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437 Donald B. Munro Drive

Noise Impact Assessment

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Noise Impact Assessment

437 Donald B. Munro Drive

Prepared by:

NOVATECH

240 Michael Cowpland Drive, Suite 200
Ottawa, Ontario, K2M 1P6

May 31, 2019

Ref: R-2019-102
Novatech File No. 119023

May 31, 2019

BY COURIER

City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: Jenny Kluge, Planner

**Reference: 437 Donald B. Munro Drive
Noise Impact Assessment
Our File No.: 119023**

Please find enclosed three (3) copies of the 'Noise Impact Assessment' for 437 Donald B. Munro Drive.

Please contact the undersigned with any questions, or if you require additional information.

Sincerely,

NOVATECH



Lucas Wilson, P.Eng.
Project Coordinator

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1.0 INTRODUCTION

The subject site is located within the Village of Carp at 437 Donald B. Munro Drive. The site is approximately 0.17ha and is bounded by Donald B. Munro Drive to the north, existing residential/commercial buildings to the east and west, and a rail corridor and Carp River to the south. A key plan of the area is presented as **Figure 1-1**.

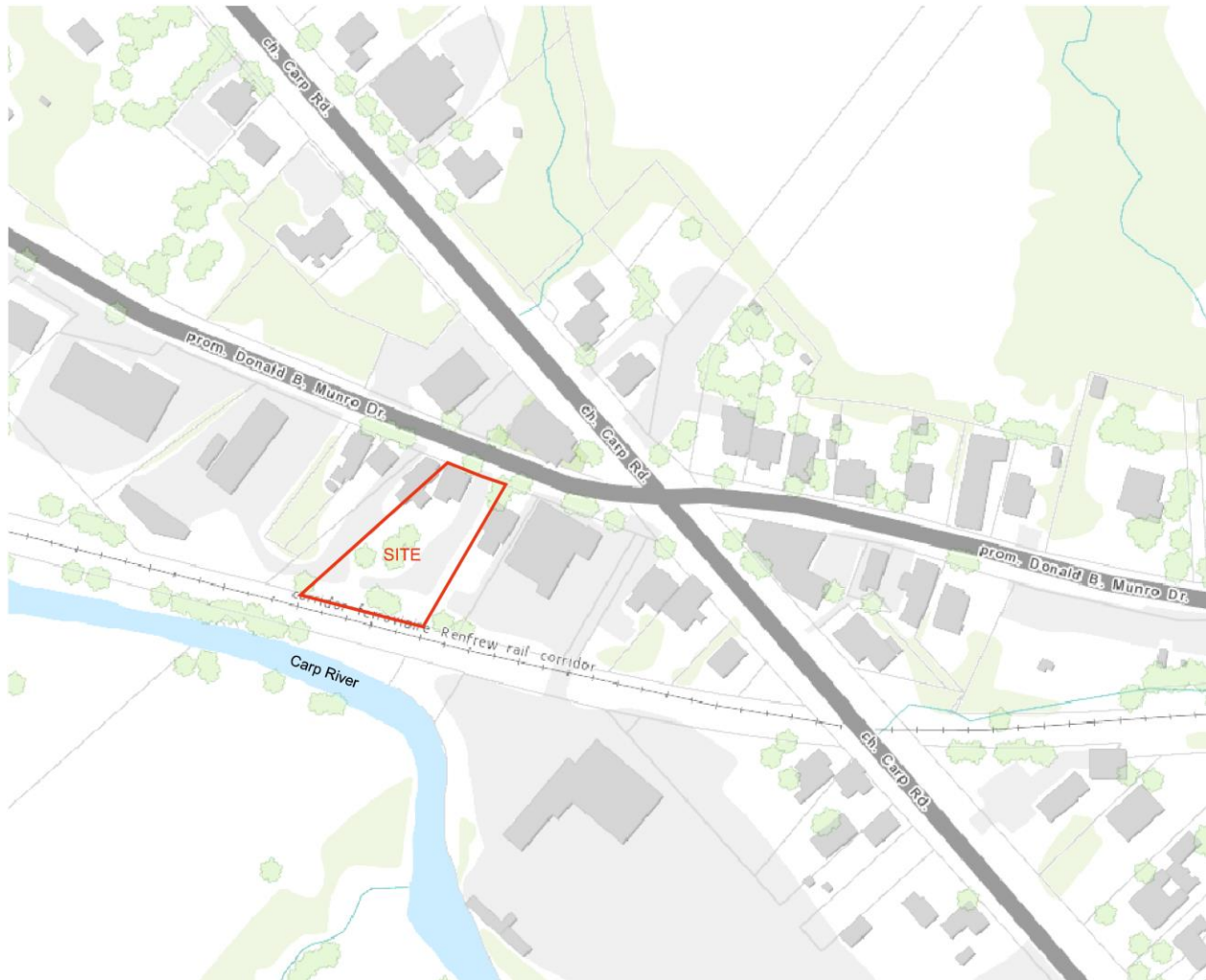
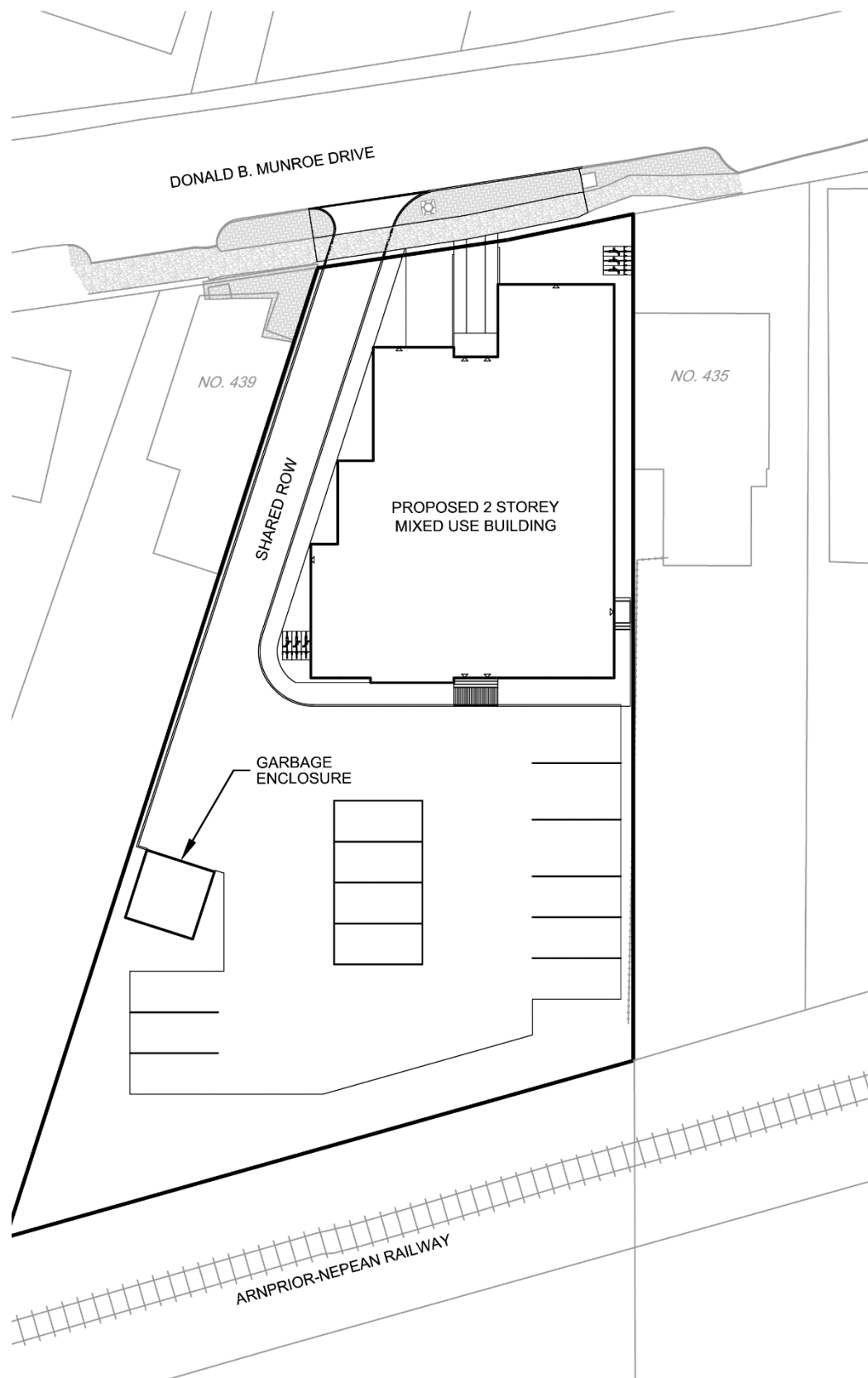


Figure 1-1 Key Plan

The proposed development will consist of a 2-storey mixed use building with two commercial units on the first floor and two apartment units on the second floor. The proposed site plan is shown below in

Figure 1-2.

This report assesses potential noise sources that could affect the development, analyses the sound levels and outlines any necessary noise attenuation requirements for compliance with the City of Ottawa Environmental Noise Control Guidelines (ENCG) and the MOE Environmental Noise Guidelines (MOE Publication NPC-300).

**Figure 1-2 Site Plan**

2.0 CITY OF OTTAWA ENVIRONMENTAL NOISE CONTROL GUIDELINES

2.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, railways and transitways as expressed in the City of Ottawa Official Plan (May 2003). These policies are supported by the Environmental Noise Control Guidelines (ENCG) which is a technical document that outlines the specific sound level criteria. The City of Ottawa's *Environmental Noise Control Guidelines (ENCG)*, January, 2016 and the Ministry of Environment's *Environmental Noise Guidelines, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300* have been used for the purpose of this report. As per Section 2.2 of the City of Ottawa Noise Control Guidelines (2016), unless otherwise noted, developments should be consistent with NPC-300 (MOE publication, 2013).

The areas that must be assessed for acoustic protection include the Outdoor Living Area (OLA) and the Outdoor Plane of Window (POW).

These locations are defined as:

- Outdoor Living Area (OLA):** The Outdoor Living Area is defined as that part of the outdoor amenity area provided for the quiet enjoyment of the outdoor environment during the daytime period. These amenity areas are typically backyards, gardens, terraces, patios and common outdoor living areas. The OLA noise target for traffic and rail noise sources is 55 dBA. This criterion may be exceeded by an amount not greater than 5 dBA, subject to justification and the use of a Warning Clause. OLA noise levels are analysed at 3.0m from the building façade, 1.5m above grade.
- Plane of Window (POW):** The plane of window is defined as the indoor living space where the sound levels will affect the living room area during daytime hours and bedrooms during night time hours. The residential Plane of Window noise target for traffic and rail noise sources is 55 dBA during the day and 50 dBA at night. If this criterion is exceeded, the property may be subject to building component analysis and warning clauses. The indoor noise impact for rail and road noise must be assessed separately and the sound criterion is broadly summarized in **Table 2-1**, **Table 2-2** and **Table 2-3**. POW noise levels are analysed 1.5m above grade for the first floor commercial units and 6.0m above grade for the second floor apartment units.

Table 2-1 City of Ottawa Outdoor Plane of Window Sound Level Criteria

TIME PERIOD	RECEIVER LOCATION	SOUND LEVEL CRITERIA
Daytime (07:00 - 23:00 hrs)	Plane of Living Room Window	55 dBA
Night time (23:00 - 07:00 hrs)	Plane of Bedroom Window	50 dBA

Compliance with the outdoor sound level criteria generally ensures compliance with the indoor sound level criteria which is summarized below in **Table 2-2**.

Table 2-2 Indoor Sound Level Criteria Surface Transportation

TIME PERIOD	RECEIVER LOCATION	SOUND LEVEL CRITERIA	
		Roadways, Transitways and LRT	Rail (diesel engines/ locomotives)
Daytime (07:00 - 23:00 hrs)	General offices, reception area, retails stores, etc.	50 dBA	45 dBA
Daytime (07:00 - 23:00 hrs)	Living/Dining Rooms of residential dwelling units , hospitals, schools, nursing homes, day-care centres, theatres, places of worship, individual or semiprivate offices, conference rooms etc.	45 dBA	40 dBA
Night Time (23:00 - 07:00 hrs)	Sleeping quarters of residential units , hospitals, nursing homes, senior citizen homes, etc.	40 dBA	35 dBA

Table 2-3 MOE Façade Material Requirements for Rail Noise Only

ASSESSMENT LOCATION	DISTANCE TO RAILWAY (m)	SOUND LEVEL	FAÇADE MATERIAL REQUIREMENT
PLANE OF BEDROOM WINDOW	Less than 100m	Leq _{24hr} Less than or equal to 60 dBA	No additional requirement
		Leq _{24hr} greater than 60 dBA	Brick veneer or acoustically equivalent
	Greater than 100m	Leq _{24hr} less than or equal to 60 dBA	No additional requirement
		Leq _{24hr} greater than 60 dBA	No additional requirement

2.2 Noise Attenuation Requirements

When sound levels are predicted to be less than the specified criteria for daytime and night time conditions, no attenuation measures are required on the part of the proponent. As the noise criteria are exceeded, a combination of attenuation measures is recommended by the City of Ottawa and the MOE to modify the development environment.

These attenuation measures may include any or all of the following:

- Distance setback with soft ground;
- Insertion of noise insensitive land uses between the source and sensitive receptor;
- Orientation of building to provide sheltered zone;
- Construction of a noise barrier wall and/or berm;
- Installation of a forced air ventilation system with provision for central air;
- Installation of central air;
- Acoustically selected building façade components

2.2.1 Noise Barrier

Noise barriers should only be used when other noise control measures have been considered, and there is no other alternative. When noise levels exceed 55 dBA in the Outdoor Living Area, control measures (barriers) may be required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

The noise barriers are to be compliant with the City standards for noise barriers and have the following characteristics.

- Minimum height of 2.2m;
- Maximum height of 2.5m (unless approved by the City of Ottawa);
- Situated 0.30m inside the private property;
- A surface mass density not less than 20kg/sq.m; and
- No holes or gaps.

2.2.2 Ventilation Requirements

A forced air heating system with provision for a central air conditioning system is required if the daytime surface transportation noise levels are between 55 dBA and 60 dBA and/or night time surface transportation noise levels are between 50 dBA and 60 dBA.

The installation of a central air conditioning system is required when the daytime noise level exceeds 65 dBA and/or night time noise levels exceed 60 dBA for surface transportation noise sources.

2.2.3 Building Component Assessment

When noise levels exceed 65 dBA (daytime) or 60 dBA (night time) for surface transportation noise sources the exterior cladding system of the building envelope must be acoustically assessed to ensure the indoor sound criteria is achieved. This includes analysis of the exterior wall, door, and/or glazing system specifications as appropriate.

The NRC research *Acoustic Insulation Factor: A Rating for the Insulation of Buildings against Noise* (June 1980, JD Quirt) is used to assess the building components and the required acoustic insulation factor (AIF). This method is recognized by the City of Ottawa.

The required AIF is based on the Outside L_{eq} , Indoor L_{eq} required, and the number of exterior façade components.

Minimum Required AIF = Outside L_{eq} – Indoor L_{eq} + $\log_{10}$ (Number of Components) + 2dB

Where, N = Number of components (walls, windows and roof);
L = Sound Level expressed on a common decibel scale.

2.2.4 Warning Clauses

When predicted noise levels exceed the specified criteria, the City of Ottawa and the MOE recommend warning clauses be registered as a notice on title and incorporated into the sales agreements to warn potential purchaser/buyers/tenants of the possible elevated noise levels.

The following typical warning clauses are extracted from Section C8.1 of the MOE NPC-300 document.

Warning Clause Type A

“Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

Warning Clause Type B

“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

Warning Clause Type C

“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant 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.”

Warning Clause Type D

“This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City’s and the Ministry of the Environment’s noise criteria.”

2.2.5 Summary of Noise Attenuation Measure Requirements

Table 2-4 summarizes the noise attenuation measure requirements and warning clauses should sound criteria be exceeded.

Table 2-4 Outdoor, Ventilation and Warning Clause Requirements (NPC-300)

Assessment Location	L _{eq} (dBA)	Outdoor Control Measures	Indoor Control Measures		Warning Clause
			Ventilation Requirements	Building Components	
Outdoor Living Area (OLA)	Less than 55	None required	N/A	N/A	None required
	Between 55 and 60	Control measures (barriers) may not be required but should be considered	N/A	N/A	Required if resultant L _{eq} exceeds 55 dBA Type A
	More than 60	Barriers required	N/A	N/A	Required if resultant L _{eq} exceeds 55 dBA Type B
Plane of Living Room Window (POW)	Less than 55	N/A	None Required	None Required	None Required
	Between 55 and 65	N/A	Forced air heating with provision for central air conditioning	None Required	Required Type C
	More Than 65	N/A	Central Air Conditioning	Acoustical performance of the windows and walls should be specified	Required Type D
Plane of Bedroom Window (POW)	Less than 50	N/A	None Required	None Required	None Required
	Between 50 and 60	N/A	Forced air heating with provision for central air conditioning	None Required	Required Type C
	More than 60	N/A	Central Air Conditioning	Acoustical performance of the windows and walls should be specified	Required Type D

3.0 NOISE SOURCES

The City of Ottawa Official Plan and Environmental Noise Control Guidelines (ENCG) stipulate that a noise impact assessment is required when a noise sensitive development is within proximity to a surface transportation (road or rail), stationary and aircraft noise sources.

The following criteria are applicable to the subject site:

- Within 100m from the right-of-way of an existing/proposed arterial/collector;
- Within 300m from the right-of-way of an existing/proposed rail corridor;

Figure 3-1 shows the noise sources that have an impact on this development. Donald B. Munro Drive (Collector) and Carp Road (Arterial) are located within 100m of the development and east-west running rail corridor is located within 300m of the development.

3.1 Donald B. Munro (Collector)

Donald B. Munro Drive is classified as a 2-Lane Rural Collector (2-RCU) Roadway in the 2013 Transportation Master Plan. As no Annual Average Daily Traffic (AADT) value is specified for this type of road in the ENCG, a value of 8,000 corresponding to a 2-Lane Urban Collector (2-UCU) was selected.

As per Table B1 of Appendix B of the ENCG, **Table 3-1** outlines the traffic parameters used to calculate the sound levels for the development.

Table 3-1 Donald B. Munro Drive Noise Parameters

Roadway Classification	2-Lane Rural Collector
Annual Average Daily Traffic (AADT)	8,000 veh/day
Day/Night Split (%)	92/8
Heavy Trucks (%)	5
Medium Trucks (%)	7
Posted Speed Limit	40 km/hr
Road Gradient	1.0%

3.2 Carp Road (Arterial)

Carp Road is classified as a 2-Lane Rural Arterial (2-RAU) Roadway in the 2013 Transportation Master Plan. An Annual Average Daily traffic value of 15,000 is specified for this type of road.

As per Table B1 of Appendix B of the ENCG, **Table 3-2** outlines the traffic parameters used to calculate the sound levels for the development.

Table 3-2 Carp Road Noise Parameters

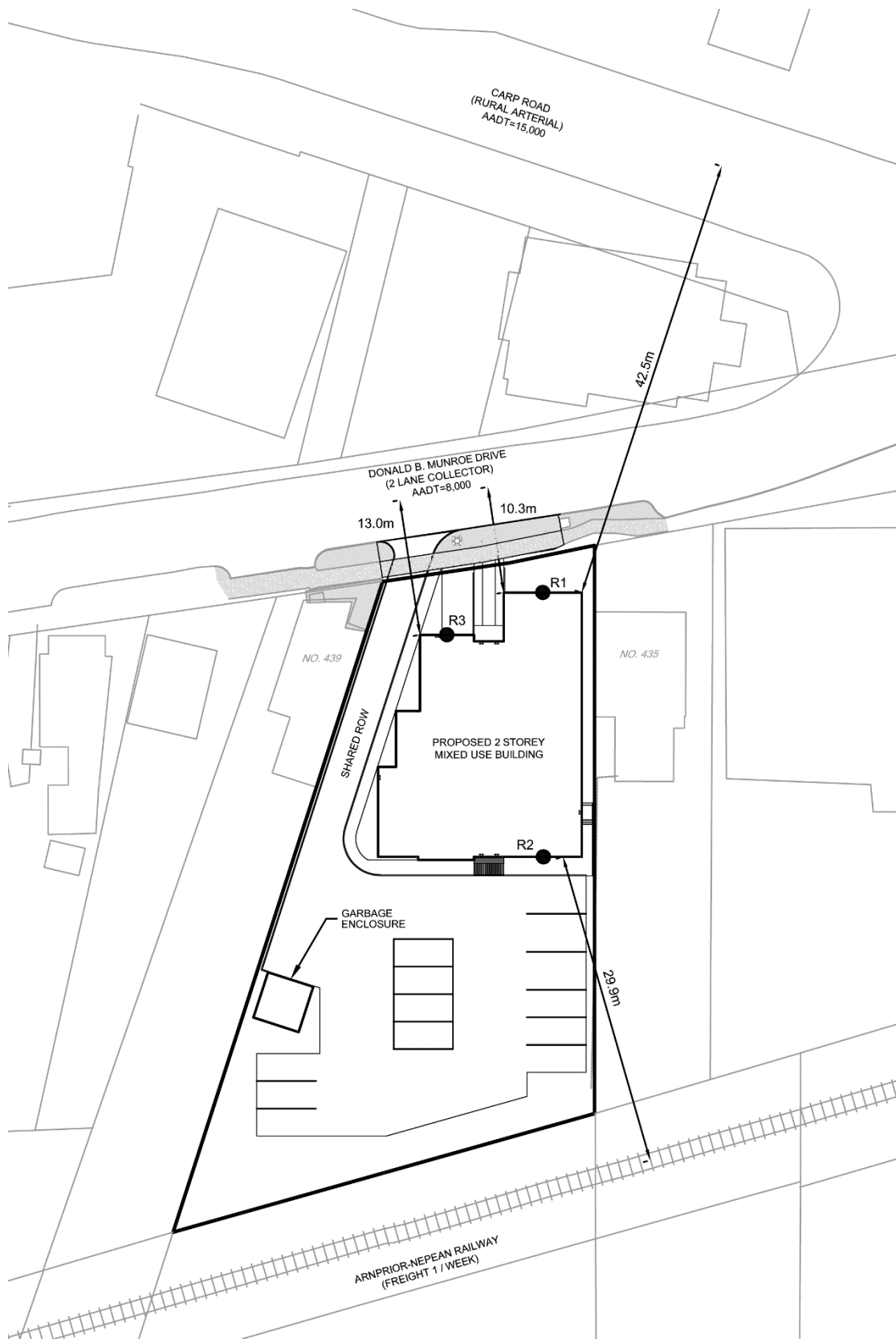
Roadway Classification	2-Lane Rural Collector
Annual Average Daily Traffic (AADT)	8,000 veh/day
Day/Night Split (%)	92/8
Heavy Trucks (%)	5
Medium Trucks (%)	7
Posted Speed Limit	40 km/hr
Road Gradient	1.0%

3.3 Arnprior-Nepean Railway Co.

An east-west running rail line is located approximately 30m south of the site. The Arnprior-Nepean Railway Co. owned by Nylene Canada Inc. operates one train per week to Arnprior. The train is powered by 1 locomotive that pulls three to four freight cars, all of which travels at approximately 16 km/hr (10 mph). Railway noise modelling parameters were acquired from Nylene Canada Inc., **Appendix B**, and are summarized below.

Table 3-3 Railway Noise Parameters

	Engine Type	Welded Track	Speed	Train Frequency per Day	Cars per Train	Locomotives per Train
Freight	Diesel	No	16 kph	1 (week)	3-4	1

**Figure 3-1 Noise Source**

4.0 NOISE LEVEL PREDICTIONS

4.1 Modelling

Noise levels are calculated using the STAMSON computer program, version 5.03. Road data is input into the program as applicable, whereupon the program calculates an A-weighted 16 hour L_{eq} noise level for the daytime and an 8 hour L_{eq} noise level for the night time. Both receiver locations R1 and R3 are within 15m of the centre line of Donald B. Munro Drive. The STAMSON computer program has a minimum distance of 15.0m to be used in the model calculations. The modelled L_{eq} noise levels at R1 and R3 will be adjusted using the following equation taken from the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) Technical document.

$$L_{eq} = L_{ref} + A_d$$

Where,

L_{ref} is the Reference Sound Level

A_d is the Distance Adjustment.

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

$\alpha = 0$ (For Reflective Surface)

$$\text{R1 (Commercial): } A_d = 10(1 + 0)\log(15/10.6)$$

$$A_d = 1.50 \text{ dBA}$$

$$\begin{aligned} L_{eq} &= 64.68 \text{ dBA} + 1.50 \text{ dBA} \\ &= 66.18 \text{ dBA} \end{aligned}$$

$$\text{R1 (Residential): } A_d = 10(1 + 0)\log(15/13.3)$$

$$A_d = 0.52 \text{ dBA}$$

$$\begin{aligned} L_{eq} &= 64.67 \text{ dBA} + 0.52 \text{ dBA} \\ &= 65.19 \text{ dBA (Daytime)} \end{aligned}$$

$$\begin{aligned} L_{eq} &= 57.07 \text{ dBA} + 0.52 \text{ dBA} \\ &= 57.59 \text{ dBA (Night-time)} \end{aligned}$$

$$\text{R3 (Commercial): } A_d = 10(1 + 0)\log(15/13.3)$$

$$A_d = 0.52 \text{ dBA}$$

$$\begin{aligned} L_{eq} &= 64.32 \text{ dBA} + 0.52 \text{ dBA} \\ &= 64.84 \text{ dBA} \end{aligned}$$

$$\text{R3 (Residential): } A_d = 10(1 + 0)\log(15/13.3)$$

$$A_d = 0.52 \text{ dBA}$$

$$\begin{aligned} L_{eq} &= 64.36 \text{ dBA} + 0.52 \text{ dBA} \\ &= 64.88 \text{ dBA (Daytime)} \end{aligned}$$

$$\begin{aligned} L_{eq} &= 56.76 \text{ dBA} + 0.52 \text{ dBA} \\ &= 57.28 \text{ dBA (Night-time)} \end{aligned}$$

The results of these computer calculations are presented in **Appendix A** and summarized in **Table 4-1**.

Table 4-1 POW Noise Level Summary

LOCATION	PLANE OF WINDOW (POW) NOISE LEVEL – L_{eq} - (dBA)	
	DAYTIME	NIGHT TIME
R1 (1 st Floor – Commercial)	66.18	-
R1 (2 nd Floor - Residential)	65.19	57.59
R2 (1 st Floor - Commercial)	49.41	-
R2 (2 nd Floor - Residential)	51.22	41.72
R3 (1 st Floor - Commercial)	64.84	-
R3 (2 nd Floor - Residential)	64.88	57.28

4.2 Outdoor Control Measures

The development does not contain any shared amenity space and therefore no outdoor control measures are required.

4.3 Indoor Control Measures

The residential unit located at R3 (west side of building) requires forced air heating with provision for central air conditioning and a warning clause Type C as the daytime plane of window noise level is above 55 dBA.

Typical wording for Type C warning clause:

“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant 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.”

The residential unit located at R1 (east side of building) requires central air conditioning and associated warning clause Type D.

Typical wording for Type D warning clause:

“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 noise levels are within the City’s and the Ministry of the Environment’s noise criteria.”

4.4 Building Component Assessment

The sound levels at R1 for both the residential and commercial units are above the daytime allowance of 65 dBA therefore, an analysis of the cladding system is warranted. To comply with the ENCG policies, the building envelope will require a minimum AIF rating to provide the indoor noise levels as shown above in **Table 2-2**.

Required AIF:

$$\text{Commercial AIF} = 66.18 \text{ dBA} - 50 \text{ dBA} + 10\log(3) + 2 \text{ dBA} = 23$$

$$\text{Residential AIF} = 65.19 \text{ dBA} - 45 \text{ dBA} + 10\log(3) + 2 \text{ dBA} = 27$$

To comply with the ENCG policies, the building components for the commercial unit at receiver location R1 will require a minimum AIF of 23 to provide the appropriate indoor noise levels. The building components for the residential unit at receiver location R1 will require a minimum AIF of 27 to provide the appropriate indoor noise levels.

An EW1 wall section provides an AIF range of 29 to 39 depending on the percentage of exterior wall area to total floor area of the room. This range exceeds the required AIF for both the commercial and residential units. A standard window section of 6mm glazing x 13mm air space x 6mm glazing provides an AIF range of 27 to 40 depending on the window area as a percentage of total floor area of the room. This range meets or exceeds the required AIF for both commercial and residential units. As long as the building components meet the minimum requirements of the Ontario Building Code, the indoor noise levels will comply with the ENCG.

5.0 CONCLUSIONS AND RECOMMENDATIONS

To meet the requirements for compliance with the City of Ottawa Environmental Noise Control Guidelines and the MOE Environmental Noise Guideline the following measures are required.

Outdoor Control Measures

No attenuation measures are required as there is no outdoor amenity space.

Indoor Control Measures

The residential unit at R3 (west side of building) will require warning clause Type C. The residential unit at R1 (east side of building) will require warning clause Type D. Warning clause locations are shown below in **Figure 5-1**.

Building Component Assessment

The indoor noise levels for commercial and residential units will comply with the ENCG if the building components meet the minimum requirements of the Ontario Building Code.

Warning Clauses

Warning clauses are to be placed on title and in the purchase and sale agreements as indicated above and in **Figure 5-1**. The following typical warning clauses are extracted from Section C8.1 of the MOE NPC-300 document.

Warning Clause Type 'C'

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant 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."

Warning Clause Type 'D'

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor noise levels are within the City's and the Ministry of the Environment's noise criteria."

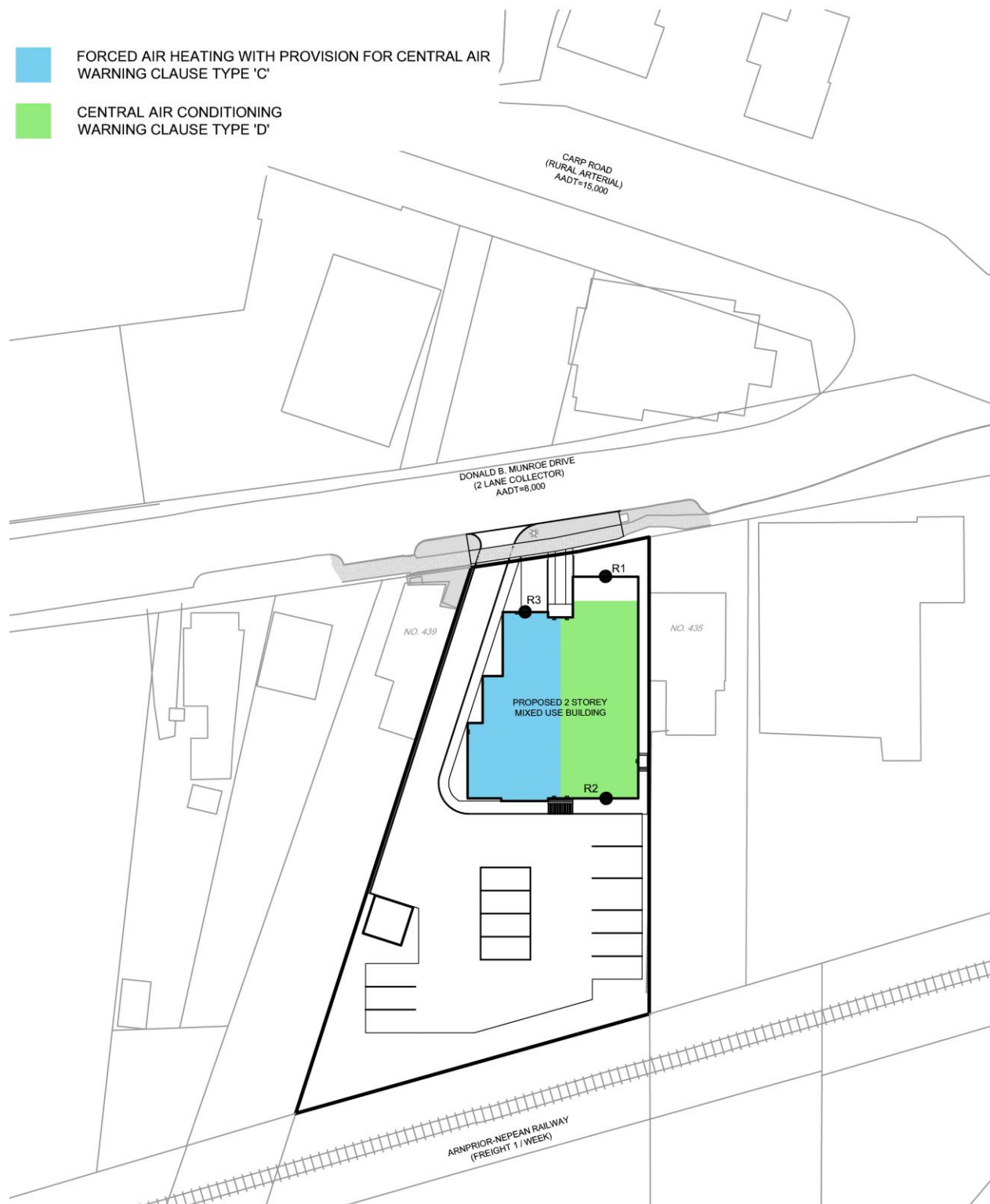


Figure 5-1 Construction Requirements and Warning Clauses

If you have any questions or comments with regards to this report, please do not hesitate to contact the undersigned.

Respectfully issued,

NOVATECH

Prepared By:



Lucas Wilson, P.Eng.
Project Coordinator

Reviewed By:

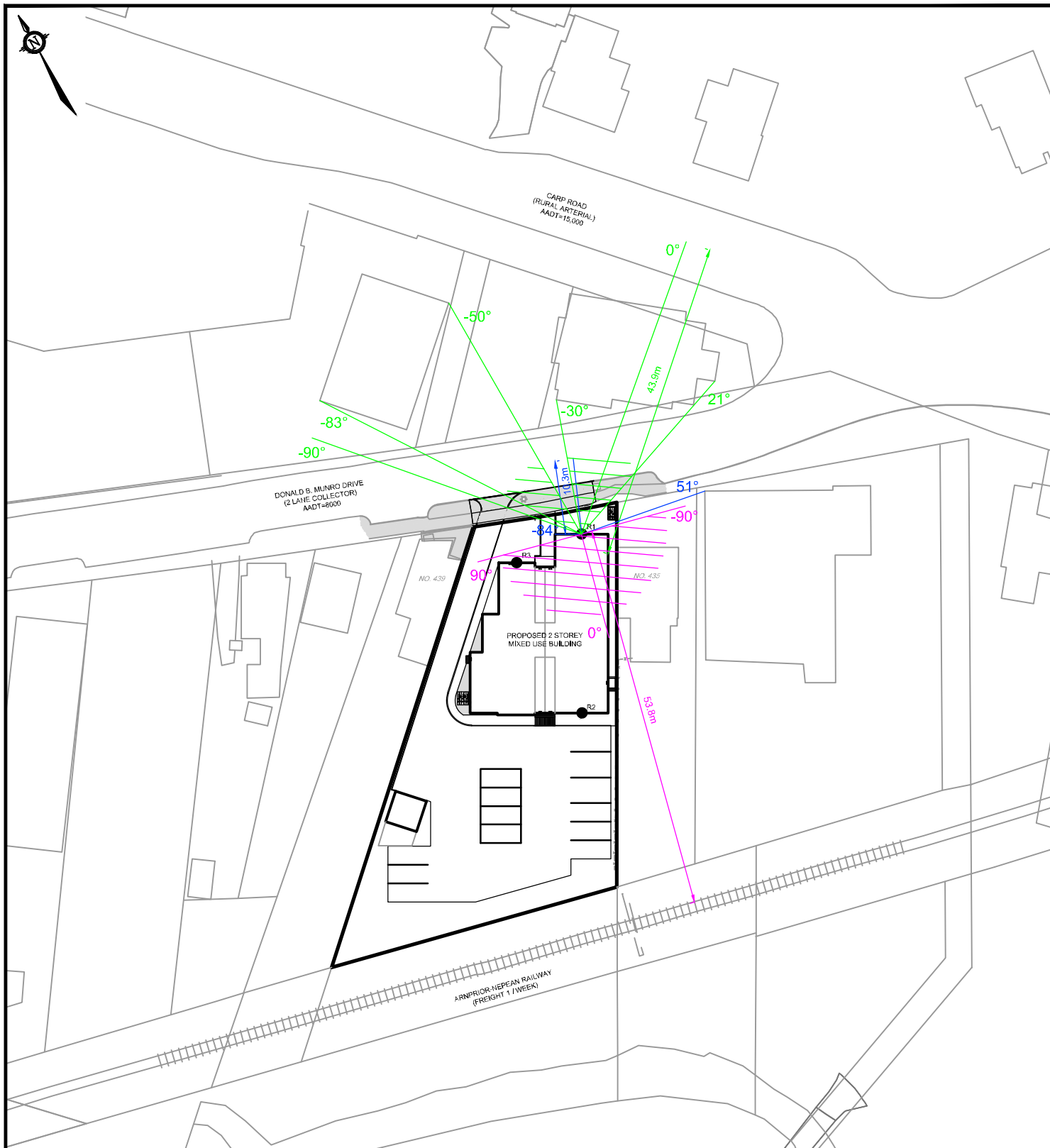


Mark Bissett, P.Eng.
Senior Project Manager

APPENDIX A

Receiver Location Figures Stamson Model Output

M:\2019\119023\CAD\Design\Noise\119023-N-Report.dwg, FIG 1, May 30, 2019 - 2:58pm, Iwilson



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-  CARP ROAD BARRIER ANGLE
-  ARNPRIOR-NEPEAN RAILWAY BARRIER ANGLE
-  CARP ROAD NOISE ANGLE
-  DONALD B. MUNRO DRIVE NOISE ANGLE
-  ARNPRIOR-NEPEAN RAILWAY NOISE ANGLE
-  RECEIVER LOCATION

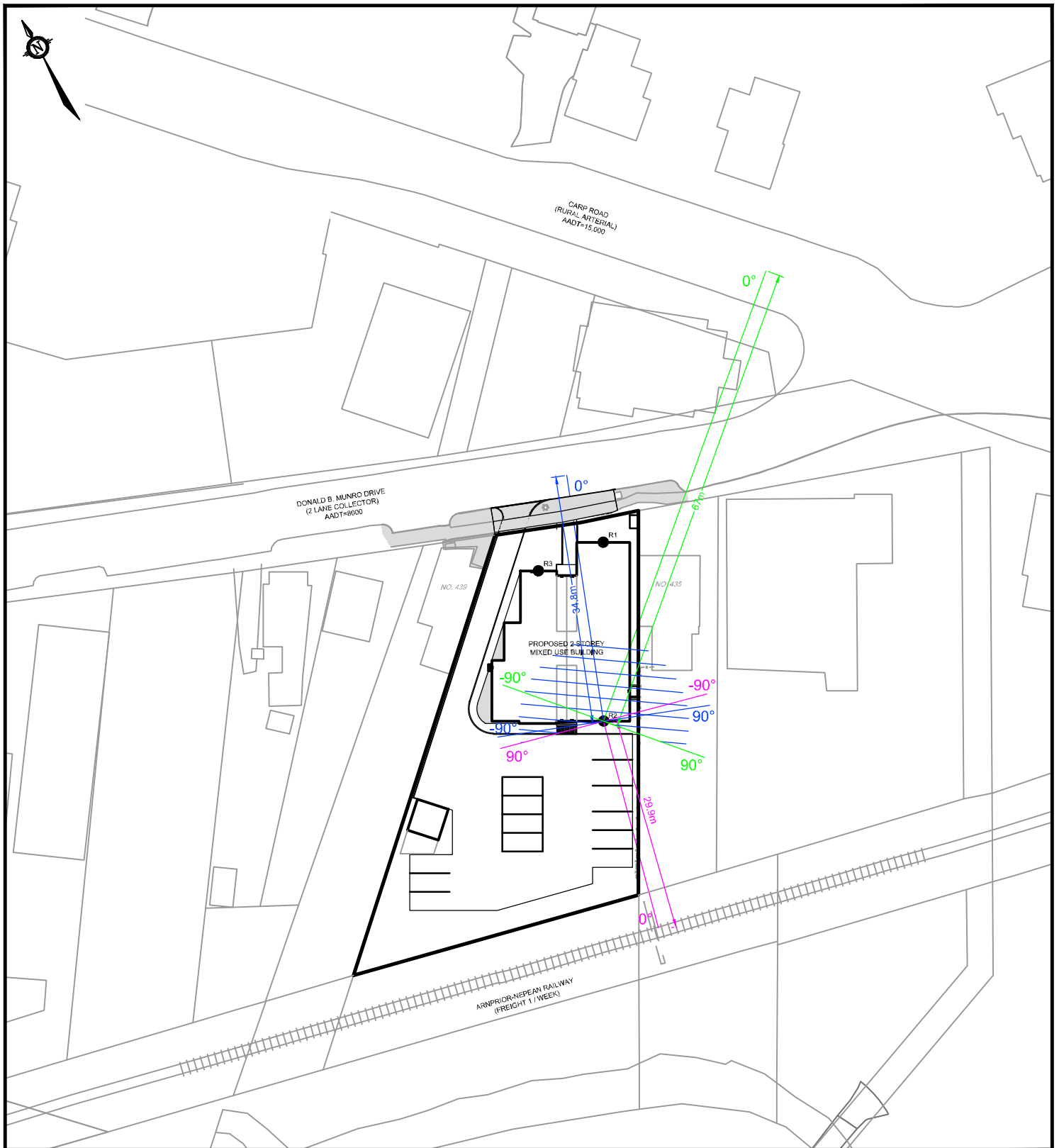
437 DONALD B. MUNRO DRIVE

RECEIVER LOCATION R1

SCALE 1 : 750 

DATE MAY 2019 JOB 119023 FIGURE FIG-1

M:\2019\119023\CAD\Design\Figures\Noise\119023-N-Report.dwg, FIG 2, May 30, 2019 - 3:00pm, IWilson



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- DONALD B. MUNRO/CARP ROAD BARRIER ANGLE
- CARP ROAD NOISE ANGLE
- DONALD B. MUNRO DRIVE NOISE ANGLE
- ARNPRIOR-NEPEAN RAILWAY NOISE ANGLE
- RECEIVER LOCATION

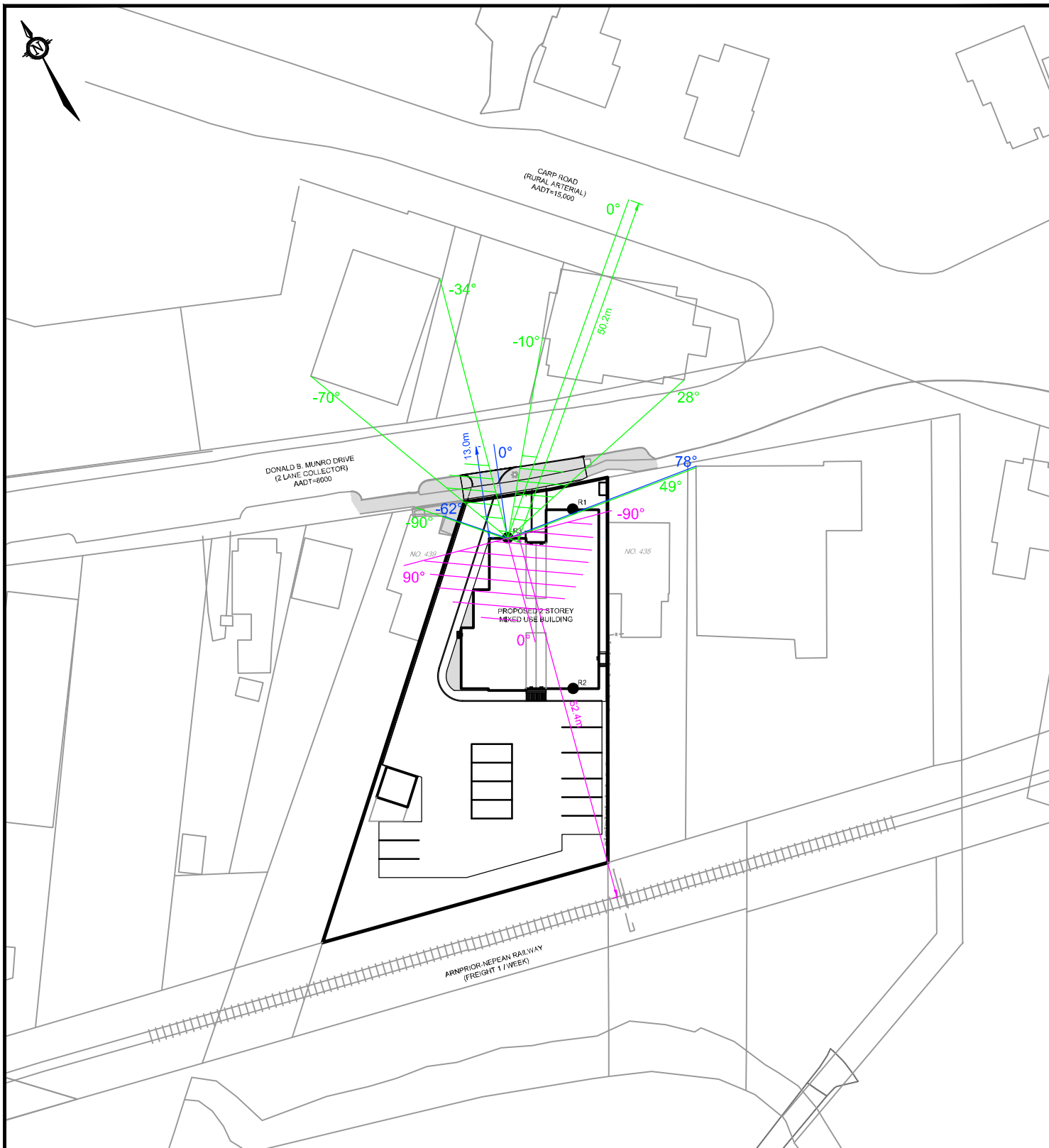
437 DONALD B. MUNRO DRIVE

RECEIVER LOCATION R2

SCALE 1 : 750

DATE MAY 2019 JOB 119023 FIGURE FIG-2

M:\2019\119023\CAD\Design\Figures\Noise\119023-N-Report.dwg, FIG 3, May 30, 2019 - 3:00pm, Iwilson



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- CARP ROAD BARRIER ANGLE
- ARNPRIOR-NEPEAN RAILWAY BARRIER ANGLE
- CARP ROAD NOISE ANGLE
- DONALD B. MUNRO DRIVE NOISE ANGLE
- ARNPRIOR-NEPEAN RAILWAY NOISE ANGLE
- RECEIVER LOCATION

437 DONALD B. MUNRO DRIVE

RECEIVER LOCATION R3

SCALE 1 : 750 0 10 20 30

DATE MAY 2019 JOB 119023 FIGURE FIG-3

STAMSON 5.0 NORMAL REPORT Date: 03-05-2019 11:17:56
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r111.te Time Period: Day/Night 16/8 hours
 Description: R1 POW (1st Floor Commercial)

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	!# loc	!# Cars	! Eng type	!Cont weld
1.	1.0/0.0	16.0	1.0	6.0	Diesel	No

Data for Segment # 1: Rail (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 50.70 / 15.00 m
 Receiver height : 1.50 / 6.00 m
 Topography : 4 (Elevated; with barrier)
 No Whistle
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
 Barrier height : 8.00 m
 Elevation : 2.30 m
 Barrier receiver distance : 1.00 / -34.70 m
 Source elevation : 93.00 m
 Receiver elevation : 95.31 m
 Barrier elevation : 95.31 m
 Reference angle : 0.00

Results segment # 1: Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	1.50	1.50	96.81
0.50	1.50	1.43	96.74

LOCOMOTIVE (0.00 + 26.07 + 0.00) = 26.07 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	49.52	-5.29	0.00	0.00	0.00	-18.16	26.07

WHEEL (0.00 + 11.66 + 0.00) = 11.66 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	35.22	-5.29	0.00	0.00	0.00	-18.26	11.66

Segment Leq : 26.22 dBA

Total Leq All Segments: 26.22 dBA

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

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

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

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

Data for Segment # 1: Donald (day/night)

Angle1 Angle2 : -84.00 deg 77.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Carp (day/night)

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 43.40 / 43.40 m
Receiver height : 1.50 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -50.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 19.80 / 19.80 m
Source elevation : 96.15 m
Receiver elevation : 95.31 m
Barrier elevation : 95.35 m
Reference angle : 0.00

Road data, segment # 3: Carp (day/night)

```
-----
Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00
```

Data for Segment # 3: Carp (day/night)

```
-----
Angle1 Angle2 : -30.00 deg 51.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 43.40 / 43.40 m
Receiver height : 1.50 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -30.00 deg Angle2 : 21.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 19.80 / 19.80 m
Source elevation : 96.15 m
Receiver elevation : 95.31 m
Barrier elevation : 95.35 m
Reference angle : 0.00
```

Results segment # 1: Donald (day)

Source height = 1.50 m

ROAD (0.00 + 63.47 + 0.00) = 63.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	77	0.00	63.96	0.00	0.00	-0.48	0.00	0.00	0.00	63.47

Segment Leq : 63.47 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.84	97.19

ROAD (0.00 + 44.41 + 54.32) = 54.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-50	0.00	68.48	0.00	-4.61	-6.53	0.00	0.00	-12.93	44.41
-50	-30	0.00	68.48	0.00	-4.61	-9.54	0.00	0.00	0.00	54.32

Segment Leq : 54.75 dBA

Results segment # 3: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.84	97.19

ROAD (0.00 + 38.56 + 56.08) = 56.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	21	0.00	68.48	0.00	-4.61	-5.48	0.00	0.00	-19.83	38.56
21	51	0.00	68.48	0.00	-4.61	-7.78	0.00	0.00	0.00	56.08

Segment Leq : 56.16 dBA

Total Leq All Segments: 64.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.68

STAMSON 5.0 NORMAL REPORT Date: 03-05-2019 11:18:31
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r112.te Time Period: Day/Night 16/8 hours
 Description: R1 POW (2nd Floor Residential)

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed ! (km/h)	!# loc !/Train	!# Cars !/Train	! Eng type	! Cont !weld
1.	! 1.0/0.0	! 16.0	! 1.0	! 6.0	! Diesel	! No

Data for Segment # 1: Rail (day/night)

Angle1	Angle2	: -90.00 deg	90.00 deg
Wood depth		: 0	(No woods.)
No of house rows		: 0 / 0	
Surface		: 2	(Reflective ground surface)
Receiver source distance		: 50.70 / 15.00	m
Receiver height		: 6.00 / 6.00	m
Topography		: 4	(Elevated; with barrier)
No Whistle			
Barrier angle1		: -90.00 deg	Angle2 : 90.00 deg
Barrier height		: 8.00	m
Elevation		: 2.30	m
Barrier receiver distance		: 1.00 / -34.70	m
Source elevation		: 93.00	m
Receiver elevation		: 95.31	m
Barrier elevation		: 95.31	m
Reference angle		: 0.00	

Results segment # 1: Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	! 6.00	! 5.91	! 101.22
0.50	! 6.00	! 5.85	! 101.16

LOCOMOTIVE (0.00 + 29.35 + 0.00) = 29.35 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	49.52	-5.29	0.00	0.00	0.00	-14.88	29.35

WHEEL (0.00 + 14.71 + 0.00) = 14.71 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	35.22	-5.29	0.00	0.00	0.00	-15.22	14.71

Segment Leq : 29.50 dBA

Total Leq All Segments: 29.50 dBA

Results segment # 1: Rail (night)

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
4.00 !	6.00 !	15.97 !	111.28
0.50 !	6.00 !	24.07 !	119.38

LOCOMOTIVE (0.00 + 0.00 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	0.00	0.00	0.00	0.00	0.00	99.00	99.00

* Bright Zone !

WHEEL (0.00 + 0.00 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	0.00	0.00	0.00	0.00	0.00	99.00	99.00

* Bright Zone !

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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

Car traffic volume : 6477/563 veh/TimePeriod *

Medium truck volume : 515/45 veh/TimePeriod *

Heavy truck volume : 368/32 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 7.00

Heavy Truck % of Total Volume : 5.00

Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Donald (day/night)

Angle1 Angle2 : -76.00 deg 77.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 15.00 / 15.00 m

Receiver height : 6.00 / 6.00 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Road data, segment # 2: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Carp (day/night)

Angle1 Angle2 : -90.00 deg -29.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 46.40 / 46.40 m
Receiver height : 6.00 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -79.00 deg Angle2 : -47.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 22.80 / 22.80 m
Source elevation : 96.15 m
Receiver elevation : 95.31 m
Barrier elevation : 95.35 m
Reference angle : 0.00

Road data, segment # 3: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Carp (day/night)

Angle1 Angle2 : -29.00 deg 49.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 46.40 / 46.40 m
Receiver height : 6.00 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -29.00 deg Angle2 : 17.00 deg

Barrier height : 8.00 m
 Barrier receiver distance : 22.80 / 22.80 m
 Source elevation : 96.15 m
 Receiver elevation : 95.31 m
 Barrier elevation : 95.35 m
 Reference angle : 0.00

Results segment # 1: Donald (day)

Source height = 1.50 m

ROAD (0.00 + 63.25 + 0.00) = 63.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-76	77	0.00	63.96	0.00	0.00	-0.71	0.00	0.00	0.00	63.25

Segment Leq : 63.25 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50 !	6.00 !	4.16 !	99.51

ROAD (51.44 + 44.16 + 53.58) = 55.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-79	0.00	68.48	0.00	-4.90	-12.14	0.00	0.00	0.00	51.44
-79	-47	0.00	68.48	0.00	-4.90	-7.50	0.00	0.00	-11.92	44.16
-47	-29	0.00	68.48	0.00	-4.90	-10.00	0.00	0.00	0.00	53.58

Segment Leq : 55.94 dBA

Results segment # 3: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	4.16	99.51

ROAD (0.00 + 42.18 + 56.07) = 56.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-29	17	0.00	68.48	0.00	-4.90	-5.93	0.00	0.00	-15.47	42.18
17	49	0.00	68.48	0.00	-4.90	-7.50	0.00	0.00	0.00	56.07

Segment Leq : 56.25 dBA

Total Leq All Segments: 64.67 dBA

Results segment # 1: Donald (night)

Source height = 1.50 m

ROAD (0.00 + 55.66 + 0.00) = 55.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-76	77	0.00	56.36	0.00	0.00	-0.71	0.00	0.00	0.00	55.66

Segment Leq : 55.66 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	4.16	99.51

ROAD (43.84 + 36.56 + 45.98) = 48.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-79	0.00	60.88	0.00	-4.90	-12.14	0.00	0.00	0.00	43.84
-79	-47	0.00	60.88	0.00	-4.90	-7.50	0.00	0.00	-11.92	36.56
-47	-29	0.00	60.88	0.00	-4.90	-10.00	0.00	0.00	0.00	45.98

Segment Leq : 48.35 dBA

Results segment # 3: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	4.16	99.51

ROAD (0.00 + 34.58 + 48.48) = 48.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-29	17	0.00	60.88	0.00	-4.90	-5.93	0.00	0.00	-15.47	34.58
17	49	0.00	60.88	0.00	-4.90	-7.50	0.00	0.00	0.00	48.48

Segment Leq : 48.65 dBA

Total Leq All Segments: 57.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.67

STAMSON 5.0 NORMAL REPORT Date: 30-04-2019 16:52:11
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r211.te Time Period: Day/Night 16/8 hours
 Description: R2 (POW) Level 1 Commercial (Facing Rail Corridor)

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	!# loc	!# Cars	! Eng type	!Cont weld
1.	1.0/0.0	16.0	1.0	6.0	Diesel	No

Data for Segment # 1: Rail (day/night)

Angle1	Angle2	: -90.00 deg	90.00 deg
Wood depth		: 0	(No woods.)
No of house rows		: 0 / 0	
Surface		: 2	(Reflective ground surface)
Receiver source distance		: 29.50 / 29.50 m	
Receiver height		: 1.50 / 1.50 m	
Topography		: 3	(Elevated; no barrier)
No Whistle			
Elevation		: 2.30 m	
Reference angle		: 0.00	

Results segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 46.58 + 0.00) = 46.58 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	49.52	-2.94	0.00	0.00	0.00	0.00	46.58

WHEEL (0.00 + 32.28 + 0.00) = 32.28 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	35.22	-2.94	0.00	0.00	0.00	0.00	32.28

Segment Leq : 46.74 dBA

Total Leq All Segments: 46.74 dBA

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

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

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

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

Data for Segment # 1: Donald (day/night)

```

-----
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth      :           0           (No woods.)
No of house rows :           0 / 0
Surface         :           2           (Reflective ground surface)
Receiver source distance : 35.20 / 35.20 m
Receiver height  :           1.50 / 1.50 m
Topography      :           2           (Flat/gentle slope; with barrier)
Barrier angle1   : -90.00 deg   Angle2 : 90.00 deg
Barrier height   :           8.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation :           95.00 m
Receiver elevation :           95.31 m
Barrier elevation :           95.31 m
Reference angle  :           0.00

```

Road data, segment # 2: Carp (day/night)

```

-----
Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient      : 0 %
Road pavement      : 1 (Typical asphalt or concrete)

```

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

```

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth         : 0.00
Number of Years of Growth           : 0.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume      : 92.00

```

Data for Segment # 2: Carp (day/night)

```

-----
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth      :           0           (No woods.)
No of house rows :           0 / 0
Surface         :           2           (Reflective ground surface)
Receiver source distance : 67.40 / 67.40 m
Receiver height  :           1.50 / 1.50 m
Topography      :           2           (Flat/gentle slope; with barrier)
Barrier angle1   : -90.00 deg   Angle2 : 90.00 deg
Barrier height   :           8.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation :           96.15 m
Receiver elevation :           95.31 m
Barrier elevation :           95.31 m
Reference angle  :           0.00

```

Results segment # 1: Donald (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source	! Receiver	! Barrier	! Elevation of
Height (m)	! Height (m)	! Height (m)	Barrier Top (m)
1.50	!	1.50	!
		1.49	!
			96.80

ROAD (0.00 + 42.03 + 0.00) = 42.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.96	0.00	-3.70	0.00	0.00	0.00	-18.22	42.03

Segment Leq : 42.03 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source	! Receiver	! Barrier	! Elevation of
Height (m)	! Height (m)	! Height (m)	Barrier Top (m)
1.50	!	1.50	!
		1.51	!
			96.82

ROAD (0.00 + 43.84 + 0.00) = 43.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	68.48	0.00	-6.53	0.00	0.00	0.00	-18.11	43.84

Segment Leq : 43.84 dBA

Total Leq All Segments: 46.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.41

Filename: r2l2.te Time Period: Day/Night 16/8 hours
 Description: R2 (POW) Level 2 Residential (Facing Rail Corridor)

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	!# loc	!# Cars	! Eng type	!Cont weld
1.	1.0/0.0	16.0	1.0	6.0	Diesel	No

Data for Segment # 1: Rail (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 29.50 / 29.50 m
 Receiver height : 6.00 / 6.00 m
 Topography : 3 (Elevated; no barrier)
 No Whistle
 Elevation : 2.30 m
 Reference angle : 0.00

Results segment # 1: Rail (day)

LOCOMOTIVE (0.00 + 46.58 + 0.00) = 46.58 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	49.52	-2.94	0.00	0.00	0.00	0.00	46.58

WHEEL (0.00 + 32.28 + 0.00) = 32.28 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	35.22	-2.94	0.00	0.00	0.00	0.00	32.28

Segment Leq : 46.74 dBA

Total Leq All Segments: 46.74 dBA

Results segment # 1: Rail (night)

LOCOMOTIVE (0.00 + -2.94 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	0.00	-2.94	0.00	0.00	0.00	0.00	-2.94

WHEEL (0.00 + -2.94 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	0.00	-2.94	0.00	0.00	0.00	0.00	-2.94

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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

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

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

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

Data for Segment # 1: Donald (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 35.20 / 35.20 m
Receiver height : 6.00 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation : 95.00 m
Receiver elevation : 95.31 m
Barrier elevation : 95.31 m
Reference angle : 0.00

Road data, segment # 2: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Carp (day/night)

```

-----
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth           :      0           (No woods.)
No of house rows     :      0 / 0
Surface              :      2           (Reflective ground surface)
Receiver source distance : 67.40 / 67.40 m
Receiver height       :    6.00 / 6.00 m
Topography           :      2           (Flat/gentle slope; with barrier)
Barrier angle1        : -90.00 deg   Angle2 : 90.00 deg
Barrier height        :    8.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation      :   96.15 m
Receiver elevation    :   95.31 m
Barrier elevation     :   95.31 m
Reference angle       :    0.00

```

Results segment # 1: Donald (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
      1.50 !      6.00 !      5.86 !      101.17

```

ROAD (0.00 + 45.07 + 0.00) = 45.07 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
   -90    90    0.00  63.96   0.00  -3.70   0.00   0.00   0.00 -15.18  45.07
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----

```

Segment Leq : 45.07 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
      1.50 !      6.00 !      5.95 !      101.26

```

ROAD (0.00 + 47.26 + 0.00) = 47.26 dBA

```

-----
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
   -90    90    0.00  68.48   0.00  -6.53   0.00   0.00   0.00 -14.69  47.26
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----

```

Segment Leq : 47.26 dBA

Total Leq All Segments: 49.31 dBA

Results segment # 1: Donald (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	5.86	101.17

ROAD (0.00 + 37.48 + 0.00) = 37.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	56.36	0.00	-3.70	0.00	0.00	0.00	-15.18	37.48

Segment Leq : 37.48 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	5.95	101.26

ROAD (0.00 + 39.67 + 0.00) = 39.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	60.88	0.00	-6.53	0.00	0.00	0.00	-14.69	39.67

Segment Leq : 39.67 dBA

Total Leq All Segments: 41.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.22
(NIGHT): 41.72

STAMSON 5.0 NORMAL REPORT Date: 03-05-2019 11:19:51
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3l1.te Time Period: Day/Night 16/8 hours
 Description: R3 POW (1st Floor Commercial)

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed (km/h)	!# loc	!# Cars	! Eng type	!Cont weld
1.	1.0/0.0	16.0	1.0	6.0	Diesel	No

Data for Segment # 1: Rail (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 50.70 / 15.00 m
 Receiver height : 1.50 / 6.00 m
 Topography : 4 (Elevated; with barrier)
 No Whistle
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
 Barrier height : 8.00 m
 Elevation : 2.30 m
 Barrier receiver distance : 1.00 / -34.70 m
 Source elevation : 93.00 m
 Receiver elevation : 95.31 m
 Barrier elevation : 95.31 m
 Reference angle : 0.00

Results segment # 1: Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	1.50	1.50	96.81
0.50	1.50	1.43	96.74

LOCOMOTIVE (0.00 + 26.07 + 0.00) = 26.07 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	49.52	-5.29	0.00	0.00	0.00	-18.16	26.07

WHEEL (0.00 + 11.66 + 0.00) = 11.66 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	35.22	-5.29	0.00	0.00	0.00	-18.26	11.66

Segment Leq : 26.22 dBA

Total Leq All Segments: 26.22 dBA

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

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

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

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

Data for Segment # 1: Donald (day/night)

Angle1 Angle2 : -62.00 deg 78.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Carp (day/night)

Angle1 Angle2 : -90.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 50.30 / 50.30 m
Receiver height : 1.50 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -70.00 deg Angle2 : -34.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 23.80 / 23.80 m
Source elevation : 96.15 m
Receiver elevation : 95.31 m
Barrier elevation : 95.35 m
Reference angle : 0.00

Road data, segment # 3: Carp (day/night)

```
-----
Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00
```

Data for Segment # 3: Carp (day/night)

```
-----
Angle1 Angle2 : -10.00 deg 49.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 50.30 / 50.30 m
Receiver height : 1.50 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -10.00 deg Angle2 : 28.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 23.80 / 23.80 m
Source elevation : 96.15 m
Receiver elevation : 95.31 m
Barrier elevation : 95.35 m
Reference angle : 0.00
```

Results segment # 1: Donald (day)

Source height = 1.50 m

ROAD (0.00 + 62.86 + 0.00) = 62.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-62	78	0.00	63.96	0.00	0.00	-1.09	0.00	0.00	0.00	62.86

Segment Leq : 62.86 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	1.50	!	1.86	!	97.21

ROAD (53.68 + 39.33 + 54.47) = 57.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-70	0.00	68.48	0.00	-5.25	-9.54	0.00	0.00	0.00	53.68
-70	-34	0.00	68.48	0.00	-5.25	-6.99	0.00	0.00	-16.90	39.33
-34	-10	0.00	68.48	0.00	-5.25	-8.75	0.00	0.00	0.00	54.47

Segment Leq : 57.18 dBA

Results segment # 3: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	1.50	!	1.86	!	97.21

ROAD (0.00 + 37.27 + 53.89) = 53.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	28	0.00	68.48	0.00	-5.25	-6.75	0.00	0.00	-19.20	37.27
28	49	0.00	68.48	0.00	-5.25	-9.33	0.00	0.00	0.00	53.89

Segment Leq : 53.99 dBA

Total Leq All Segments: 64.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.32

STAMSON 5.0 NORMAL REPORT Date: 03-05-2019 11:20:24
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3l2.te Time Period: Day/Night 16/8 hours
 Description: R3 POW (2nd Floor Residential)

Rail data, segment # 1: Rail (day/night)

Train Type	! Trains	! Speed ! (km/h)	!# loc !/Train	!# Cars !/Train	! Eng type	!Cont !weld
1.	! 1.0/0.0	! 16.0	! 1.0	! 6.0	!Diesel	! No

Data for Segment # 1: Rail (day/night)

Angle1	Angle2	: -90.00 deg	90.00 deg
Wood depth		: 0	(No woods.)
No of house rows		: 0 / 0	
Surface		: 2	(Reflective ground surface)
Receiver source distance		: 50.70 / 50.70	m
Receiver height		: 6.00 / 6.00	m
Topography		: 4	(Elevated; with barrier)
No Whistle			
Barrier angle1		: -90.00 deg	Angle2 : 90.00 deg
Barrier height		: 8.00	m
Elevation		: 2.30	m
Barrier receiver distance		: 1.00 / 1.00	m
Source elevation		: 93.00	m
Receiver elevation		: 95.31	m
Barrier elevation		: 95.31	m
Reference angle		: 0.00	

Results segment # 1: Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	! 6.00	! 5.91	! 101.22
0.50	! 6.00	! 5.85	! 101.16

LOCOMOTIVE (0.00 + 29.35 + 0.00) = 29.35 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	49.52	-5.29	0.00	0.00	0.00	-14.88	29.35

WHEEL (0.00 + 14.71 + 0.00) = 14.71 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	35.22	-5.29	0.00	0.00	0.00	-15.22	14.71

Segment Leq : 29.50 dBA

Total Leq All Segments: 29.50 dBA

Results segment # 1: Rail (night)

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
4.00 !	6.00 !	5.91 !	101.22
0.50 !	6.00 !	5.85 !	101.16

LOCOMOTIVE (0.00 + -20.17 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	0.00	-5.29	0.00	0.00	0.00	-14.88	-20.17

WHEEL (0.00 + -20.51 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	0.00	-5.29	0.00	0.00	0.00	-15.22	-20.51

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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

Car traffic volume : 6477/563 veh/TimePeriod *

Medium truck volume : 515/45 veh/TimePeriod *

Heavy truck volume : 368/32 veh/TimePeriod *

Posted speed limit : 40 km/h

Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000

Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 7.00

Heavy Truck % of Total Volume : 5.00

Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Donald (day/night)

Angle1 Angle2 : -62.00 deg 78.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 2 (Reflective ground surface)

Receiver source distance : 15.00 / 15.00 m

Receiver height : 6.00 / 6.00 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Road data, segment # 2: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Carp (day/night)

Angle1 Angle2 : -90.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 50.30 / 50.30 m
Receiver height : 6.00 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -70.00 deg Angle2 : -34.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 23.80 / 23.80 m
Source elevation : 96.15 m
Receiver elevation : 95.31 m
Barrier elevation : 95.35 m
Reference angle : 0.00

Road data, segment # 3: Carp (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Carp (day/night)

Angle1 Angle2 : -10.00 deg 49.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 50.30 / 50.30 m
Receiver height : 6.00 / 6.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -10.00 deg Angle2 : 28.00 deg

Barrier height : 8.00 m
 Barrier receiver distance : 23.80 / 23.80 m
 Source elevation : 96.15 m
 Receiver elevation : 95.31 m
 Barrier elevation : 95.35 m
 Reference angle : 0.00

Results segment # 1: Donald (day)

Source height = 1.50 m

ROAD (0.00 + 62.86 + 0.00) = 62.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-62	78	0.00	63.96	0.00	0.00	-1.09	0.00	0.00	0.00	62.86

Segment Leq : 62.86 dBA

Results segment # 2: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50 !	6.00 !	4.23 !	99.58

ROAD (53.68 + 43.39 + 54.47) = 57.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-70	0.00	68.48	0.00	-5.25	-9.54	0.00	0.00	0.00	53.68
-70	-34	0.00	68.48	0.00	-5.25	-6.99	0.00	0.00	-12.84	43.39
-34	-10	0.00	68.48	0.00	-5.25	-8.75	0.00	0.00	0.00	54.47

Segment Leq : 57.29 dBA

Results segment # 3: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	4.23	99.58

ROAD (0.00 + 41.46 + 53.89) = 54.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	28	0.00	68.48	0.00	-5.25	-6.75	0.00	0.00	-15.01	41.46
28	49	0.00	68.48	0.00	-5.25	-9.33	0.00	0.00	0.00	53.89

Segment Leq : 54.14 dBA

Total Leq All Segments: 64.36 dBA

Results segment # 1: Donald (night)

Source height = 1.50 m

ROAD (0.00 + 55.27 + 0.00) = 55.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-62	78	0.00	56.36	0.00	0.00	-1.09	0.00	0.00	0.00	55.27

Segment Leq : 55.27 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	6.00	4.23	99.58

ROAD (46.09 + 35.80 + 46.88) = 49.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-70	0.00	60.88	0.00	-5.25	-9.54	0.00	0.00	0.00	46.09
-70	-34	0.00	60.88	0.00	-5.25	-6.99	0.00	0.00	-12.84	35.80
-34	-10	0.00	60.88	0.00	-5.25	-8.75	0.00	0.00	0.00	46.88

Segment Leq : 49.69 dBA

Results segment # 3: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	6.00	!	4.23	!	99.58

ROAD (0.00 + 33.86 + 46.30) = 46.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	28	0.00	60.88	0.00	-5.25	-6.75	0.00	0.00	-15.01	33.86
28	49	0.00	60.88	0.00	-5.25	-9.33	0.00	0.00	0.00	46.30

Segment Leq : 46.54 dBA

Total Leq All Segments: 56.76 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.36
(NIGHT): 56.76

APPENDIX B

Building Component Assessment CN Rail Information

TABLE 5: Acoustic Insulation Factor for Various Types of Windows

Window area as a percentage of total floor area of room (1)														Single glazing	Double glazing of indicated glass thickness						Triple glazing	
4	5	6	8	10	13	16	20	25	32	40	50	63	80	Thickness	2mm and 3mm glass	3mm and 4mm glass	4mm and 6mm glass	3mm and 3mm and 6mm glass	3mm, 3mm and 3mm glass	3mm and 6mm glass		
Acoustic Insulation Factor (AIF) (2)														Thickness	Interpane spacing in mm (3)						Interpane spacings in mm (5)	
35	34	33	32	31	30	29	28	27	26	25	24	23	22	3mm	6							
36	35	34	33	32	31	30	29	28	27	26	25	24	23	3mm	13							
37	36	35	34	33	32	31	30	29	28	27	26	25	24	3mm	16	6						
38	37	36	35	34	33	32	31	30	29	28	27	26	25	4mm, 6mm	18	13	6					
39	38	37	36	35	34	33	32	31	30	29	28	27	26		12	16	13	6	6,6			
40	39	38	37	36	35	34	33	32	31	30	29	28	27	9mm (4)	28	20	16	13	6,10	6,6		
41	40	39	38	37	36	35	34	33	32	31	30	29	28		35	25	20	16	6,15	6,6		
42	41	40	39	38	37	36	35	34	33	32	31	30	29	12mm (4)	42	32	25	20	6,20	6,15		
43	42	41	40	39	38	37	36	35	34	33	32	31	30		50	40	32	25	6,30	6,20		
44	43	42	41	40	39	38	37	36	35	34	33	32	31		53	50	40	32	6,40	6,30		
45	44	43	42	41	40	39	38	37	36	35	34	33	32		80	63	50	40	6,50	6,40		
46	45	44	43	42	41	40	39	38	37	36	35	34	33		100	80	63	55	6,65	6,50		
47	46	45	44	43	42	41	40	39	38	37	36	35	34		125	100	80	75	6,80	6,65		
48	47	46	45	44	43	42	41	40	39	38	37	36	35		130	125	100	95	6,100	6,80		
49	48	47	46	45	44	43	42	41	40	39	38	37	36			150	125	110		6,100		
50	49	48	47	46	45	44	43	42	41	40	39	38	37			150	135	125		6,100		

Source: National Research Council, Division of Building Research, June 1980.

Explanatory Notes:

- 1) Where the calculated percentage window area is not presented as a column heading, the nearest percentage column in the table values should be used.
- 2) AIF data listed in the table are for well-fitted weatherstripped units that can be opened. The AIF values apply only when the windows are closed. For windows fixed and sealed to the frame, add three (3) to the AIF given in the table. The AIF values listed in the table are for the interpane spacing or glass thickness for a specific double glazed window is not listed in the table, the nearest listed values should be used.
- 3) The AIF ratings for 9mm and 12mm glass are for laminated glass only; for solid glass subtract two (2) from the AIF value listed in the table.
- 4) If the interpane spacings for a specific triple-glazed window are not listed in the table, use the listed case whose combined spacings are nearest the actual combined spacing.
- 5) The AIF data listed in the table are for typical windows, but details of glass mounting, window seals, etc. may result in slightly different performance for some manufacturers' products. If laboratory sound transmission loss data (conforming to ASTM test method E-90) are available, these should be used to calculate the AIF.

Table 6.3 - Acoustic Insulation Factor for Various Types of Exterior Wall

	Percentage of exterior wall area to total floor area of room											Type of Exterior Wall
	16	20	25	32	40	50	63	80	100	125	160	
Acoustic	39	38	37	36	35	34	33	32	31	30	29	EW1
Insulation	41	40	39	38	37	36	35	34	33	32	31	EW2
Factor	44	43	42	41	40	39	38	37	36	35	34	EW3
	47	46	45	44	43	42	41	40	39	38	37	EW4
	48	47	46	45	44	43	42	41	40	39	38	EW1R
	49	48	47	46	45	44	43	42	41	40	39	EW2R
	50	49	48	47	46	45	44	43	42	41	40	EW3R
	55	54	53	52	51	50	49	48	47	46	45	EW5
	56	55	54	53	52	51	50	49	48	47	46	EW4R
	58	57	56	55	54	53	52	51	50	49	48	EW6
	59	58	57	56	55	54	53	52	51	50	49	EW7 or EW5R
	63	62	61	60	59	58	57	56	55	54	53	EW8

Source : National Research Council, Division of Building Research, December 1980.

Explanatory Notes :

- 1) Where the calculated percentage wall area is not presented as a column heading, the nearest percentage column in the table should be used.
- 2) The common structure of walls EW1 to EW5 is composed of 12.7 mm gypsum board, vapour barrier, and 38 x 89 mm studs with 50 mm (or thicker) mineral wool or glass fibre batts in inter-stud cavities.
- 3) EW1 denotes exterior wall as in Note 2), plus sheathing, plus wood siding or metal siding and fibre backer board.
EW2 denotes exterior wall as in Note 2), plus rigid insulation (25-30 mm), and wood siding or metal siding and fibre backer board.
EW3 denotes simulated mansard with structure as in Note 2), plus sheathing, 28 x 89 mm framing, sheathing, and asphalt roofing material.
EW4 denotes exterior wall as in Note 2), plus sheathing and 20 mm stucco.
EW5 denotes exterior wall as in Note 2), plus sheathing, 25 mm air space, 100 mm brick veneer.
EW6 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25-50 mm), 100 mm back-up block, 100 mm face brick.
EW7 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25-50 mm), 140 mm back-up block, 100 mm face brick.
EW8 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25-50 mm), 200 mm concrete.
- 4) R signifies the mounting of the interior gypsum board on resilient clips.
- 5) An exterior wall conforming to rainscreen design principles and composed of 12.7 mm gypsum board, 100 mm concrete block, rigid insulation (25-50 mm), 25 mm air space, and 100 mm brick veneer has the same AIF as EW6.
- 6) An exterior wall described in EW1 with the addition of rigid insulation (25-50 mm) between the sheathing and the external finish has the same AIF as EW2.

Lucas Wilson

From: David Steeds <dave.steeds@nylene.com>
Sent: Friday, April 26, 2019 2:05 PM
To: Lucas Wilson
Cc: Mark Bissett; David Steeds; Tom Fishenden
Subject: RE: Carp Rail Information

Lucas

Yes the Arnprior-Nepean Railway Co. as owned by Nylene Canada Inc. does operate track that runs at the rear of your location of study. As such I can confirm the following;

- 1 train delivery to Arnprior per week
- 1 locomotive is used
- Typically 3 – 4 tank cars although this is subject to change based on Nylene product demand
- I am not positive but I believe that the speed through Carp is 5 mph, max. will be 10 mph (CN operates the train)
- As above while I am not positive I believe that whistle locations are limited to level crossings without AWS, as such I do not believe they whistle at the Carp Road crossing but may whistle at the private crossing just east of the location of study

Hope this helps,

Dave

Dave Steeds, P.Eng.
General Manager



200 McNab Street
Arnprior, Ontario K7S 3P2

☎ Phone: (613) 623-7404
📠 Fax: (613) 623-8922
📱 Cell: (613) 302-5920
📧 david.steeds@nylene.com

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From: Lucas Wilson <l.wilson@novatech-eng.com>
Sent: April 25, 2019 1:53 PM
To: David Steeds <dave.steeds@nylene.com>
Cc: Mark Bissett <m.bissett@novatech-eng.com>
Subject: Carp Rail Information

David,

We are working on a project located at 437 Donald B. Munroe Drive in the Village of Carp and require information regarding rail traffic to complete a Noise Impact Assessment. I believe Nylene Canada has a train travelling through this corridor and would like to request the following information:

- Train volumes
- # of locomotives per train
- # of cars per train
- Average speed through Carp
- Whistle locations

Please let me know if you have any questions.

Thanks,

Lucas Wilson, P.Eng., Project Coordinator | Engineering

NOVATECH

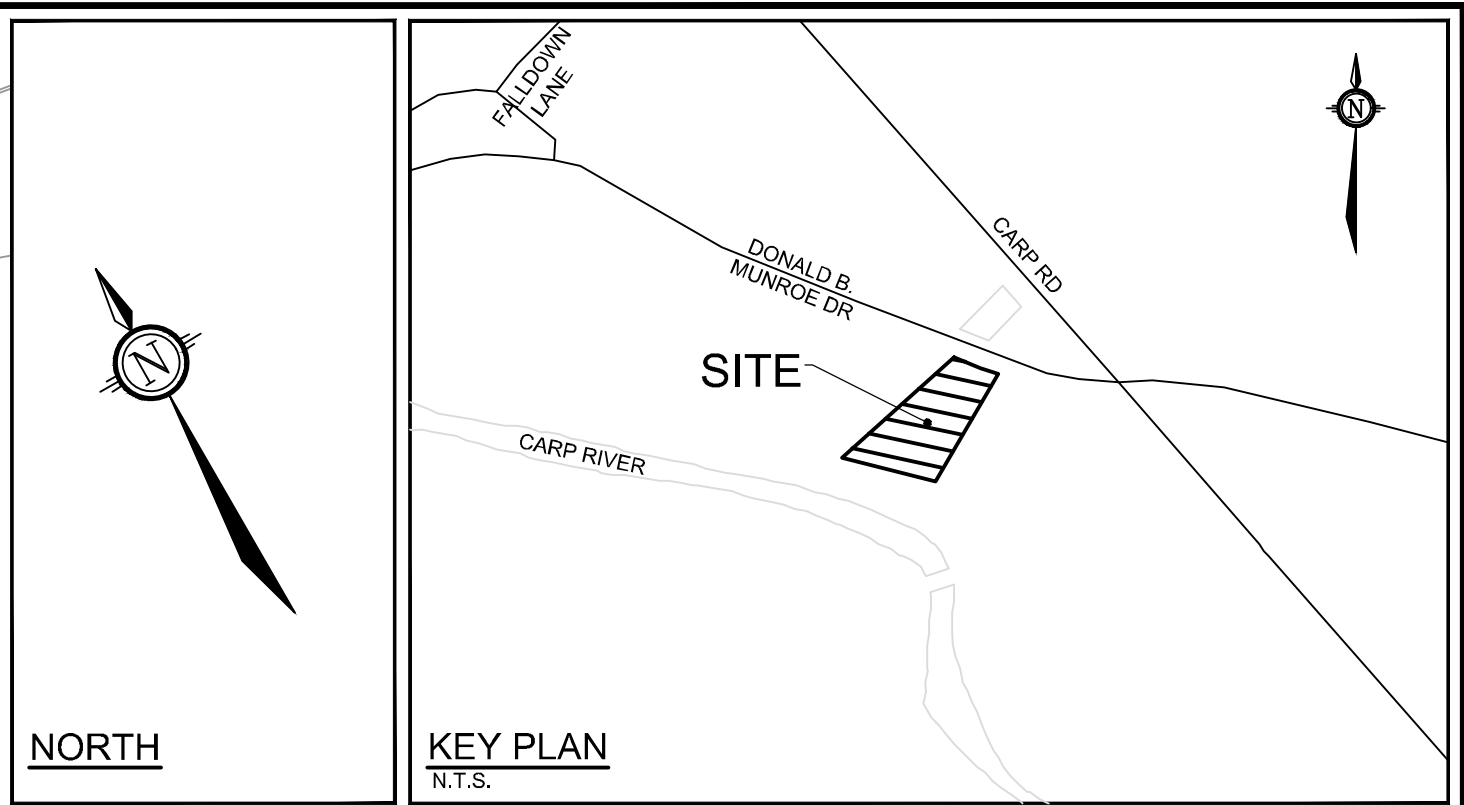
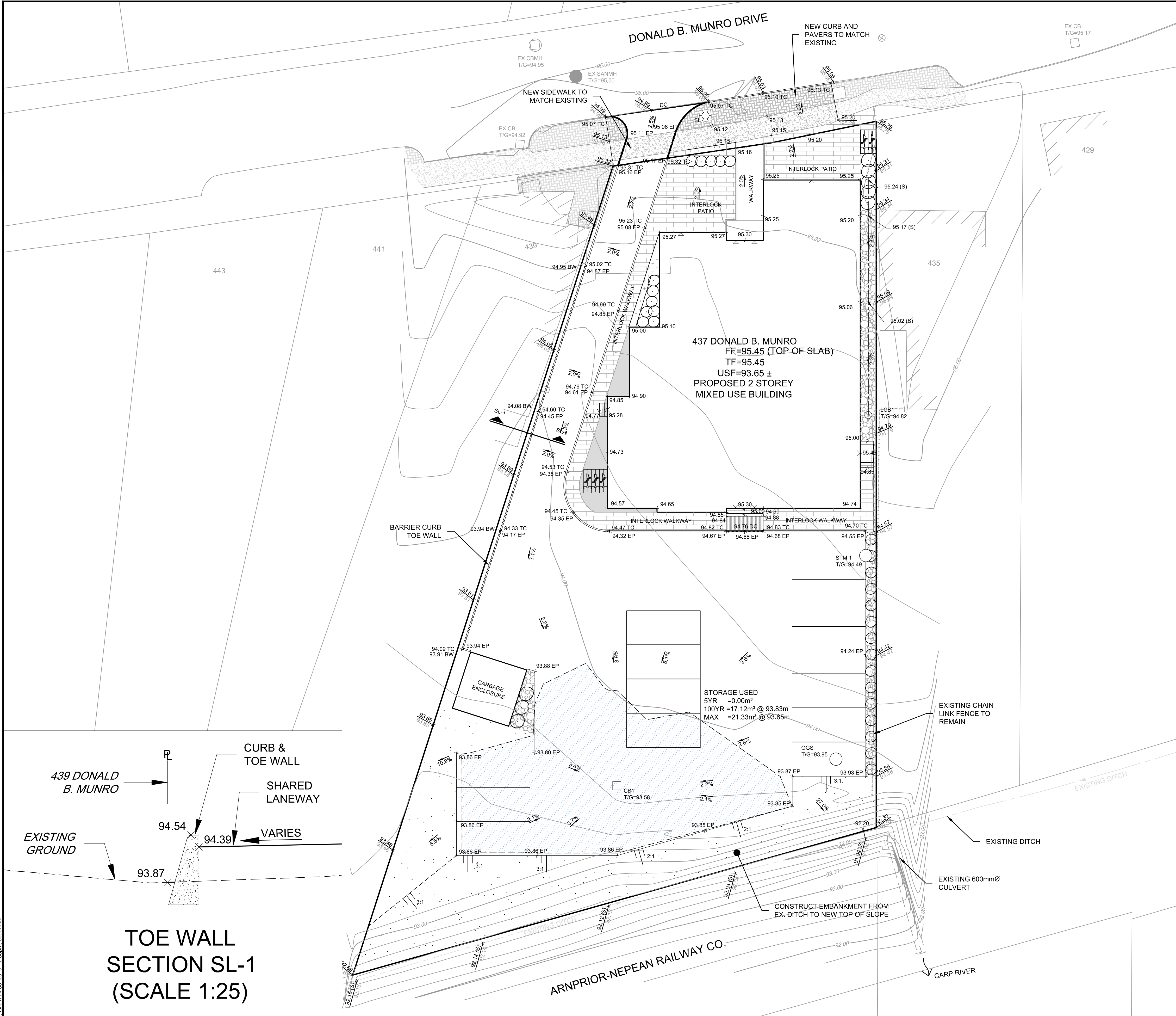
Engineers, Planners & Landscape Architects | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6

Office 613.254.9643 x282 | **Fax** 613.254.5867 | **Email** l.wilson@novatech-eng.com

The information contained in this email message is confidential and is for exclusive use of the addressee.

APPENDIX C

**Grading Plan
Site Plan
Floor / Elevation Plans**



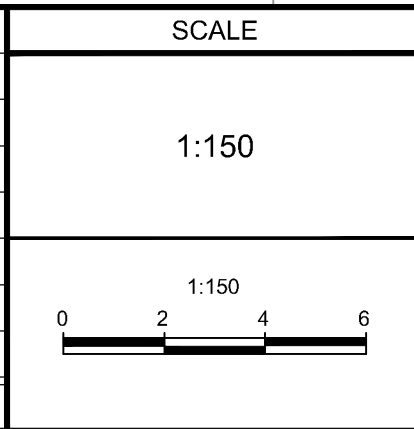
- LEGEND**
- | | | | |
|-------------|--|-------------------|---|
| 2.6% | PROPOSED SLOPE AND DIRECTION | — | CURB SC1.1 |
| 72.55 | PROPOSED ELEVATION | DC | DEPRESSED CURB |
| 72.55 | EXISTING ELEVATION | --- | TOE WALL |
| ×103.41 | PROPOSED ELEVATION | CONCRETE SIDEWALK | REINSTATEMENT |
| ×103.41 BW | PROPOSED ELEVATION AT BOTTOM OF WALL | BOULEVARD PAVER | REINSTATEMENT |
| ×103.41 EP | PROPOSED ELEVATION AT EDGE OF PAVEMENT | OGS | PROPOSED OIL GRIT SEPARATOR |
| ×103.41 TC | PROPOSED ELEVATION AT TOP OF CURB | LCB | PROPOSED LANDSCAPE CATCHBASIN |
| ×103.41 DC | PROPOSED ELEVATION AT DEPRESSED CURB | CB | PROPOSED CATCHBASIN |
| ×103.41 (S) | PROPOSED ELEVATION AT CENTRE OF DITCH | EX SANMH | EXISTING SANITARY MANHOLE |
| FF= | FINISH FLOOR (TOP OF SLAB) | EX CBMH | EXISTING CATCHBASIN MANHOLE |
| TF= | TOP OF FOUNDATION | EX CB | EXISTING CATCHBASIN |
| USF= | UNDERSIDE OF FOOTING ELEVATION | EX HYD | EXISTING HYDRANT |
| --- | PROPOSED SWALE | --- | EXISTING VALVE & VALVE CHAMBER LOCATION |
| --- | MAX STATIC PONDING AREA | --- | EXISTING FENCE |
| SL | STREET LIGHT | | |

- GENERAL NOTES:**
- DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 - THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
 - CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
 - BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
 - CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
 - DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
 - OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
 - RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.
 - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
 - THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
 - BOULEVARDS SHALL BE REINSTATEMENT WITH 100mm OF TOPSOIL, SEED AND MULCH.
 - REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
 - ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
 - REFER TO GEOTECHNICAL INVESTIGATION PROJECT NUMBER: PG4916-1 (DATED MAY 24, 2019), PREPARED BY PATERSON FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.

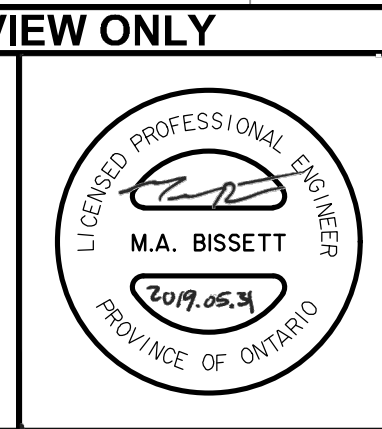
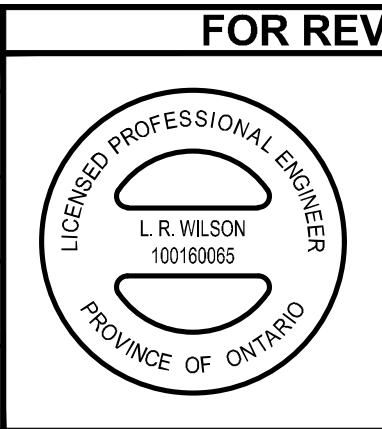
- GRADING AND PAVEMENT NOTES:**
- ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
 - EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (10 TON) VIBRATORY STEEL DRUM ROLLER UNDER DRY CONDITIONS AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
 - ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
 - THE GRANULAR BASE SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
 - ASPHALTIC CONCRETE TO BE COMPACTED TO 92-97% MAX. RELATIVE DENSITY.
 - ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW IF A WOVEN GEOTEXTILE IS REQUIRED BELOW THE GRANULAR MATERIALS; AND TO CONFIRM THE DEPTH AND COMPACTION OF GRANULAR B'
 - PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE.
 - MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
 - ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
 - ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.1).
 - REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED, BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	SITE PLAN SUBMISSION	MAY 31/19	MAB



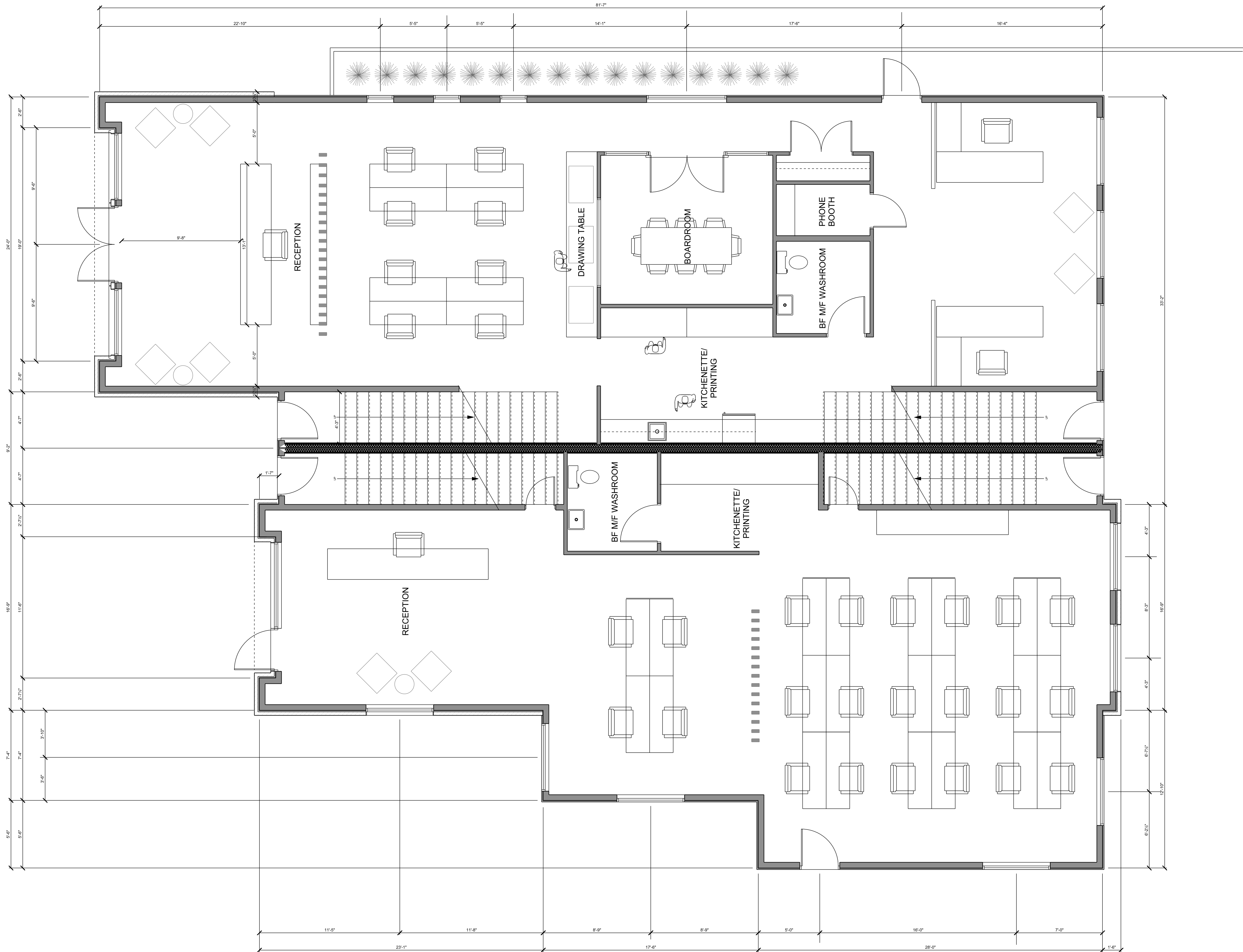
DESIGN	LRW
CHECKED	MAB
DRAWN	CB
CHECKED	MAB
APPROVED	JGR



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA 437 - DONALD B. MUNRO DRIVE		PROJECT NO. 119023
GRADING AND DRAINAGE PLAN		REV REV # 1
		DRAWING NO. 119023-GR

M:\2019\119023\CAD\Drawings\119023-GR.dwg, GR, May 30, 2019, 2:39pm, cbeahmer



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DRAWING NOTES

REVISIONS		
2	ISSUED FOR REVIEW	4 APRIL 2019
1	ISSUED FOR PLANNING REVIEW	17 DEC 2018
NO.	DESCRIPTION	DATE

DEVELOPER / BUILDER



Maple Leaf Custom Homes
PO Box 94, Dunrobin Ontario
K0A 1T0
t: 613.832.4757

DESIGNER

The undersigned has reviewed and takes responsibility for design activities as described in Ontario Building Code 1.4.1.2 and has the qualifications and meets the requirements set out in the Ontario Building Code

Stephen Ardington, BCIN # 35954
Ardington + Associates Design Inc.
125 York Street Suite 502 | Ottawa, Ontario
e: steve@ardington.ca t: 613.832.3425

PROJECT INFORMATION

437 DONALD B MUNRO
CARP ONTARIO

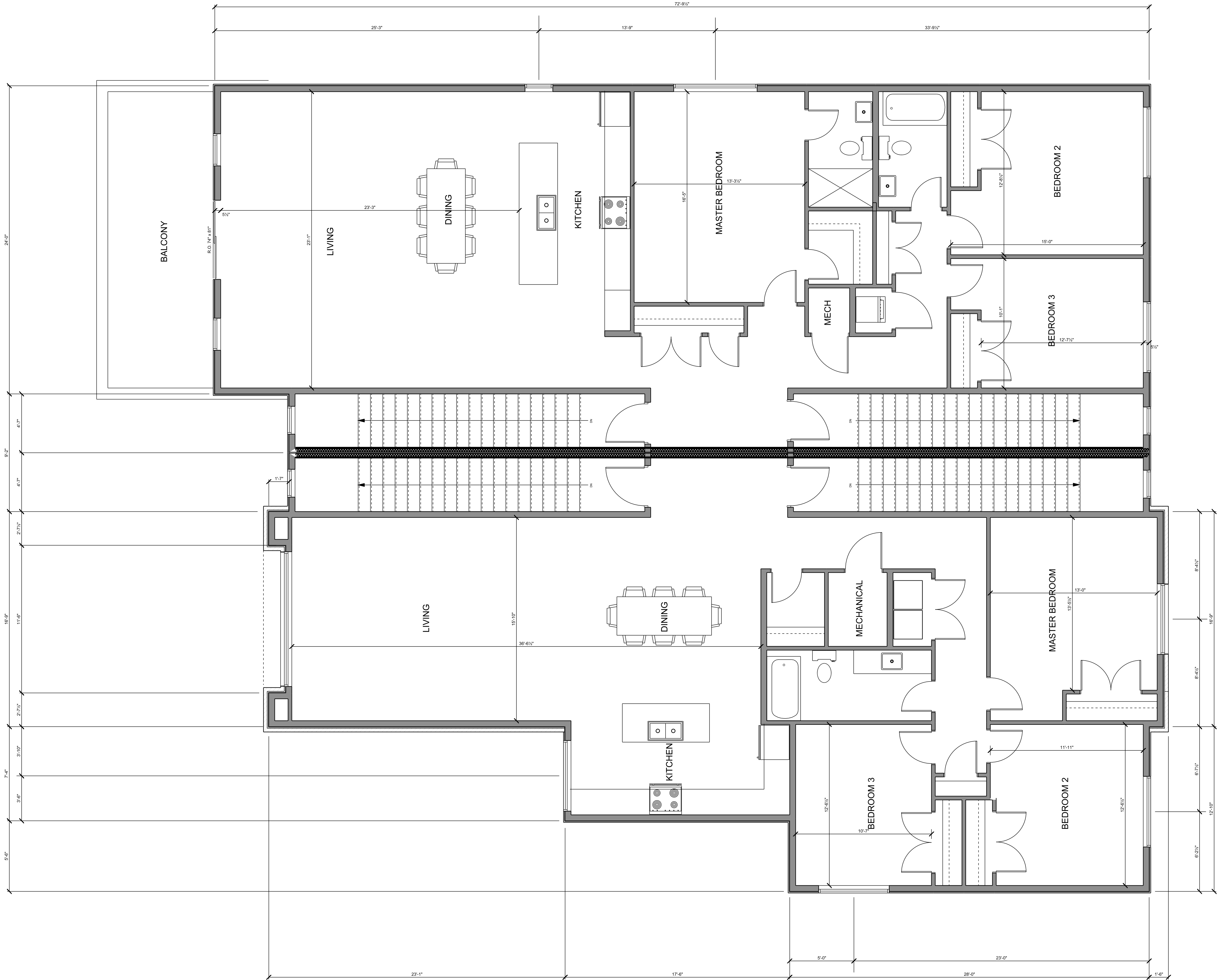
DRAWING INFORMATION

MAIN FLOOR PLAN

SCALE: 1/4" = 1'-0"

DRAWN BY	CHECKED BY	DRAWING NO.
S.A.	S.A.	
PROJECT NO.		

A3



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DRAWING NOTES

REVISIONS		
2	ISSUED FOR REVIEW	4 APRIL 2019
1	ISSUED FOR PLANNING REVIEW	17 DEC 2018
NO.	DESCRIPTION	DATE

DEVELOPER / BUILDER



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PROJECT INFORMATION

437 DONALD B MUNRO
CARP ONTARIO

DRAWING INFORMATION

SECOND FLOOR PLAN

SCALE: 1/4" = 1'-0"

DRAWN BY	CHECKED BY	DRAWING NO.
S.A.	S.A.	
PROJECT NO.		

A4



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DRAWING NOTES

REVISIONS		
2	ISSUED FOR REVIEW	4 APRIL 2019
1	ISSUED FOR PLANNING REVIEW	17 DEC 2018
NO.	DESCRIPTION	DATE

DEVELOPER / BUILDER

MAPLE LEAF
HOMES

Maple Leaf Custom Homes
PO Box 94, Dunrobin Ontario
K0A 1T0
t: 613.832.4757

DESIGNER

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PROJECT INFORMATION

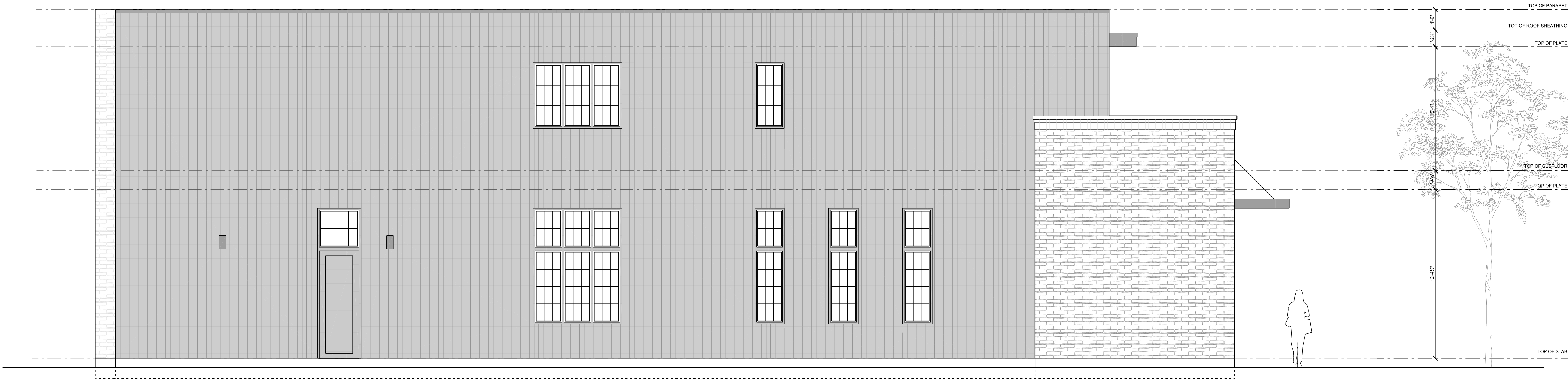
437 DONALD B MUNRO
CARP ONTARIO

DRAWING INFORMATION

FRONT AND REAR ELEVATIONS
SCALE: 1/4" = 1'-0"

DRAWN BY	CHECKED BY	DRAWING NO.
S.A.	S.A.	
PROJECT NO.		

A5



LEFT ELEVATION



RIGHT ELEVATION

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DRAWING NOTES

REVISIONS

NO.	DESCRIPTION	DATE
2	ISSUED FOR REVIEW	4 APRIL 2019
1	ISSUED FOR PLANNING REVIEW	17 DEC 2018

DEVELOPER / BUILDER



Maple Leaf Custom Homes
PO Box 94, Dunrobin Ontario
K0A 1T0
t: 613.832.4757

DESIGNER

The undersigned has reviewed and takes responsibility for design
activities as described in Ontario Building Code 1.4.1.2 and
has the qualifications and meets the requirements set out in the
Ontario Building Code

Stephen Ardington, BCIN # 35954
Ardington + Associates Design Inc.
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e: steve@ardington.ca t: 613.832.3425

PROJECT INFORMATION

437 DONALD B MUNRO
CARP ONTARIO

DRAWING INFORMATION

RIGHT AND LEFT ELEVATIONS

SCALE: 1/4" = 1'-0"

DRAWN BY	CHECKED BY	DRAWING NO.
S.A.	S.A.	
PROJECT NO.		

A6

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WEST PARCEL			
	PART	AREA (SQ/M)	ROW / EASEMENT
	PART 1	234	
	PART 2	9.8	ROW FOR SHARED ACCESS
	PART 3	866	ROW FOR SHARED ACCESS + PARKING

EAST PARCEL			
	PART	AREA (SQ/M)	ROW / EASEMENT
	PART 4	274.5	
	PART 5	10.1	ROW FOR SHARED ACCESS
	PART 6	257	ROW FOR SHARED ACCESS + PARKING

[illegible]

ARDINGTON AND ASSOCIATES DESIGN INC.
126 YORK STREET SUITE 502 | OTTAWA, ONTARIO
E: steve@ardington.ca | T: 613.882.3425 | BCIN 43329

The undersigned has reviewed and takes responsibility for design activities as described in Ontario Building Code 1.4.1.2 and as the qualifications and meets the requirements set out in the Ontario Building Code

PROJECT INFORMATION

437 DONALD B MUNRO

CARP ONTARIO

ARCHITECTURAL SITE PLAN
SCALE = 1:150

PROJECT NO.	DRAWN BY	CHECKED BY	DRAWING NO.
	S.A.	S.A.	

A1

