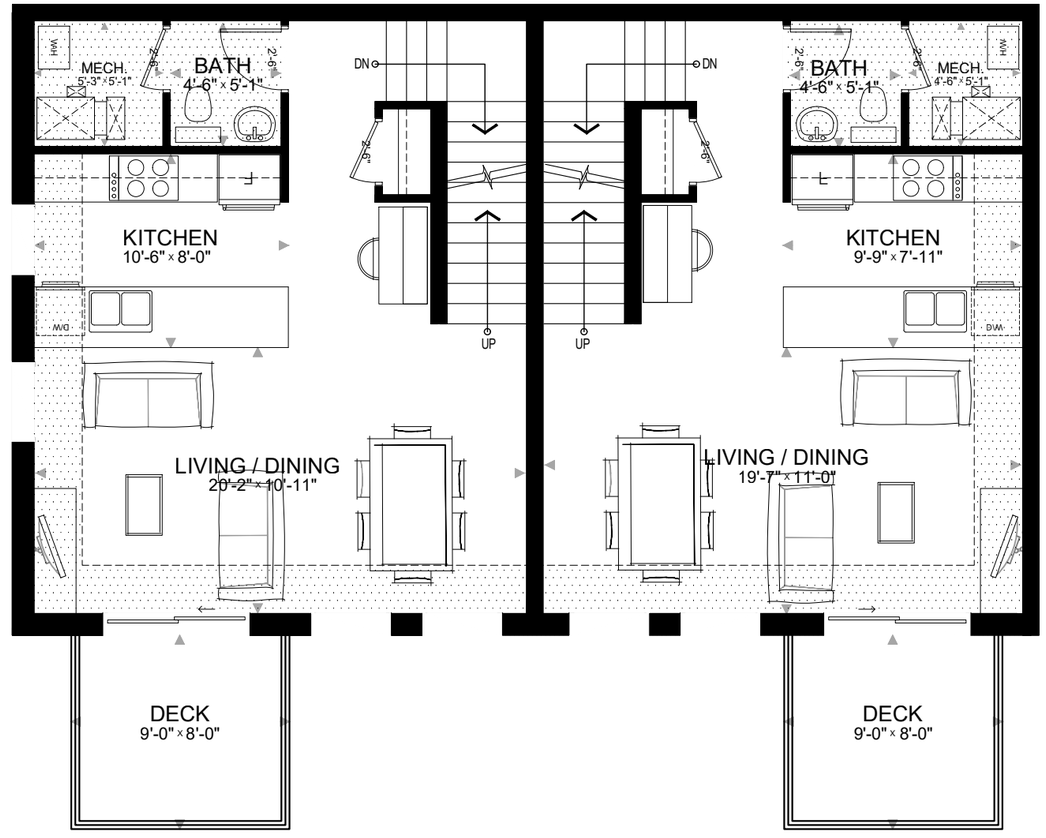


THIRD FLOOR INTERIOR UNIT

UPPER END UNIT
TOTAL: 1,062sqft

UPPER INTERIOR UNIT
TOTAL: 1,005sqft

SECOND FLOOR END UNIT



SECOND FLOOR INTERIOR UNIT

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May 27, 2019 SCALE: 1:75

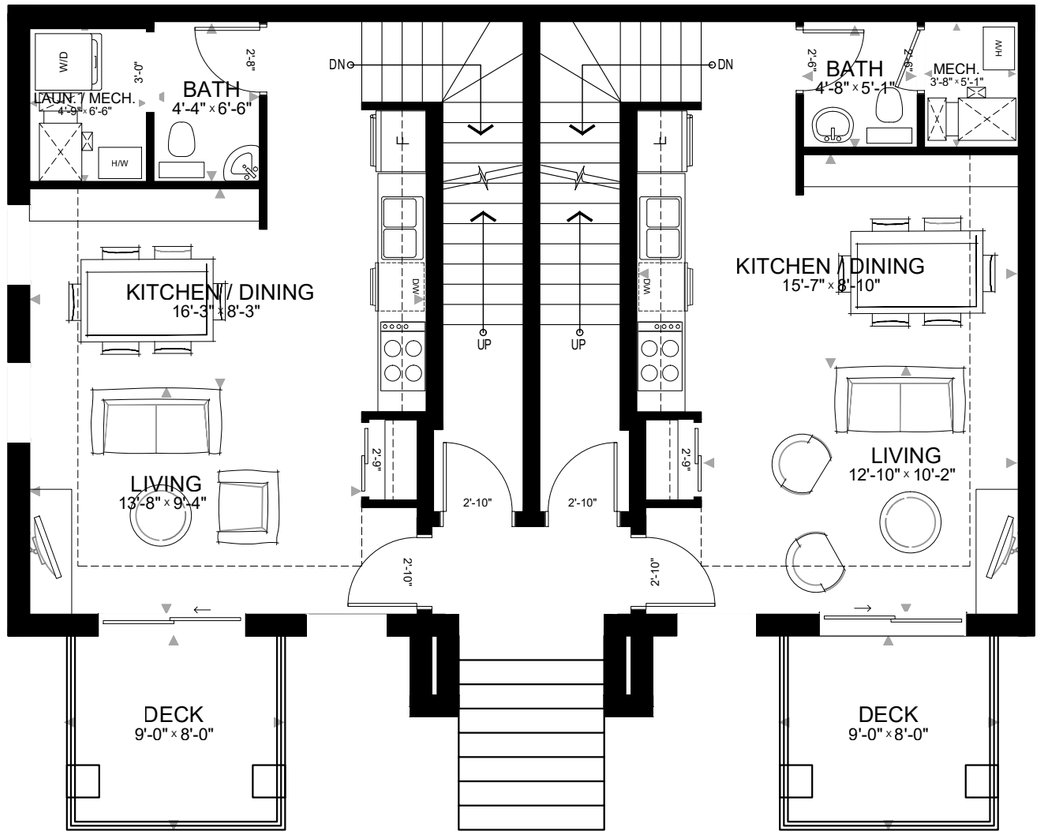
UPPER STACKED UNIT PLANS

Drawing name: Z:\1820 Chapel Hill South\1820 dwgs\1820 AutoCAD\1820 Design Layouts.dwg

PLOTTED Fri, 12 Jul 2019

GROUND FLOOR END UNIT

GROUND FLOOR INTERIOR UNIT

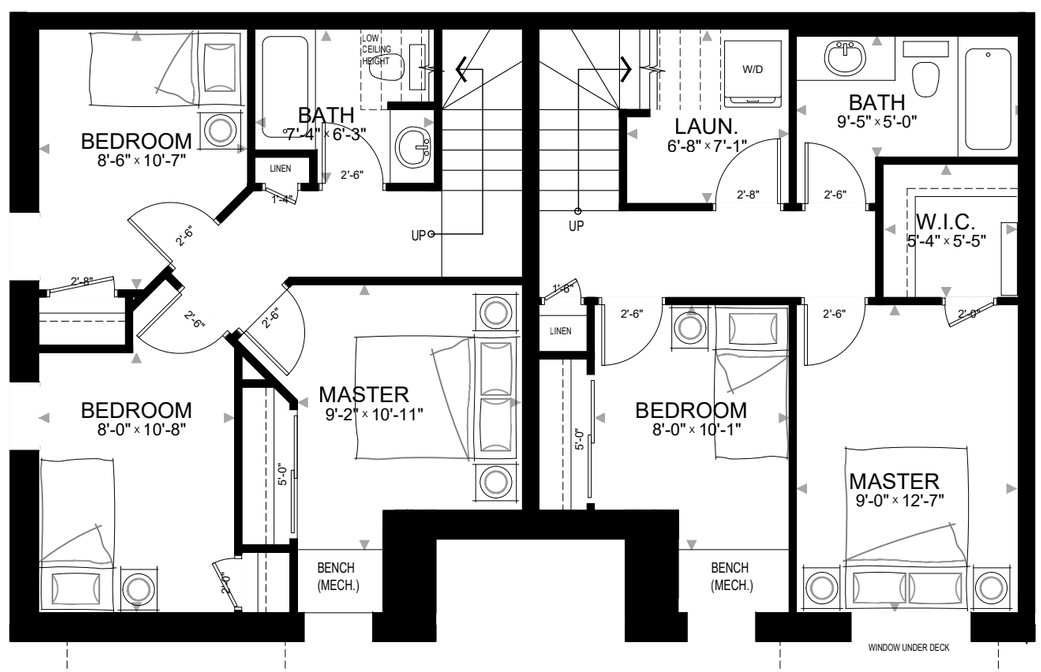


LOWER END UNIT
TOTAL: 981sqft

LOWER INTERIOR UNIT
TOTAL: 927sqft

BASEMENT FLOOR END UNIT

BASEMENT FLOOR INTERIOR UNIT



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JUNE 24, 2019 SCALE: 1:75

LOWER STACKED UNIT PLANS

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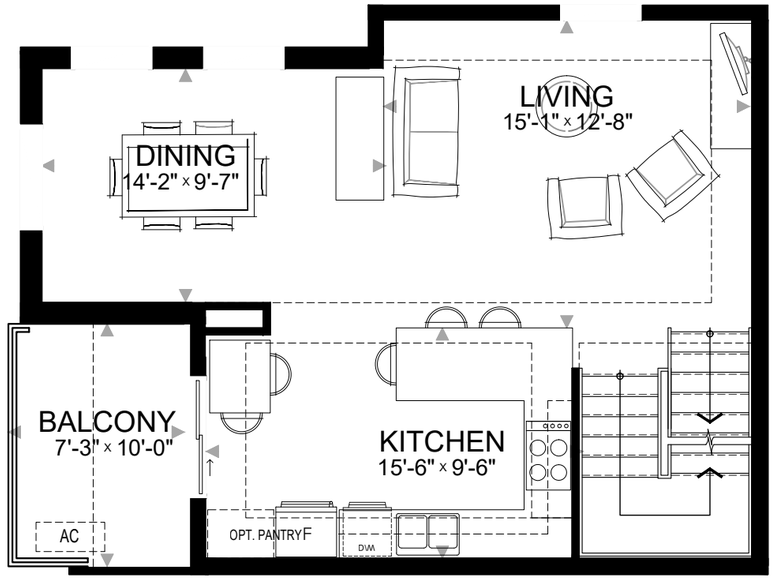
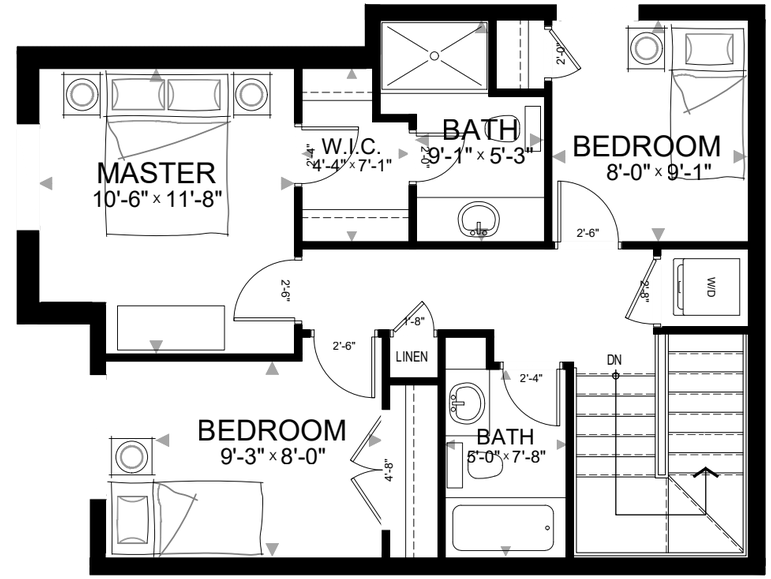
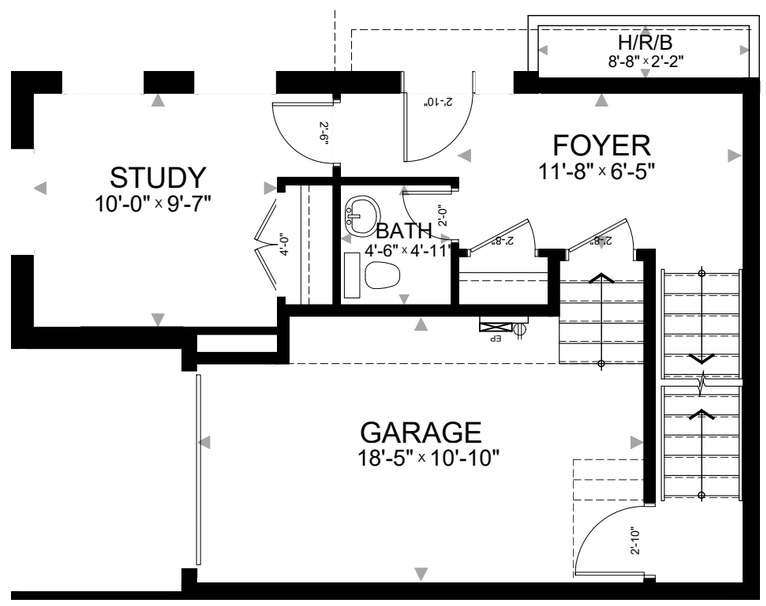


SECOND FLOOR: 611sqft



THIRD FLOOR: 651sqft



GROUND FLOOR: 307sqft

END UNIT TOTAL: 1,569sqft

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June 7, 2019 SCALE: 1:75

END UNIT PLANS

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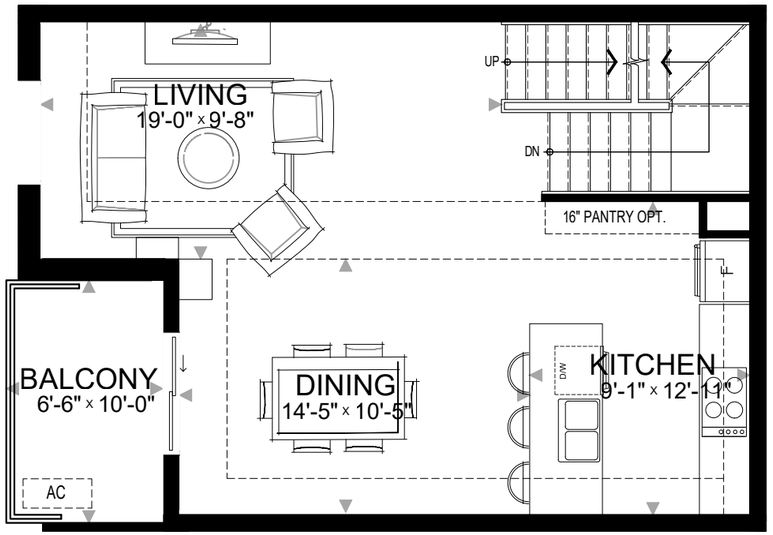
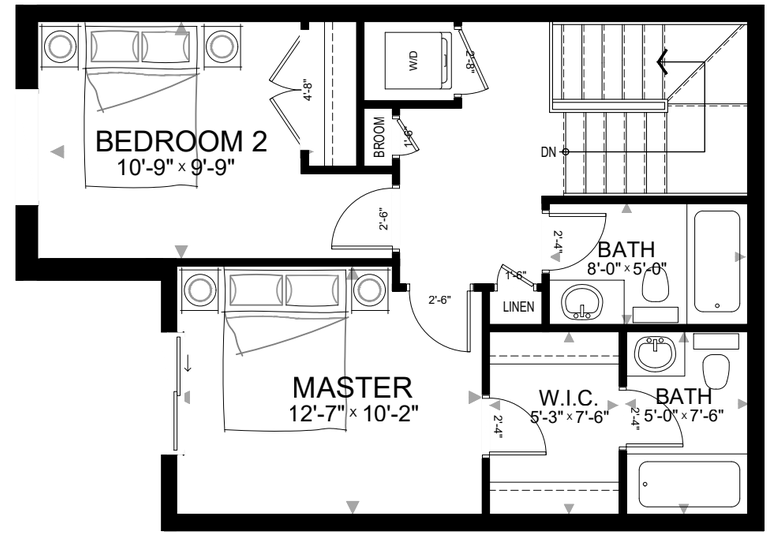
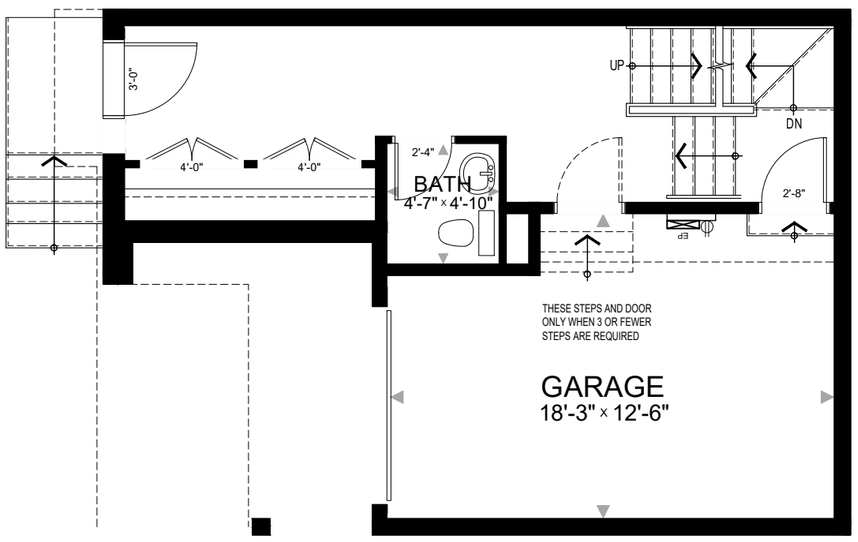


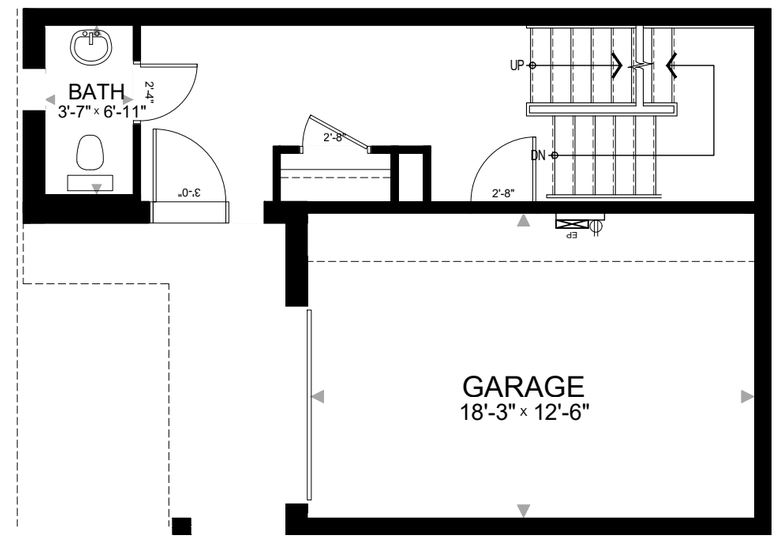
SECOND FLOOR: 580sqft



THIRD FLOOR: 580sqft



GROUND FLOOR (WITH PORCH): 213sqft



GROUND FLOOR (NO PORCH): 177sqft

INTERIOR UNIT TOTAL: 1,373sqft / 1,337sqft (no porch)

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INTERIOR UNIT PLANS

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6102 Renaud Road - Terrace Block 4 - End Units

Source: Road Traffic

Predicted free-field day time sound level: 68.63 dBA

Predicted free-field night time sound level: 61.3 dBA

Table 1.1 - Sound level at building façade

	Day (Living Area)				Night (Bedroom)			
	Wall 1	Wall 2	Wall 3	Wall 4	Wall 1	Wall 2	Wall 3	Wall 4
Source 1	68.63	68.63	68.63	68.63	61.3	61.3	61.3	61.3
Shielding Correction	0	-3	-15	-3	0	-3	-15	-3
Resultant Sound Level	68.63	65.63	53.63	65.63	61.3	58.3	46.3	58.3

Table 1.2 - Number of Components

Room	Wall 1			Wall 2			Wall 3			Wall 4			Total Number of Components
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	
Basement Floor - Lower Unit - West Facing	1	1								1	1		4
Main Floor - Lower Unit - West Facing	1	1	1							1	1		5
Second Floor - Upper Unit - West Facing	1	1	1							1	1		5
Third Floor - Upper Unit - West Facing	1	1								1	1		4
Basement Floor - Lower Unit - East Facing										1	1		2
Main Floor - Lower Unit - East Facing										1	1		2
Second Floor - Upper Unit - East Facing										1	1		2
Third Floor - Upper Unit - East Facing										1	1		2

Note: Ignore if sound level below 55 dBA

* Component AIF exceeds required value by 10 or more and has been ignored as a component

Table 1.3 - AIF

	Wall 1	Wall 2	Wall 3	Wall 4
Basement Floor - Lower Unit - West Facing	32			29
Main Floor - Lower Unit - West Facing	33			30
Second Floor - Upper Unit - West Facing	33			30
Third Floor - Upper Unit - West Facing	32			29
Basement Floor - Lower Unit - East Facing				26
Main Floor - Lower Unit - East Facing				26
Second Floor - Upper Unit - East Facing				26
Third Floor - Upper Unit - East Facing				26

Note: Max AIF selected between Day and Night

Table 1.4 - Adjustment for Geometry

	Wall 1	Wall 2	Wall 3	Wall 4
Exposure Angle	0-90	0-90	0-90	0-90
Adjustment	0			3

Table 1.5 - Required AIF

	Wall 1	Wall 2	Wall 3	Wall 4
Basement Floor - Lower Unit - West Facing	32			32
Main Floor - Lower Unit - West Facing	33			33
Second Floor - Upper Unit - West Facing	33			33
Third Floor - Upper Unit - West Facing	32			32
Basement Floor - Lower Unit - East Facing				29
Main Floor - Lower Unit - East Facing				29
Second Floor - Upper Unit - East Facing				29
Third Floor - Upper Unit - East Facing				29

Table 2.1 - Component Area (ft^2)

Room	Wall 1			Wall 2			Wall 3			Wall 4			Room Floor Area
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	
Basement Floor - Lower Unit - West Facing	7	17								14	10		464
Main Floor - Lower Unit - West Facing	60	92	23							40	135		464
Second Floor - Upper Unit - West Facing	80	116	-							40	157		468
Third Floor - Upper Unit - West Facing	33	142								33	142		468
Basement Floor - Lower Unit - East Facing										14	10		464
Main Floor - Lower Unit - East Facing										40	135		464
Second Floor - Upper Unit - East Facing										40	157		468
Third Floor - Upper Unit - East Facing										17	158		468

Note: Rosaline J. Hill Architect Inc.

Table 2.2 - Component Percentages per Room Floor Area (%)

Room	Wall 1			Wall 2			Wall 3			Wall 4		
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door
Basement Floor - Lower Unit - West Facing	2	4								3	2	
Main Floor - Lower Unit - West Facing	13	20	5							9	29	
Second Floor - Upper Unit - West Facing	17	25	-							9	34	
Third Floor - Upper Unit - West Facing	7	30								7	30	
Basement Floor - Lower Unit - East Facing										3	2	
Main Floor - Lower Unit - East Facing										9	29	
Second Floor - Upper Unit - East Facing										9	34	
Third Floor - Upper Unit - East Facing										4	34	

Table 2.3 - Component Selection

Room	Wall 1			Wall 2			Wall 3			Wall 4		
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door
Basement Floor - Lower Unit - West Facing	2 (6) 2	EW1								2 (6) 2	EW1	
Main Floor - Lower Unit - West Facing	2 (18) 2	EW1	D2							2 (15) 2	EW1	
Second Floor - Upper Unit - West Facing	2 (22) 2	EW1	-							2 (15) 2	EW1	
Third Floor - Upper Unit - West Facing	2 (6) 2	EW1								2 (6) 2	EW1	
Basement Floor - Lower Unit - East Facing										2 (6) 2	EW1	
Main Floor - Lower Unit - East Facing										2 (6) 2	EW1	
Second Floor - Upper Unit - East Facing										2 (6) 2	EW1	
Third Floor - Upper Unit - East Facing										2 (6) 2	EW1	

Note 1: Use Tables 7.2 - 7.4, "Topic 7, Enironmental Noise Assesment in Land Use Planning Manual"

Note 2: Windows are based on 2 mm glass thickness (Double Glaze Windows)

6102 Renaud Road - Terrace Block 4 - Internal Units

Source: Road Traffic

Predicted free-field day time sound level: 68.63 dBA

Predicted free-field night time sound level: 61.3 dBA

Table 1.1 - Sound level at building façade

	Day (Living Area)				Night (Bedroom)			
	Wall 1	Wall 2	Wall 3	Wall 4	Wall 1	Wall 2	Wall 3	Wall 4
Source 1	68.63	68.63	68.63	68.63	61.3	61.3	61.3	61.3
Shielding Correction	0	-3	-15	-3	0	-3	-15	-3
Resultant Sound Level	68.63	65.63	53.63	65.63	61.3	58.3	46.3	58.3

Table 1.2 - Number of Components

Room	Wall 1			Wall 2			Wall 3			Wall 4			Total Number of Components
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	
Basement Floor - Lower Unit - West Facing	1	1											2
Main Floor - Lower Unit - West Facing	1	1	1										3
Second Floor - Upper Unit - West Facing	1	1	1										3
Third Floor - Upper Unit - West Facing	1	1											2

Note: Ignore if sound level below 55 dBA

* Component AIF exceeds required value by 10 or more and has been ignored as a component

Table 1.3 - AIF

	Wall 1	Wall 2	Wall 3	Wall 4
Basement Floor - Lower Unit - West Facing	29			
Main Floor - Lower Unit - West Facing	30			
Second Floor - Upper Unit - West Facing	30			
Third Floor - Upper Unit - West Facing	29			

Note: Max AIF selected between Day and Night

Table 1.4 - Adjustment for Geometry

	Wall 1	Wall 2	Wall 3	Wall 4
Exposure Angle	0-90	0-90	0-90	0-90
Adjustment	0			

Table 1.5 - Required AIF

	Wall 1	Wall 2	Wall 3	Wall 4
Basement Floor - Lower Unit - West Facing	29			
Main Floor - Lower Unit - West Facing	30			
Second Floor - Upper Unit - West Facing	30			
Third Floor - Upper Unit - West Facing	29			

Table 2.1 - Component Area (ft^2)

Room	Wall 1			Wall 2			Wall 3			Wall 4			Room Floor Area
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	
Basement Floor - Lower Unit - West Facing	19	5											439
Main Floor - Lower Unit - West Facing	60	92	23										439
Second Floor - Upper Unit - West Facing	80	116	-										443
Third Floor - Upper Unit - West Facing	33	142											443

Note: Rosaline J. Hill Architect Inc.

Table 2.2 - Component Percentages per Room Floor Area (%)

Room	Wall 1			Wall 2			Wall 3			Wall 4		
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door
Basement Floor - Lower Unit - West Facing	4	1										
Main Floor - Lower Unit - West Facing	14	21	5									
Second Floor - Upper Unit - West Facing	18	26	-									
Third Floor - Upper Unit - West Facing	7	32										

Table 2.3 - Component Selection

Room	Wall 1			Wall 2			Wall 3			Wall 4		
	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door	Window	Wall	Door
Basement Floor - Lower Unit - West Facing	2 (6) 2	EW1										
Main Floor - Lower Unit - West Facing	2 (6) 2	EW1	D2									
Second Floor - Upper Unit - West Facing	2 (15) 2	EW1	-									
Third Floor - Upper Unit - West Facing	2 (6) 2	EW1										

Note 1: Use Tables 7.2 - 7.4, "Topic 7, Enironmental Noise Assesment in Land Use Planning Manual"

Note 2: Windows are based on 2 mm glass thickness (Double Glaze Windows)

Terrace home Block 4 - End Unit

Basement Floor - Lower Unit - East Facing

Sample Calculation:	68.63	
	61.3	

	DAY TIME		NIGHT TIME	
Table 1.1	68.63		61.3	
Wall 4 dBA:	65.63	dBA	58.3	dBA

Table 1.2

Total # of Components:	2	2

Table 1.3

Equation:	=65.63-45+10*LOG(2)+2	=58.3-40+10*LOG(2)+2
AIF:	26	23
	Use higher value	

Table 1.4

Exposure Angle:	0-90
Adjustement:	3

Table 1.5

Equation:	= AIF + Adjustment
Required AIF:	29

Table 2.1

Floor Area:	464	ft
Wall Area:	10	ft
Door Area:	0	ft
Window Area:	14	ft

Table 2.2

Wall % of Floor Area:	2	%
Wall % of Door Area:	0	%
Window % of Floor Area:	3	%

Table 2.3

Wall Component:	EW1	
Window Component:	-	
Window Component:	2 (6) 2	

Appendix C : NOISE WARNING CLAUSES

WARNING CLAUSES

The following warning clauses may be used individually or in combination:

Generic Indoor:

Indoor environment - $L_{eq}(16)$ greater than 55 dBA and less than or equal to 65 dBA or ($L_{eq}(8)$ greater than 50dBA and less than or equal to 60 dBA

To help address the need for sound attenuation this development has been designed so as to provide an indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- the provision for adding central air conditioning at the occupant's discretion.

Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City of Ottawa and the Ministry of the Environment Conservation and Parks.

Extensive Mitigation of Indoor Area:

Indoor environment - $L_{eq}(16)$ greater than 65 dBA or ($L_{eq}(8)$ greater than 60dBA

To help address the need for sound attenuation this development has been designed so as to provide an indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- multi-pane glass;
- exterior wall insulation;
- a forced central air conditioning system.

To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features.

This dwelling unit has been supplied with a forced central air conditioning system and other measures 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 City of Ottawa and the Ministry of the Environment Conservation and Parks.

Source: City of Ottawa - Environmental Noise Control Guidelines, January 2016 and Ontario Ministry of the Environment, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning Publication NPC-300, Queen's Printer for Ontario, 2013

Appendix D ORNAMENT TECHNICAL DOCUMENT EXCERPTS

5.2 Road Gradient Adjustment

This adjustment is applied to heavy trucks travelling in the upgrade direction when road gradient is more than 2 % and the change in elevation is more than 6 m. The adjustment is in the form of a multiplication factor K_g applied to number of trucks travelling up the grade. Values of this factor are tabulated in Table 1.

5.3 Traffic Volume Adjustment

The adjustment to the traffic volume V is given by

$$A_v = 10 \log(V/V_{ref}) = 10 \log (V/40) \qquad ...(12)$$

where V_{ref} is the reference traffic volume, V_{ref} = 40 vph.

Figure 2 and Table 2 present the volume adjustment.

5.4 Pavement Surface Adjustment

This adjustment is applicable when the posted speed limit is equal or greater than 80 km/h. The values of the adjustment are given in Table 12.

5.5 Distance Adjustment

The distance adjustment, which accounts both for the geometric spreading as well as the effect of ground surface, is given by the following expression:

$$A_d = 10 (1 + \alpha) \log(D_{ref}/D) \qquad ... (13)$$

where

1. Reflective Surfaces (hard ground)

   $\alpha = 0$

2. Absorptive Surfaces (soft ground)

   $\alpha = 0.66$, $h_{eff} \leq 3$ m

   $\alpha = 0.75 \left(1 - \frac{h_{eff}}{25} \right)$, $3 < h_{eff} \leq 25$ m

   $\alpha = 0$, $h_{eff} > 25$ m

   where α is the ground absorption coefficient and h_{eff} is the total effective height.

Distance adjustment values are shown in Table 7 and Figure 3.

5.5.1 Reflective Surfaces

Water surfaces and hard ground surfaces (e.g. all pavements, and hard packed gravel, earth, etc.) are considered to be sound reflective. If more than half of the ground surface between the centre line of the traffic lanes under consideration and the point of reception is sound reflective, the ground absorption coefficient, α, is assumed to be zero.

5.5.2 Absorptive Surfaces

Soft ground surfaces such as ploughed fields, or ground covered with grass, shrubs, or other forms of vegetation are considered to be sound absorptive. If more than half of the ground surface between the centre line of the traffic lanes under consideration and the point of reception is sound absorptive, the ground absorption coefficient is assumed to be given by the expression for absorptive ground, varying between 0 and 0.66.

TABLE 7

Adjustment for Distance from Source to Point of Reception

Total Effect Height (m)	Ground Absorp Coeff α	Perpendicular Distance from Source to Point of Reception (m)												
		15	20	30	40	50	60	80	100	120	150	200	250	500
		Adjustment in dBA for Non-Reflective Surfaces												
1.5	0.66	0.0	-2.1	-5.0	-7.1	-8.7	-10.0	-12.1	-13.7	-15.0	-16.6	-18.7	-20.3	-25.3
2.0	0.66	0.0	-2.1	-5.0	-7.1	-8.7	-10.0	-12.1	-13.7	-15.0	-16.6	-18.7	-20.3	-25.3
3.0	0.66	0.0	-2.1	-5.0	-7.1	-8.7	-10.0	-12.1	-13.7	-15.0	-16.6	-18.7	-20.3	-25.3
4.0	0.63	0.0	-2.0	-4.9	-6.9	-8.5	-9.8	-11.9	-13.4	-14.7	-16.3	-18.3	-19.9	-24.8
6.0	0.57	0.0	-2.0	-4.7	-6.7	-8.2	-9.5	-11.4	-12.9	-14.2	-15.7	-17.7	-19.2	-23.9
8.0	0.51	0.0	-1.9	-4.5	-6.4	-7.9	-9.1	-11.0	-12.4	-13.6	-15.1	-17.0	-18.4	-23.0
10.0	0.45	0.0	-1.8	-4.4	-6.2	-7.6	-8.7	-10.5	-11.9	-13.1	-14.5	-16.3	-17.7	-22.1
12.0	0.39	0.0	-1.7	-4.2	-5.9	-7.3	-8.4	-10.1	-11.5	-12.6	-13.9	-15.6	-17.0	-21.2
16.0	0.27	0.0	-1.6	-3.8	-5.4	-6.6	-7.6	-9.2	-10.5	-11.5	-12.7	-14.3	-15.5	-19.3
20.0	0.15	0.0	-1.4	-3.5	-4.9	-6.0	-6.9	-8.4	-9.5	-10.4	-11.5	-12.9	-14.1	-17.5
25.0 and up	0.00	0.0	-1.2	-3.0	-4.3	-5.2	-6.0	-7.3	-8.2	-9.0	-10.0	-11.2	-12.2	-15.2
		Adjustment in dBA for Reflective Surfaces												
all	0.00	0.0	-1.2	-3.0	-4.3	-5.2	-6.0	-7.3	-8.2	-9.0	-10.0	-11.2	-12.2	-15.2

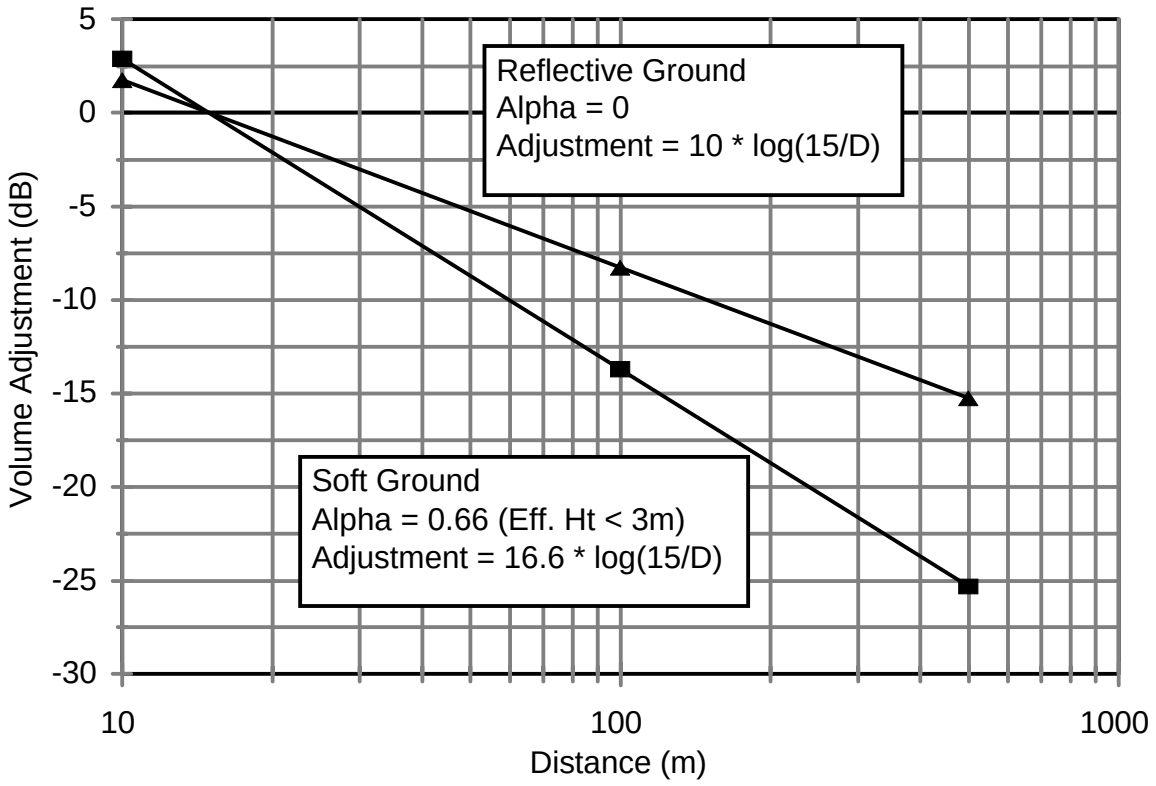

Figure 3: Distance Adjustment

Appendix E GRADING PLAN