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Klondike Road – Block 10

Noise Impact Assessment

Noise Impact Assessment

**Maple Leaf Homes
Klondike Road – Block 10**

Prepared by:

NOVATECH

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

May 17, 2021

Ref: R-2021-067
Novatech File No. 117034-10

May 17, 2021

BY COURIER

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

Attention: Lisa Stern, Planner

**Reference: Maple Leaf Homes Development
Klondike Road – Block 10
Noise Impact Assessment
Our File No.: 117034-10**

Please find enclosed the 'Noise Impact Assessment' for Maple Leaf Homes Development located at Klondike Road – Block 10.

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

Sincerely,

NOVATECH



Lucas Wilson, P.Eng.
Project Coordinator

Cc: Brian Saumure, Maple Leaf Homes

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1.0 INTRODUCTION

This report is submitted on behalf of the developer, Maple Leaf Homes for the proposed development located at 1055 Klondike Road – Block 10, herein called the ‘Subject Site’. This report assesses the environmental impact of noise on the proposed development and outlines the mitigation measures that will be required.

The proposed development is located within the Kanata North Community west of the intersection of Klondike Road and Sandhill Road. The development is approximately 0.60ha and is bounded by Klondike Road to the south, Shirley’s Brook to the west, and the future 1055 Klondike Road – Orr Ridge Subdivision to the north and east. A key plan of the area is presented below in **Figure 1-1**.

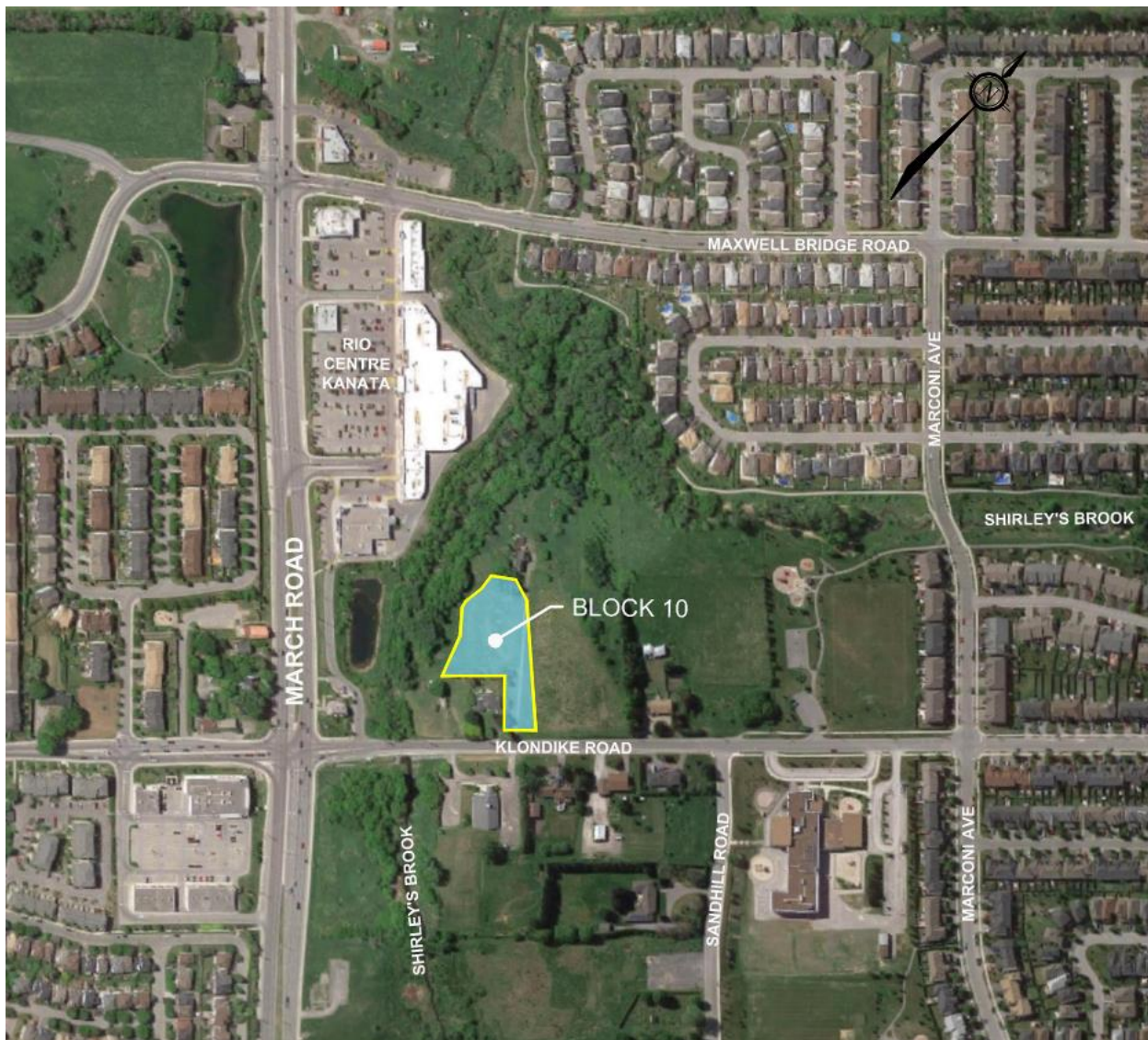


Figure 1-1 Key Plan

This report assesses the impacts of sound from vehicular traffic on the proposed development using the Ministry of the Environment (MOE) Stamson 5.0 software 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).

The following describes the existing and planned land uses adjacent to the subject site:

North / East: The lands north and east of the proposed site is the future 1055 Klondike Road – Orr Ridge Subdivision consisting of town house and semi-detached units.

South: Klondike Road, a two-lane urban collector road, bounds the Subject Site to the south. The Subject Site is located between March Road and Sandhill Road on the North Side of Klondike Road.

Southeast: To the Southeast of the Subject Site, across Klondike Road, are Brookside Baptist Church and The Greenwoods Academy.

West: The RioCentre Kanata (832-858 March Road) is located to the west of the Subject Site, separated by Shirley's Brook.

Plans are to develop a 4-storey apartment building with underground parking on the subject site, as shown on **Figure 1-2**, which will consist of 53 apartment units townhouse units.

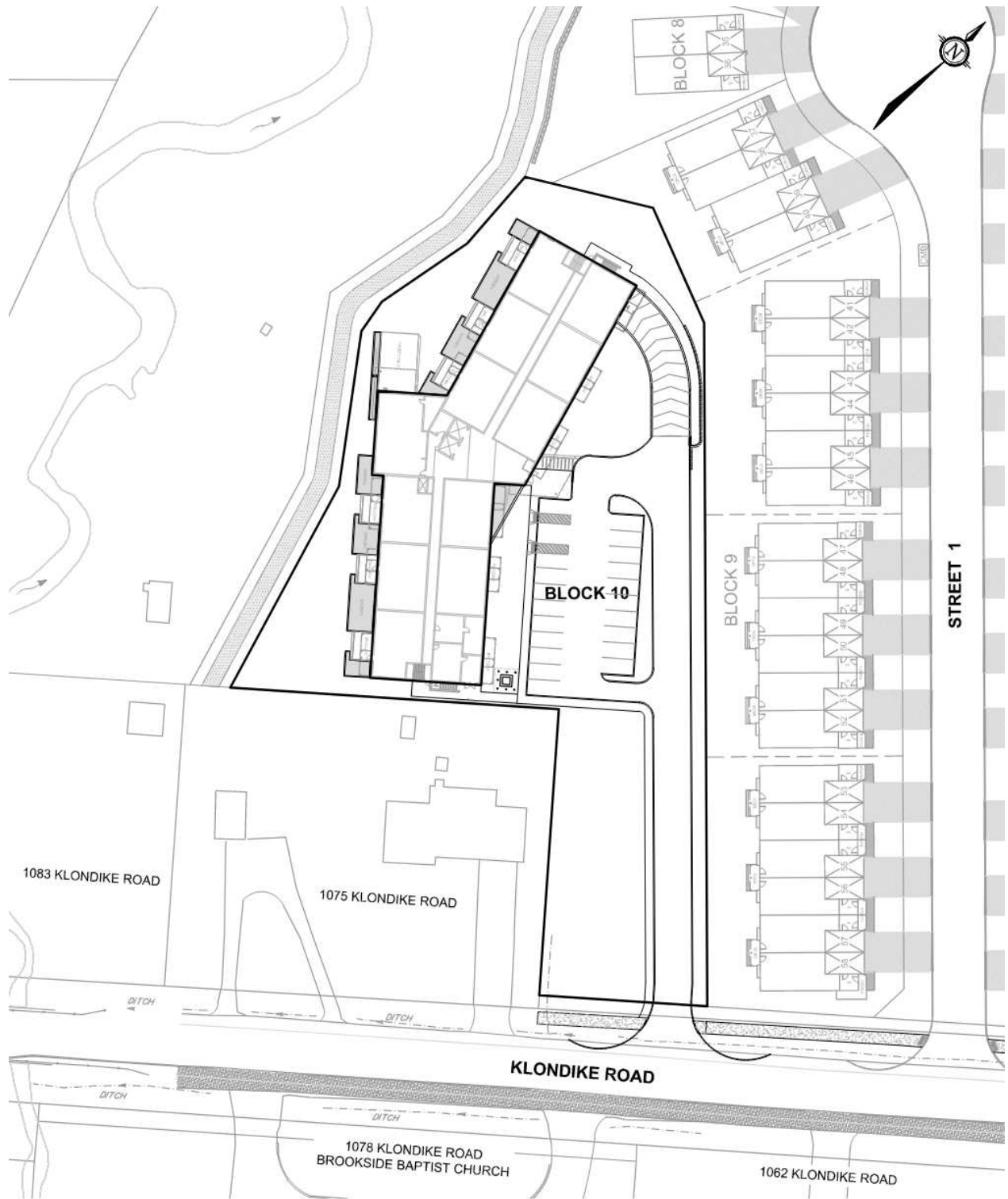


Figure 1-2 Site Plan

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 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 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 sound criterion is broadly summarized in **Table 2-1**. POW noise levels are analysed 1.5m above grade for the first storey, 4.5m above grade for the second storey, 7.5m above grade for the third storey and 10m above grade for the fourth storey.

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

TIME PERIOD	RECEIVER LOCATION	SOUND LEVEL CRITERIA
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
Night Time (23:00 - 07:00 hrs)	Sleeping quarters of residential units , hospitals, nursing homes, senior citizen homes, etc.	40 dBA

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. For the purpose of this study, when noise levels exceed 60 dBA in the Outdoor Living Area, control measures (barriers) are 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 standard 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 noise levels are between 55 dBA and 65 dBA and/or night time 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.

2.2.3 Building Component Assessment

When noise levels exceed 65 dBA (daytime) or 60 dBA (night time) 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 2-3 summarizes the noise attenuation measure requirements and warning clauses should sound criteria be exceeded.

Table 2-3 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.

Due to the site location, only roadway noise will be considered. The following distances to roadway noise sources are applicable to the subject site:

- Within 100m from the right-of-way of an existing/proposed arterial/collector

Figure 3-1 shows the noise source that has an impact on this development. Klondike Road (Collector) is located within 100m of the development.

3.1 Klondike Road (Collector)

Klondike Road is classified as an Urban Collector (2-UCU) Roadway in the 2013 Transportation Master Plan. An Annual Average Daily Traffic (AADT) value of 8,000 is specified for this type of road.

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 Klondike Road Noise Parameters

Roadway Classification	2-Lane Urban Collector
Annual Average Daily Traffic (AADT)	8,000 veh/day
Day/Night Split (%)	92/8
Heavy Trucks (%)	5
Medium Trucks (%)	7
Posted Speed Limit	50 km/hr
Road Gradient	0.5%



Figure 3-1 Noise Sources

4.0 NOISE LEVEL PREDICTIONS

4.1 Modeling

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. The results of these computer calculations are presented in **Appendix B** and summarized in **Table 4-1** and **Table 4-2**.

Table 4-1 OLA Noise Level Summary

LOCATION	OUTDOOR LIVING AREA NOISE LEVEL – L_{eq} - (dBA)
	Unattenuated
R1 (Amenity Area)	53.79

Table 4-2 POW Noise Level Summary

LOCATION	PLANE OF WINDOW (POW) NOISE LEVEL – L_{eq} - (dBA)	
	DAYTIME	NIGHT TIME
R2 (1 st to 4 th Floor)	59.63	52.04
R3 (4 th Floor)	54.10	46.51
R4 (1 st to 4 th Floor)	55.01	47.41

4.2 Outdoor Control Measures

The shared amenity space is located in the interior side yard adjacent to Shirley's Brook. The OLA noise level is below the minimum requirement of 55 dBA (53.79 dBA), therefore no mitigation measures or warning clauses are required.

4.3 Indoor Control Measures

Warning clauses are required on title relating to the requirement of forced air heating with provision for central air conditioning and required central air conditioning.

All units facing Klondike Road and all units facing Shirley's Brook up to receiver location R4 will require forced air heating with provision for central air conditioning and associated warning clause Type C and are identified below in **Figure 5-1**.

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."

4.4 Building Component Assessment

All plane-of-window noise levels within the development are below 65 dBA; therefore, building component assessment is not required. As long as building components are built to Ontario Building Code minimums, all indoor noise levels will meet the City of Ottawa and MOE guidelines outlined in **Table 2-2** above.

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

The noise level in the shared amenity space is below 55 dBA, therefore no warning clause is required.

Indoor Control Measures

All units facing Klondike Road and all units facing Shirley's Brook up to receiver location R4 will require forced air heating with provision for central air conditioning and associated warning clause Type C and are presented in **Figure 5-1**.

Building Component Assessment

All building faces will comply with the ENCG indoor noise policy employing Ontario Building Code minimum building components.

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."



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

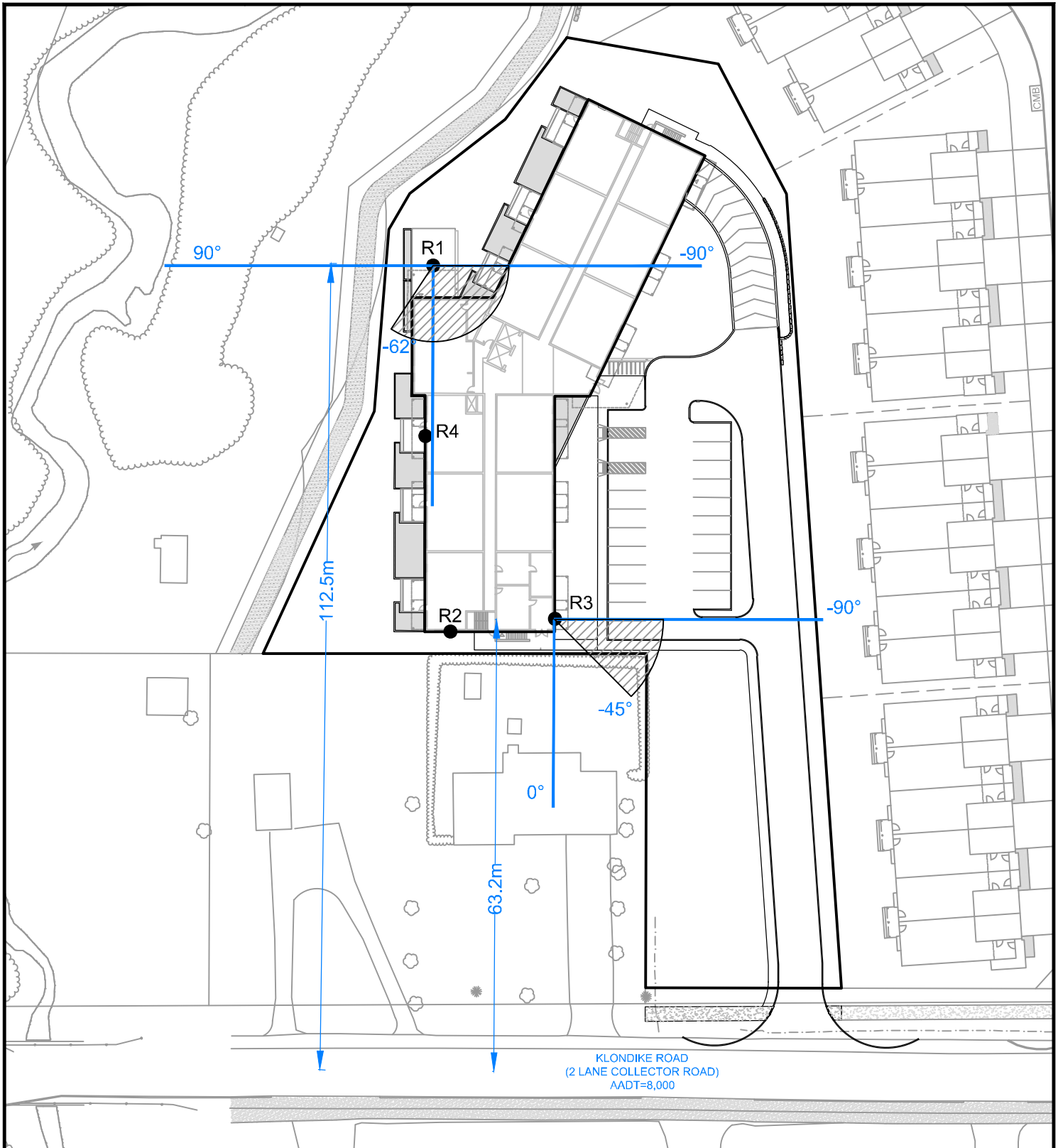
Reviewed By:



Mark Bissett, P.Eng.
Senior Project Manager

APPENDIX A
Receiver Location Figures
Stamson Model Output

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- RECEIVER LOCATION
- ▨ NOISE BARRIER ANGLE

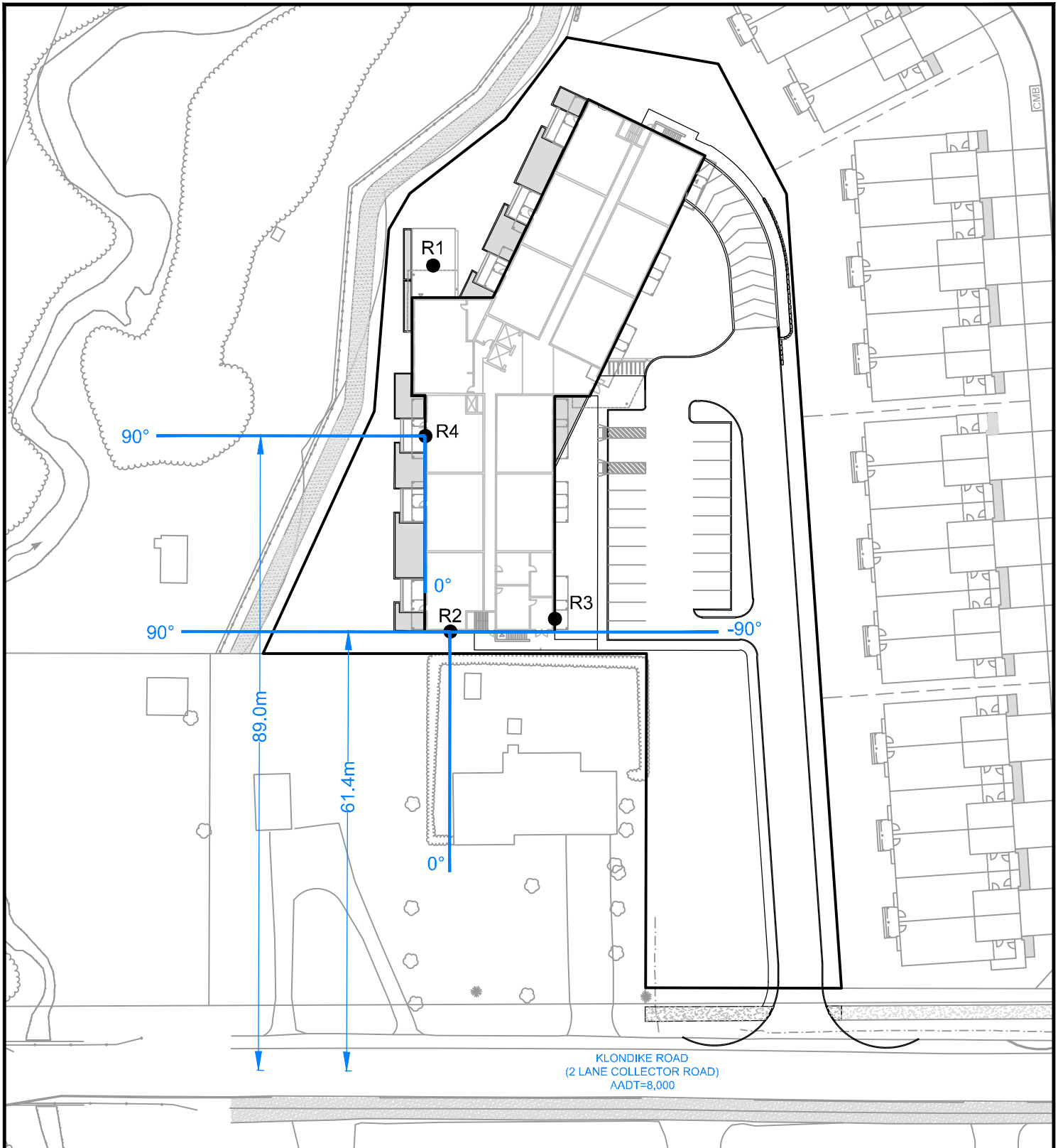
CITY OF OTTAWA
 1055 KLONDIKE ROAD - BLOCK 10

RECEIVER LOCATIONS
 R1 & R3

SCALE 1 : 750

DATE MAY 2021 JOB 117034-10 FIGURE FIG-1

M:\2017\117034\Block 10\DATA\Calculations\Noise\Figures\117034-10-Noise-DSK.dwg, R2 & R4, May 11, 2021 - 8:27pm, IWilson



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● RECEIVER LOCATION

CITY OF OTTAWA
 1055 KLONDIKE ROAD - BLOCK 10

RECEIVER LOCATIONS
 R2 & R4

SCALE 1 : 750

DATE MAY 2021 JOB 117034-10 FIGURE FIG-2

Filename: r1.te Time Period: Day/Night 16/8 hours
Description: OLA R1

Road data, segment # 1: Klondike (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: Klondike (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 : 112.50 / 112.50 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -62.00 deg Angle2 : 33.00 deg
Barrier height : 12.00 m
Barrier receiver distance : 4.50 / 4.50 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Klondike (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	1.50	1.50

ROAD (48.92 + 34.22 + 52.01) = 53.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-62	0.00	65.75	0.00	-8.75	-8.08	0.00	0.00	0.00	48.92
-62	33	0.00	65.75	0.00	-8.75	-2.78	0.00	0.00	-20.00	34.22
33	90	0.00	65.75	0.00	-8.75	-4.99	0.00	0.00	0.00	52.01

Segment Leq : 53.79 dBA

Total Leq All Segments: 53.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.79

Filename: r2.te Time Period: Day/Night 16/8 hours
Description: POW R2

Road data, segment # 1: Klondike (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: Klondike (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 : 61.40 / 61.40 m  
Receiver height : 1.50 / 1.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00
```

Results segment # 1: Klondike (day)

Source height = 1.50 m

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.75	0.00	-6.12	0.00	0.00	0.00	0.00	59.63

Segment Leq : 59.63 dBA

Total Leq All Segments: 59.63 dBA

Results segment # 1: Klondike (night)

Source height = 1.50 m

ROAD (0.00 + 52.04 + 0.00) = 52.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	58.16	0.00	-6.12	0.00	0.00	0.00	0.00	52.04

Segment Leq : 52.04 dBA

Total Leq All Segments: 52.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.63
(NIGHT): 52.04

Filename: r3.te Time Period: Day/Night 16/8 hours
 Description: POW R3

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

```
-----
Angle1    Angle2            : -90.00 deg    0.00 deg
Wood depth : 0                    (No woods.)
No of house rows : 0 / 0
Surface : 2                    (Reflective ground surface)
Receiver source distance : 63.20 / 63.20 m
Receiver height : 10.50 / 10.50 m
Topography : 2                    (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg    Angle2 : -45.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 44.00 / 44.00 m
Source elevation : 76.51 m
Receiver elevation : 78.34 m
Barrier elevation : 78.00 m
Reference angle : 0.00
```

Results segment # 1: Klondike (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 !            10.50 !            3.30 !            81.30
```

ROAD (0.00 + 45.34 + 53.48) = 54.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.00	65.75	0.00	-6.25	-6.02	0.00	0.00	-8.15	45.34
-45	0	0.00	65.75	0.00	-6.25	-6.02	0.00	0.00	0.00	53.48

Segment Leq : 54.10 dBA

Total Leq All Segments: 54.10 dBA

Results segment # 1: Klondike (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 ! 10.50 ! 3.30 ! 81.30

ROAD (0.00 + 37.74 + 45.89) = 46.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.00	58.16	0.00	-6.25	-6.02	0.00	0.00	-8.15	37.74
-45	0	0.00	58.16	0.00	-6.25	-6.02	0.00	0.00	0.00	45.89

Segment Leq : 46.51 dBA

Total Leq All Segments: 46.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.10
(NIGHT): 46.51

Filename: r4.te Time Period: Day/Night 16/8 hours
Description: POW R4

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

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 89.00 / 89.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Klondike (day)

Source height = 1.50 m

ROAD (0.00 + 55.01 + 0.00) = 55.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	65.75	0.00	-7.73	-3.01	0.00	0.00	0.00	55.01

Segment Leq : 55.01 dBA

Total Leq All Segments: 55.01 dBA

Results segment # 1: Klondike (night)

Source height = 1.50 m

ROAD (0.00 + 47.41 + 0.00) = 47.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	58.16	0.00	-7.73	-3.01	0.00	0.00	0.00	47.41

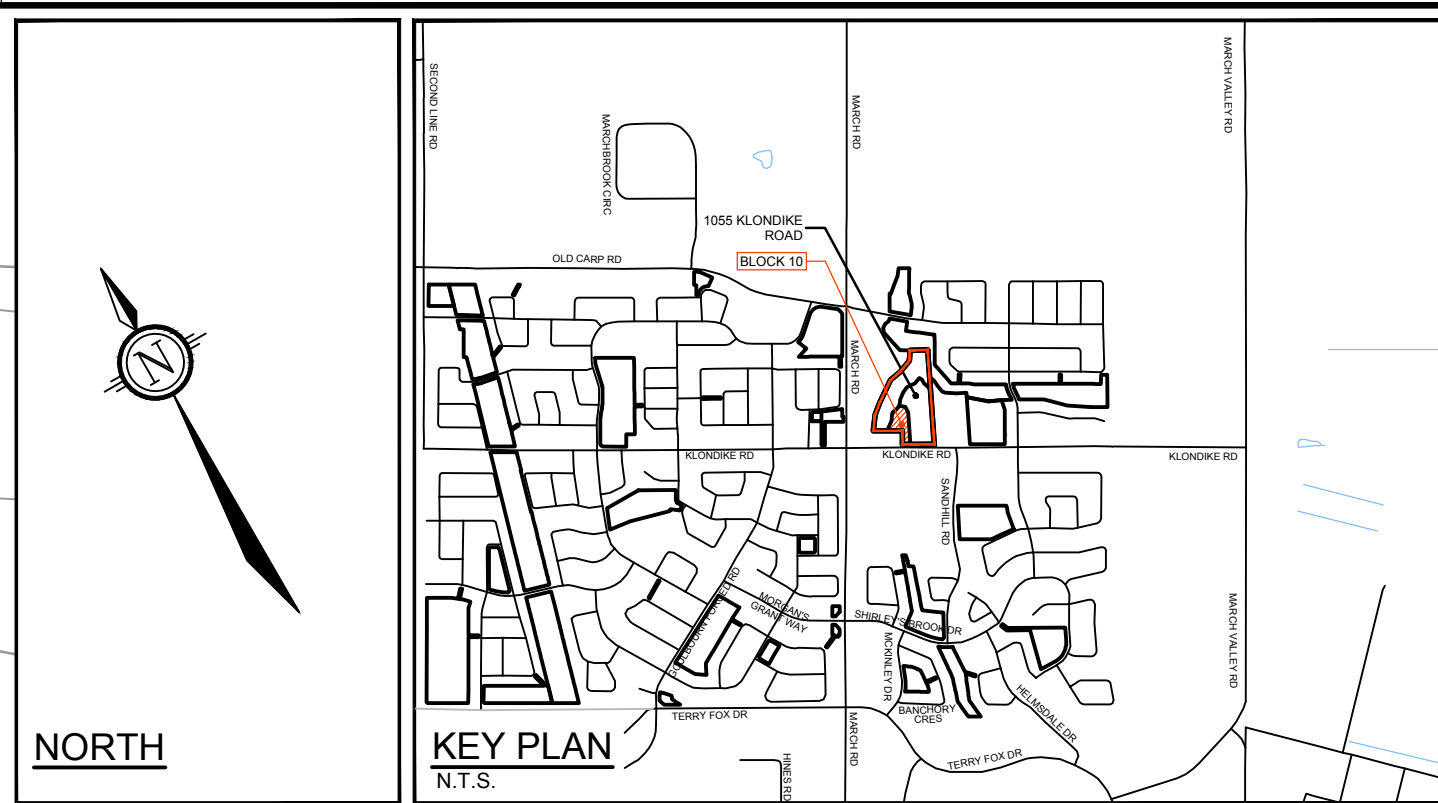
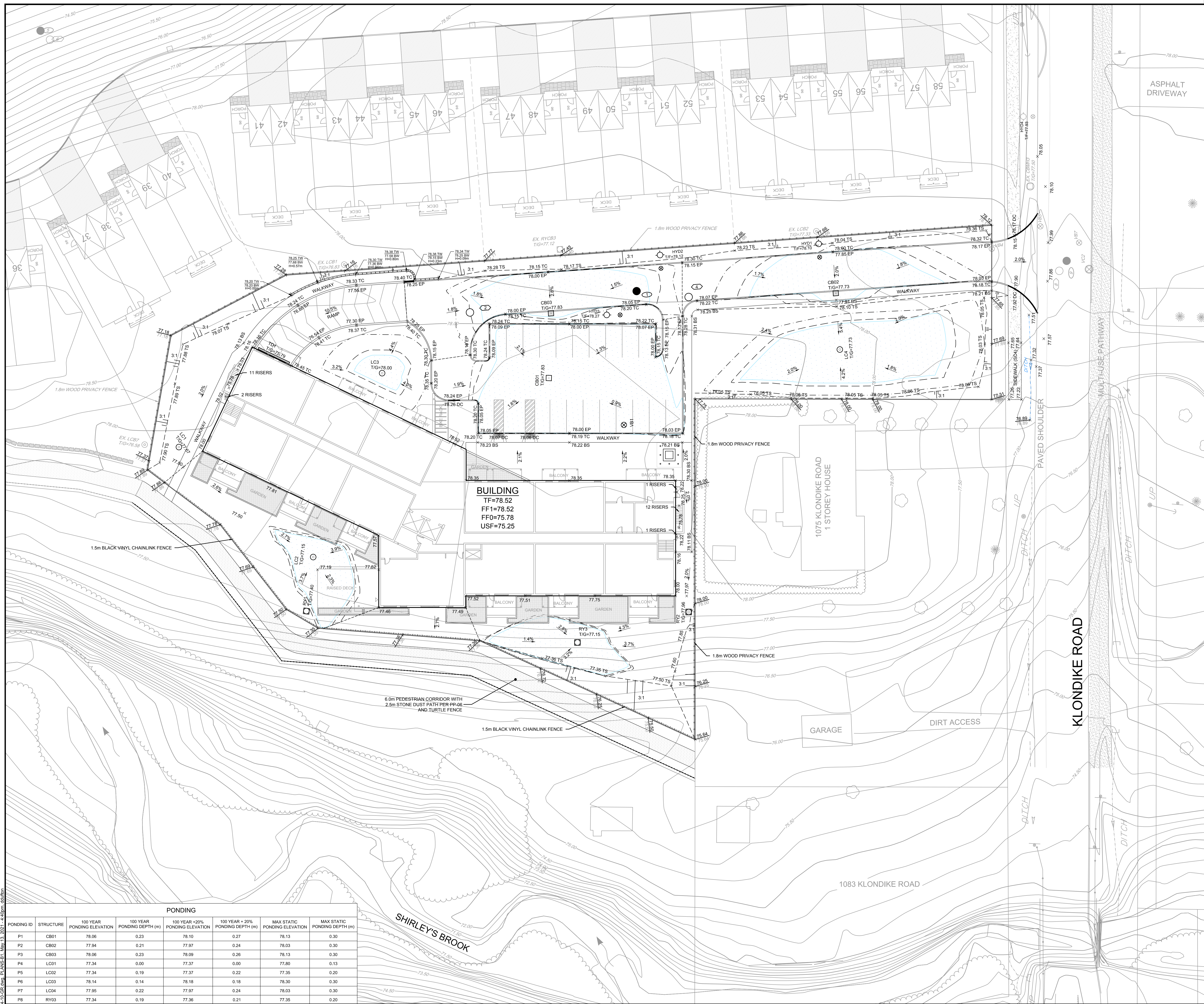
Segment Leq : 47.41 dBA

Total Leq All Segments: 47.41 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.01
(NIGHT): 47.41

APPENDIX B

117034-GR (Grading Plan)



LEGEND

	PROPOSED GRADE AND DIRECTION OF FLOW		TF TOP OF FOUNDATION
	PROPOSED ELEVATION		FF1 FINISHED FLOOR ELEVATION - 1 ST FLOOR
	PROPOSED ELEVATION		FF0 FINISHED FLOOR ELEVATION - BASEMENT
	PROPOSED TOP OF WALL ELEVATION		EP EDGE OF PAVEMENT
	PROPOSED BOTTOM OF WALL ELEVATION		TC TOP OF CURB
	EXISTING ELEVATION		BS BACK OF SIDEWALK
	TERRACING (3:1 MAX)		TS TOP OF SLOPE
	PROPOSED RETAINING WALL		DC TOP OF SLOPE
	MAJOR OVERLAND FLOW DIRECTION		MAX STATIC PONDING LIMITS
	EXISTING CONTOUR AND ELEVATION		100-YR PONDING LIMITS
			100-YR +20% PONDING LIMITS

- GENERAL NOTES:**
- DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 - THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVISING 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.
 - COORDINATE 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 OWNERS 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 REINSTATE 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.
 - ASPHALT WALKWAY TO BE CONSTRUCTED PER CITY STANDARD SC 20.
 - REFER TO GEOTECHNICAL INVESTIGATION (DATED APRIL 4, 2018), PREPARED BY GEMTEC FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
 - PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.
 - DECOMMISSIONING OF ALL MONITORING WELLS AND DRINKING WATER WELLS SHALL BE CARRIED OUT AND IN ACCORDANCE WITH OREG. 903. ANY SEPTIC SYSTEM OR AGRICULTURAL TILES DRAINS SHALL BE DECOMMISSIONED PRIOR TO ISSUANCE OF COMMENCE WORK NOTIFICATION.

- 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.
 - 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 GRANULARS.
 - PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
 - MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
 - MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
 - ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
 - ALL CURBS SHALL BE BARRIER CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.1).
 - REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

PAVEMENT STRUCTURE:

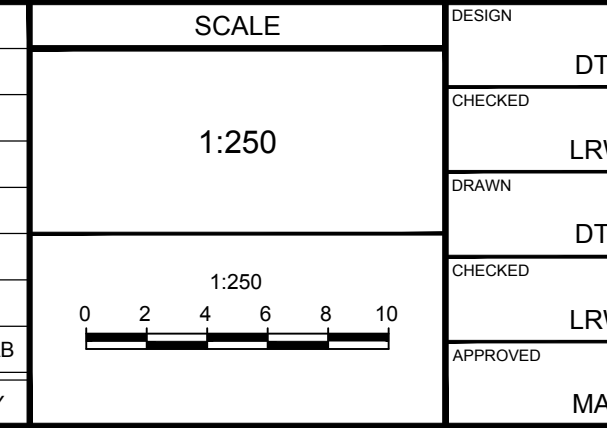
40mm	ASPHALT SP12.5
60mm	ASPHALT SP19.0
150mm	GRAN "A"
450mm	GRAN "B" TYPE II
700mm	TOTAL DEPTH

PONDING

PONDING ID	STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR + 20% PONDING ELEVATION	100 YEAR + 20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
P1	CB01	78.06	0.23	78.10	0.27	78.13	0.30
P2	CB02	77.94	0.21	77.97	0.24	78.03	0.30
P3	CB03	78.06	0.23	78.09	0.26	78.13	0.30
P4	LC01	77.34	0.00	77.37	0.00	77.80	0.13
P5	LC02	77.34	0.19	77.37	0.22	77.35	0.20
P6	LC03	78.14	0.14	78.18	0.18	78.30	0.30
P7	LC04	77.95	0.22	77.97	0.24	78.03	0.30
P8	RY03	77.34	0.19	77.36	0.21	77.35	0.20

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.	ISSUED FOR APPROVAL	MAY 17/21	MAB



FOR REVIEW ONLY

DESIGN	DTD	
CHECKED	LRW	
DRAWN	DTD	
CHECKED	LRW	
APPROVED	MAB	

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CITY OF OTTAWA
KLONDIKE RIDGE - BLOCK 10

GRADING PLAN

PROJECT NO:	117034-10
REV:	REV # 1
DRAWING NO:	117034-10-GR