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36 Years

Abbott-Fernbank Holdings Inc.
Fernbank Crossing – Phase 5

Noise Impact Assessment

Noise Impact Assessment

Abbott-Fernbank Holdings Inc.
Fernbank Crossing – Phase 5

Prepared by:

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

December 7, 2018

Ref: R-2018-110
Novatech File No. 108180-19

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December 7, 2018

BY COURIER

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

Attention: Rosanna Baggs

Reference: Fernbank Crossing Subdivision - Phase 5
Noise Impact Assessment
Our File No.: 108180-19

Please find enclosed three (3) copies of the 'Noise Impact Assessment' for Phase 5 of the proposed Fernbank Crossing residential development.

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 Abbott-Fernbank Holdings Inc. (Abbott-Fernbank) Lands are located within the new Fernbank Community on the north side of Fernbank Road, west of Terry Fox Drive. **Figure 1-1** shows the location of the Fernbank Community and the Abbott-Fernbank Lands. The lands will be developed as a low to medium density residential subdivision called Fernbank Crossing.

Figure 1-1 Key Plan

The proposed subdivision is approximately 67.30ha and will be bordered by future residential lands to the west (CRT Developments Inc.), a hydro corridor and the Trans-Canada Trail to the north, future residential lands (Blackstone) to the east, and agricultural land to the south.

Phase 5 of the proposed development will consist of 47 townhomes, as shown in **Figure 1-2**.

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).

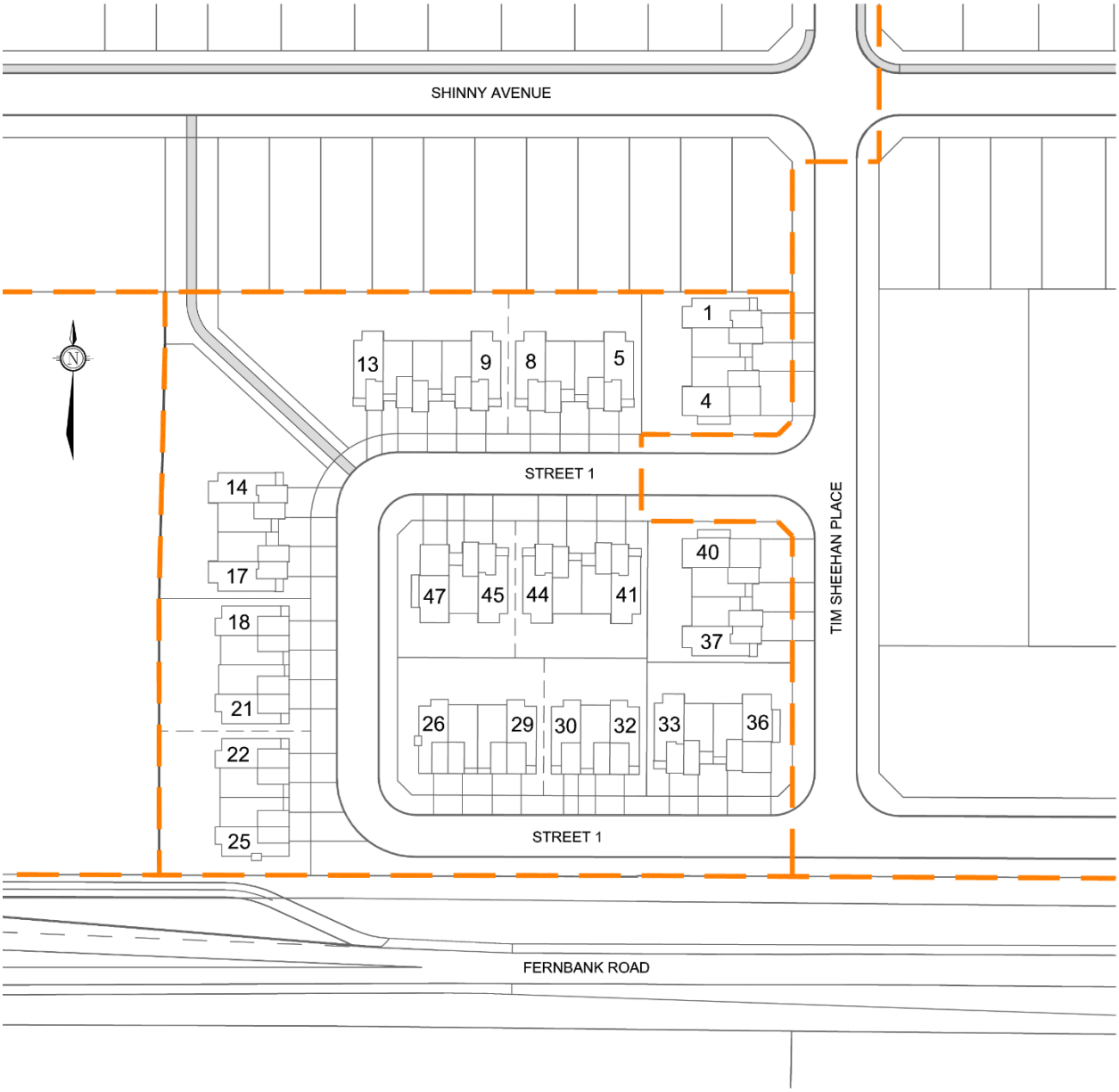


Figure 1-2 Plan of Subdivision – Phase 5

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 and 7.5m above grade for the third 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 60 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
	Between55 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
	Between50 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. Fernbank Road (Arterial) is located within 100m of the development.

3.1 Fernbank Road (Arterial)

Fernbank Road is classified as a 2-Lane Rural Arterial (2-RAU) Roadway in the 2013 Transportation Master Plan. An Annual Average Daily Traffic (AADT) value of 15,000 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 Fernbank Road Noise Parameters

Roadway Classification	2-Lane Rural Arterial
Annual Average Daily Traffic (AADT)	15,000 veh/day
Day/Night Split (%)	92/8
Heavy Trucks (%)	5
Medium Trucks (%)	7
Posted Speed Limit	80 km/hr
Road Gradient	1.5%

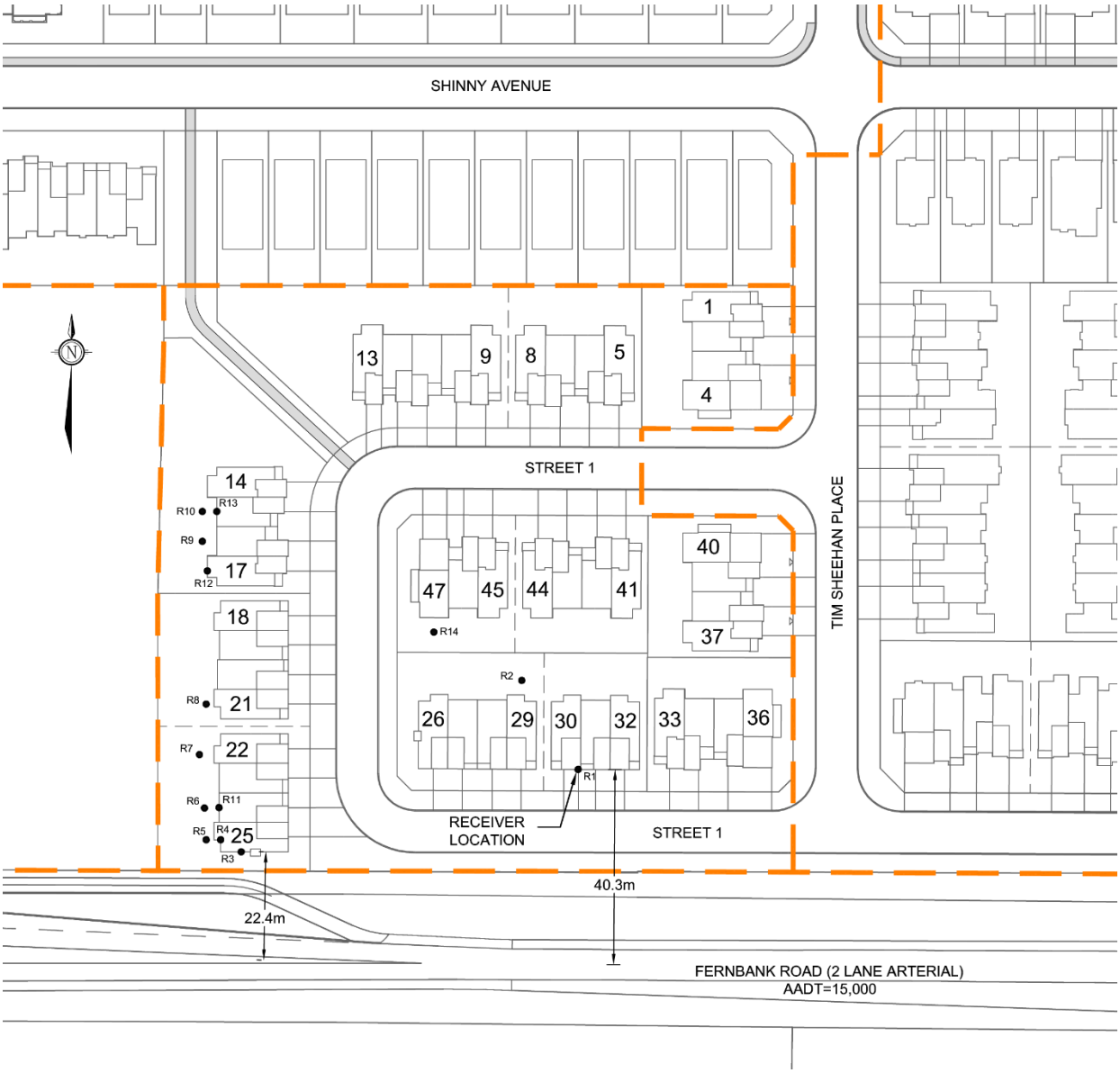


Figure 3-1 Noise Sources

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 – Leq - (dBA)	OUTDOOR LIVING AREA NOISE LEVEL – L_{eq} - (dBA)
	Unattenuated	Attenuated
R2	47.15	-
R5	66.82	59.95 (2.2m Wall) 54.86 (3.7m Wall)
R6	63.82	58.53 (2.2m Wall)
R7	61.25	59.15 (2.2m Wall)
R8	59.30	58.01 (2.2m Wall)
R9	55.61	55.10 (2.2m Wall)
R10	55.11	54.65 (2.2m Wall)
R14	53.02	-

Table 4-2 POW Noise Level Summary

LOCATION	PLANE OF WINDOW (POW) NOISE LEVEL – L_{eq} - (dBA)	
	DAYTIME	NIGHT TIME
R1	63.89	56.83
R3	68.17	60.88
R4	64.42	57.18
R11	62.72	55.56
R12	55.94	49.15
R13	54.91	48.18

4.2 Outdoor Control Measures

The OLA noise levels at R5, R6 and R7 are above 60 dBA with no noise barriers in place. In order to reduce the noise level below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible, we recommend construction of a 2.2m noise barrier located 0.30m inside the south and west property line of Unit 25 as shown in **Figure 5-1**. With the 2.2m high noise barrier at the above-mentioned unit, the modeled L_{eq} at all locations will be below 60 dBA.

Additional control measures have been utilized within the development to reduce OLA noise levels adjacent significant noise sources. The units have been oriented such that the OLA areas are shielded from Fernbank Road by the buildings. Units adjacent Fernbank Road have been situated to provide an increased setback from the roadway by way of a single loaded road.

As shown above, mitigation measures have been implemented to reduce noise levels below 60 dBA and as close to 55 dBA as possible. Along with the above-mentioned noise barrier, warning clauses (Type A and B) are to be included on title and in the purchase and sale agreements.

Typical wording for Type A warning clause: “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.”

Typical wording for Type B warning clause: “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 and Transitway 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.”

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.

Units requiring forced air heating with provision for central air conditioning and associated warning clause Type C 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.”

Units requiring central air conditioning and associated warning clause Type D are identified below in **Figure 5-1.**

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 worst-case sound level is located at R3 facing Fernbank Road and is above the 65 dBA (daytime) and 60 dBA (night-time) allowances at 68.17 dBA and 60.88 dBA respectively. 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**. Compliance at the worst-case receiver points will demonstrate compliance for all locations.

The acoustical insulation factor for residential living rooms is calculated as follows:

Three Building Components: AIF = 68.17 dBA – 45 dBA + 10log(3) dBA + 2 dBA = 30

To comply with the ENCG policies, the building components facing Fernbank Road will require a minimum AIF rating of 30 to provide the appropriate indoor noise levels. Presented below are recommended building materials that provide the required AIF rating. These building materials are only suggestions and can be substituted with equivalent building materials that meet or exceed the AIF rating.

A wall with type EW1 composition (refer to **Appendix C** for applicable worksheets) has an AIF of 30 with an exterior wall to interior floor area of 125%; this meets the minimum requirements for 3 components. A standard residential window section employs 6mm glazing x 13mm air space x 6mm glazing, which has an AIF of 30 if located in a room with a window to floor area ratio of 40%. Typical residential dwelling construction provides window-to-floor area ratios which are less than this value, and as such the exterior building envelope is shown to comply with the ENCG policy if the minimum ratios are met.

When the building floor plans and exterior facade have been finalized, the tables in **Appendix C** shall be referenced to ensure that the selected building components exceed the minimum AIF rating.

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

To comply with the ENCG policies, a 2.2m noise barrier shall be constructed 0.30m inside the south and west property line of Unit 25. The noise barrier shall be constructed as described above in **Sections 2.2.1** and **4.2** and as presented in **Figure 5-1**. All units that require warning clause type A and B are described below.

- Units 22 to 25: Warning clause Type B
- Units 16 to 21: Warning clause Type A.

Indoor Control Measures

All units that require warning clause Type C or Type D are described below, and presented in **Figure 5-1**.

- Unit 25: Warning Clause Type D
- Units 16 to 24 and Units 26 to 36: Warning Clause Type C

Building Component Assessment

All building faces will comply with the ENCG indoor noise policy employing EW1 wall components and standard residential window sections 6mm glazing x 13mm air space x 6mm glazing.

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.

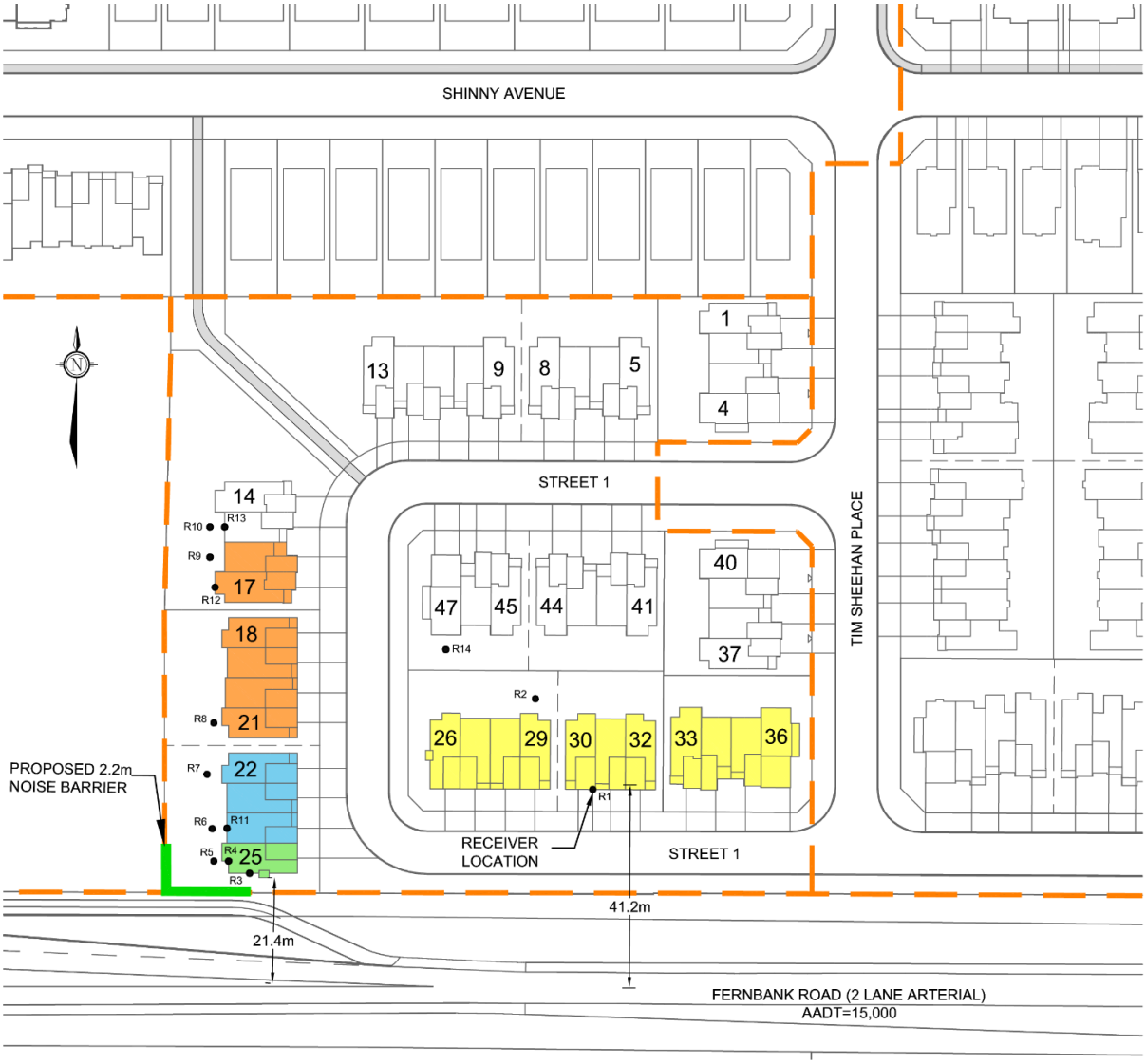
Warning Clause Type 'A'
"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

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."



FORCED AIR HEATING WITH PROVISION FOR CENTRAL AIR WARNING CLAUSE TYPE 'C'

FORCED AIR HEATING WITH PROVISION FOR CENTRAL AIR WARNING CLAUSE TYPE 'A' AND 'C'

FORCED AIR HEATING WITH PROVISION FOR CENTRAL AIR WARNING CLAUSE TYPE 'B' AND 'C'

CENTRAL AIR CONDITIONING WARNING CLAUSE TYPE 'B' AND 'D'

PROPOSED 2.2m NOISE BARRIER

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:

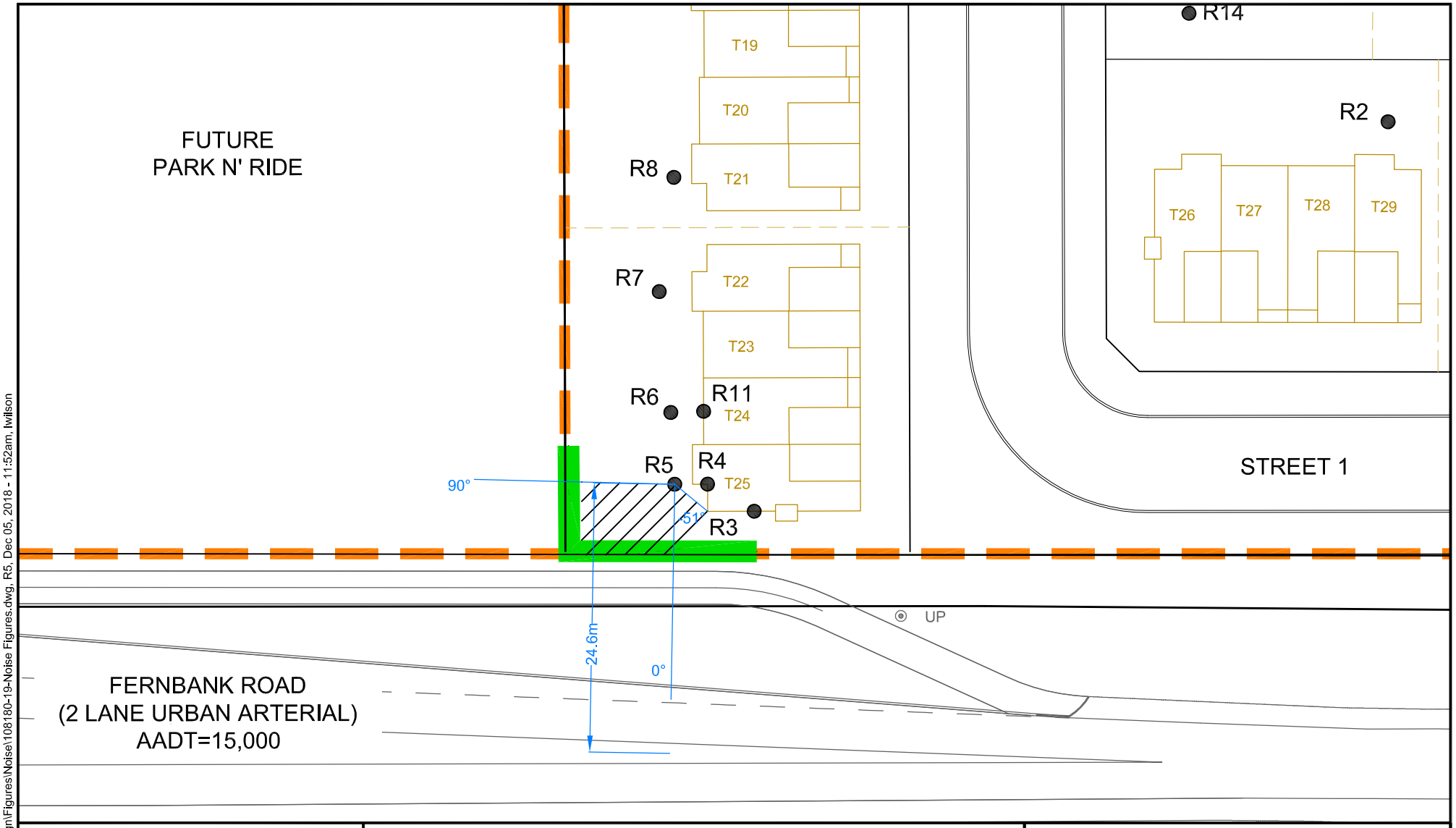
Lucas Wilson, P.Eng.
Project Coordinator

Reviewed By:

Mark Bissett, P.Eng.
Senior Project Manager

APPENDIX A

Receiver Location Figures
Stamson Model Output



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RECEIVER LOCATION

BARRIER ANGLE

CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R5

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-1

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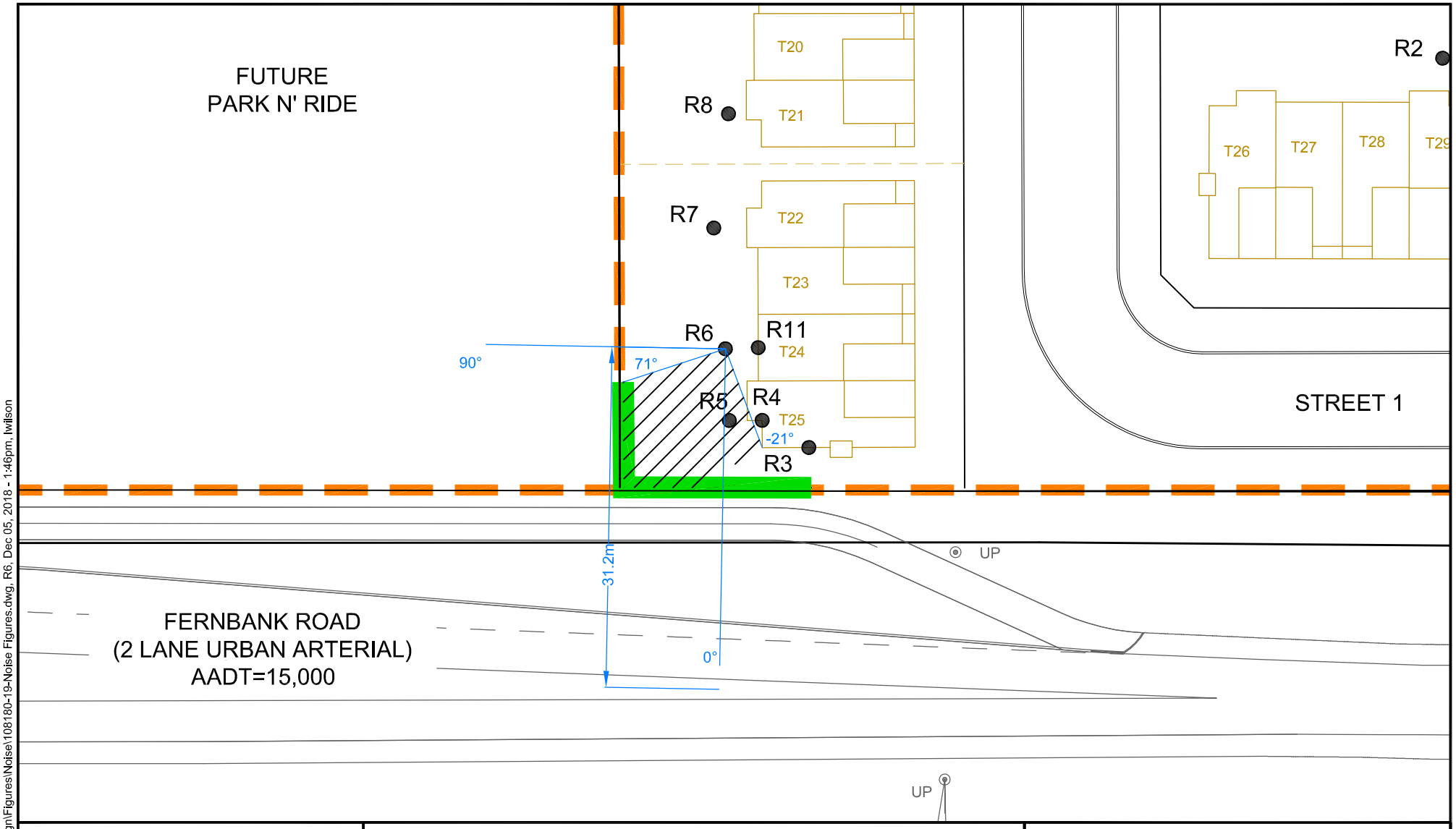

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RECEIVER LOCATION

BARRIER ANGLE

CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R6

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-2

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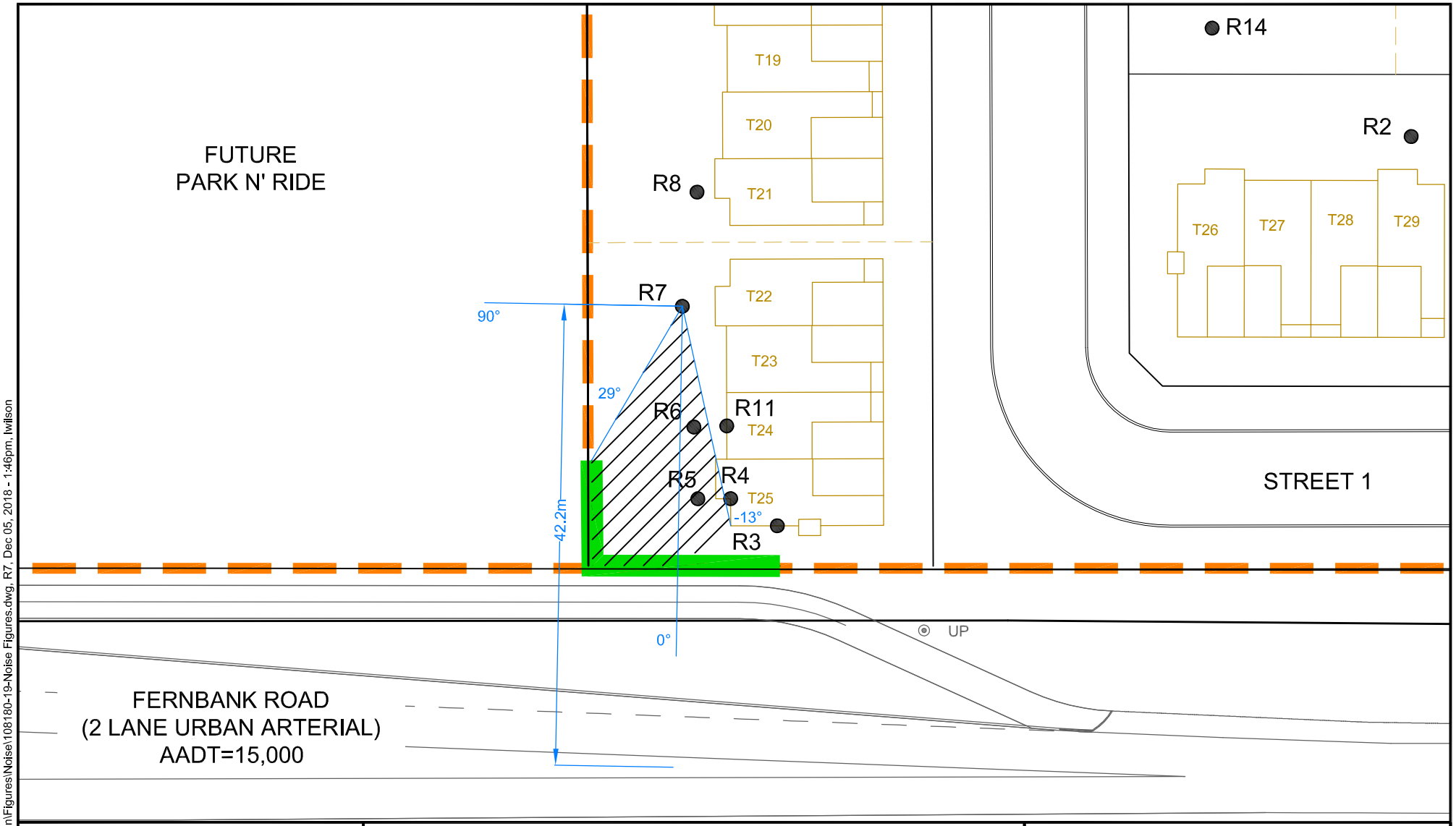

RECEIVER LOCATION

BARRIER ANGLE

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CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R7

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-3

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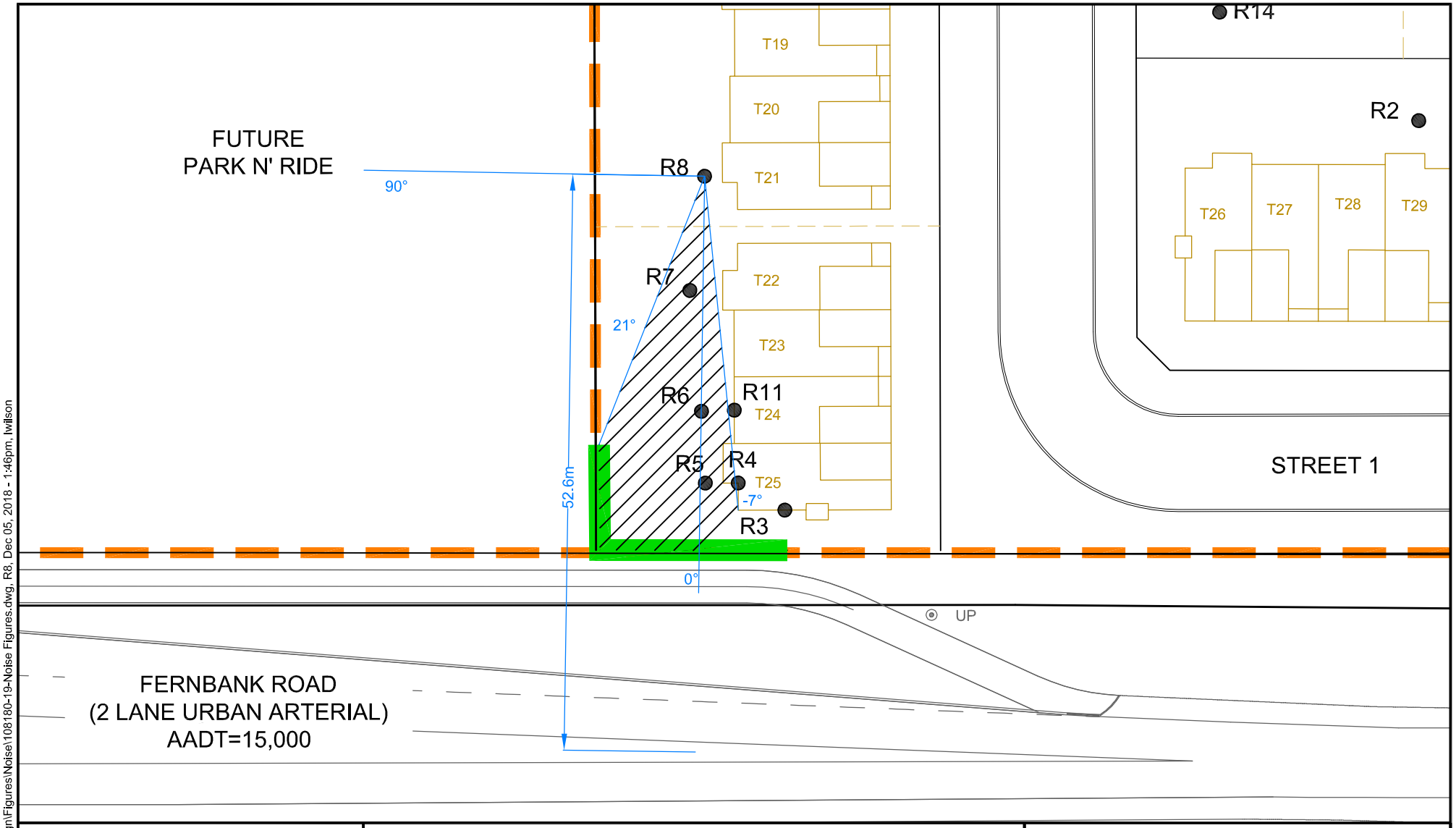

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RECEIVER LOCATION

BARRIER ANGLE

CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R8

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-4

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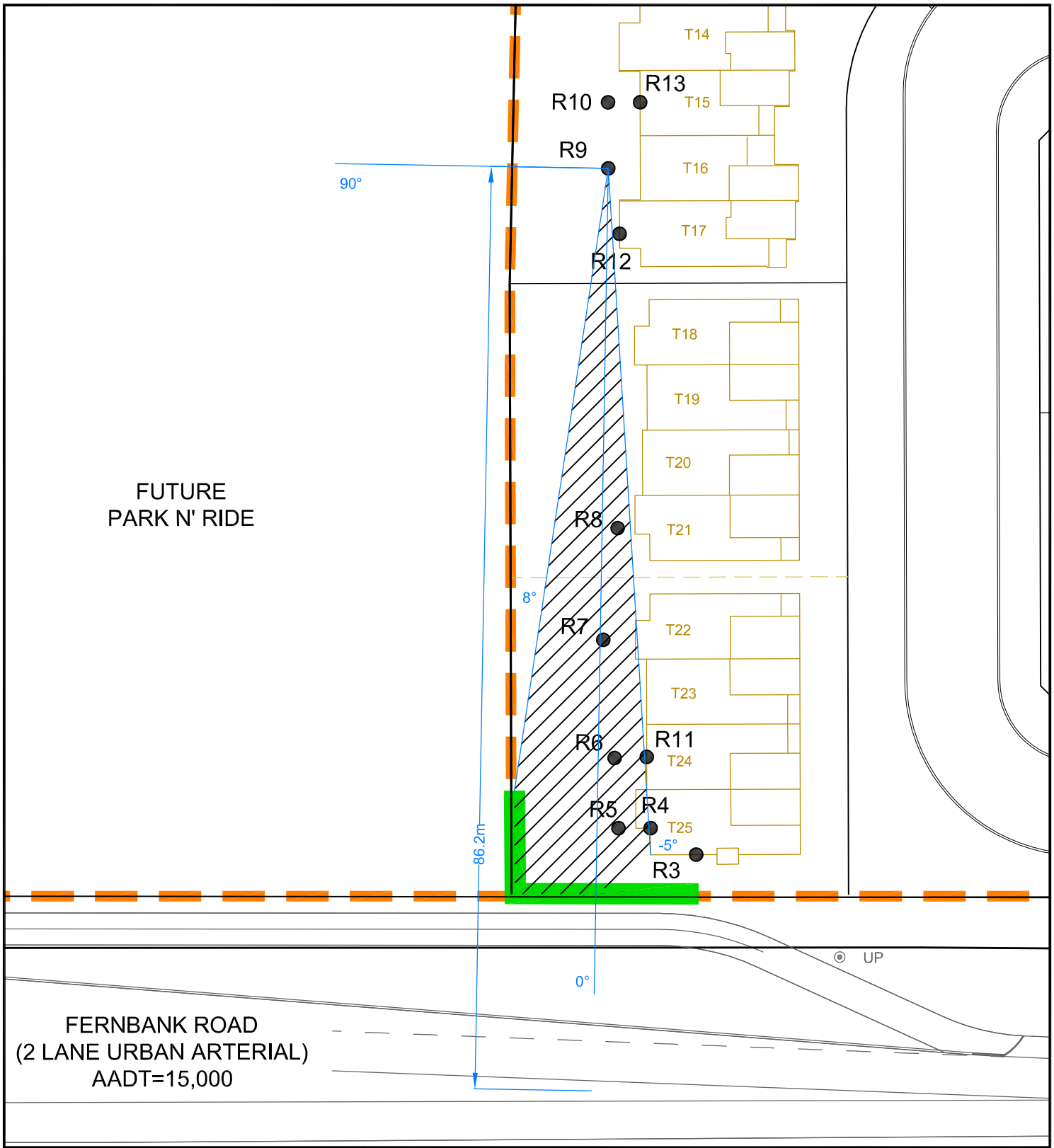

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RECEIVER LOCATION

BARRIER ANGLE

CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R9

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-5

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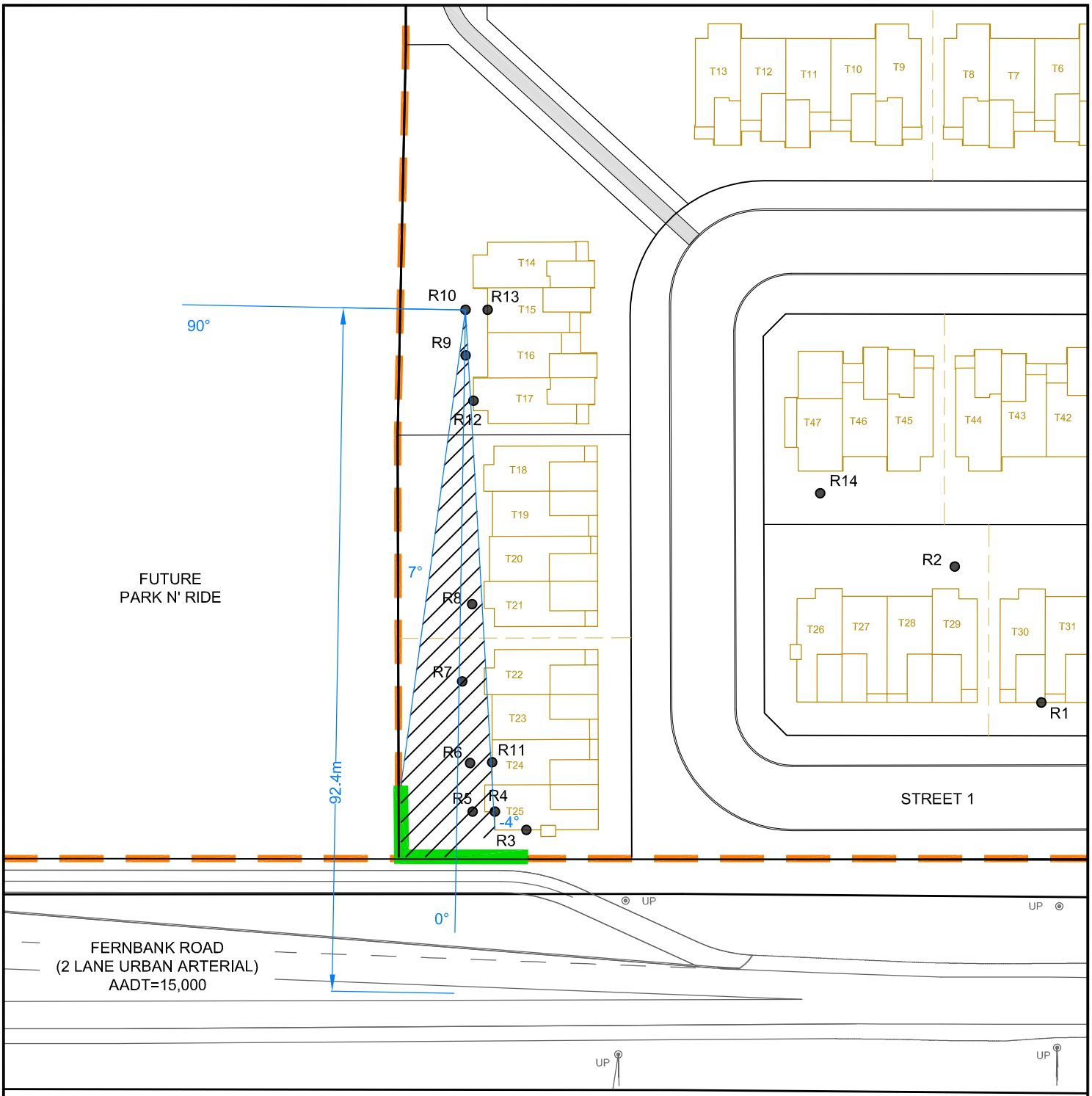

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RECEIVER LOCATION

BARRIER ANGLE

CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R10

SCALE 1 : 750 (0, 10, 20, 30)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-6

SHT8X11.DWG - 216mmx279mm

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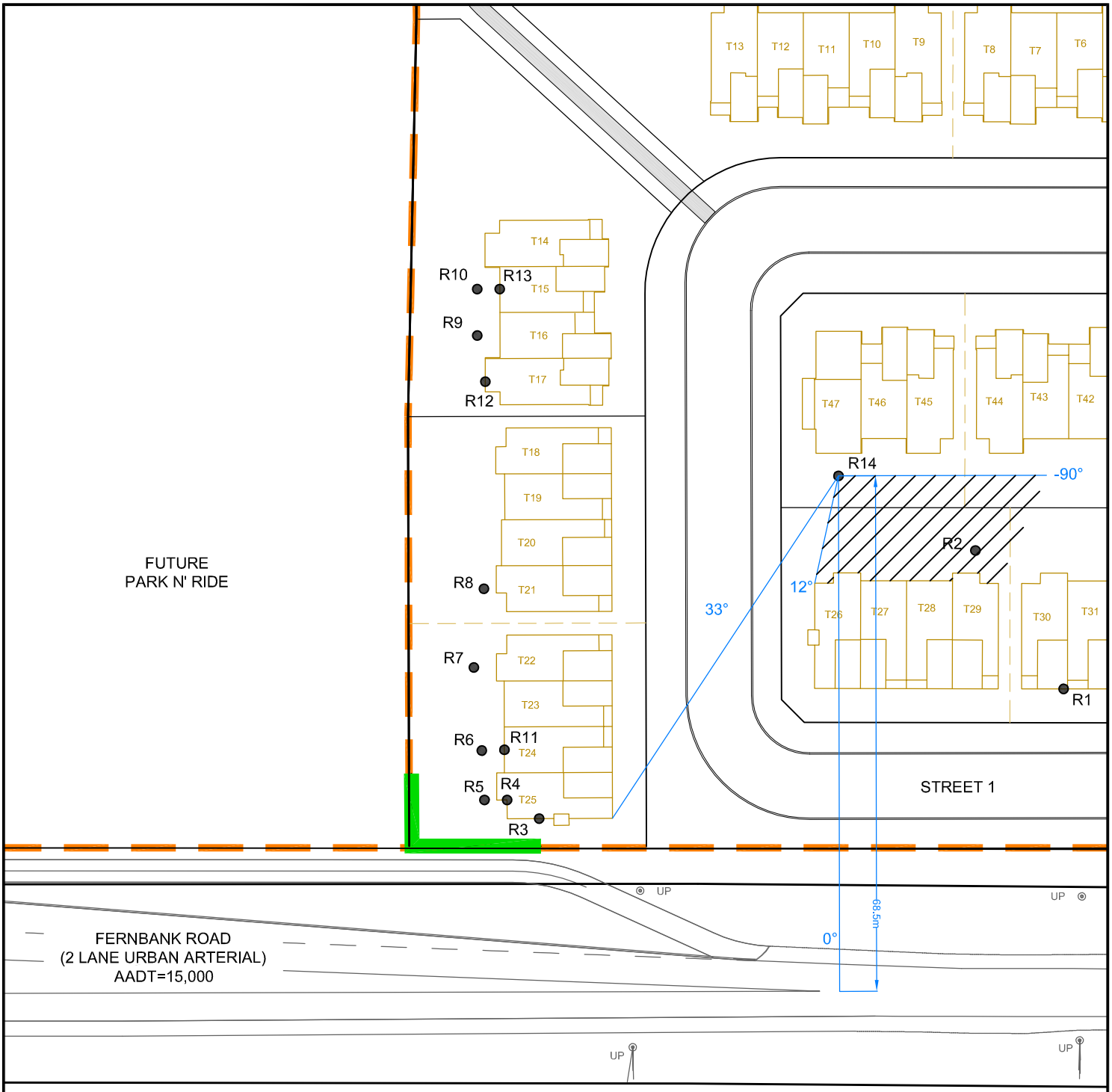

RECEIVER LOCATION

BARRIER ANGLE

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
FERNBANK CROSSING - PHASE 5

RECEIVER LOCATION R14

SCALE 1 : 750 (0, 10, 20, 30)

DATE DEC 2018 | JOB 108180-19 | FIGURE FIG-7

SHT8X11.DWG - 216mmx279mm

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STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:22:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Fernbank (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	: 80	km/h
Road gradient	: 2	%
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 # 1: Fernbank (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 40.40 / 40.40	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 63.89 + 0.00) = 63.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.49	0.00	-7.14	-1.46	0.00	0.00	0.00	63.89

Segment Leq : 63.89 dBA

Total Leq All Segments: 63.89 dBA

Results segment # 1: Fernbank (night)

Source height = 1.50 m

ROAD (0.00 + 56.83 + 0.00) = 56.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	64.89	0.00	-6.76	-1.30	0.00	0.00	0.00	56.83

Segment Leq : 56.83 dBA

Total Leq All Segments: 56.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.89
(NIGHT): 56.83

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:23:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 60.20 / 60.20 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 7.50 m
Barrier receiver distance : 3.00 / 8.60 m
Source elevation : 105.75 m
Receiver elevation : 105.07 m
Barrier elevation : 105.14 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.46	106.60

ROAD (0.00 + 47.15 + 0.00) = 47.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.21	72.49	0.00	-7.30	-0.56	0.00	0.00	-17.48	47.15

Segment Leq : 47.15 dBA

Total Leq All Segments: 47.15 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 47.15

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:24:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.30 / 22.30 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 68.17 + 0.00) = 68.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	72.49	0.00	-2.86	-1.46	0.00	0.00	0.00	68.17

Segment Leq : 68.17 dBA

Total Leq All Segments: 68.17 dBA

Results segment # 1: Fernbank (night)

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	64.89	0.00	-2.70	-1.30	0.00	0.00	0.00	60.88

Segment Leq : 60.88 dBA

Total Leq All Segments: 60.88 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.17
(NIGHT): 60.88

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:24:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Fernbank (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	: 80	km/h
Road gradient	: 2	%
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 # 1: Fernbank (day/night)

Angle1 Angle2	: 0.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 24.70 / 24.70	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 64.42 + 0.00) = 64.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	72.49	0.00	-3.60	-4.47	0.00	0.00	0.00	64.42

Segment Leq : 64.42 dBA

Total Leq All Segments: 64.42 dBA

Results segment # 1: Fernbank (night)

Source height = 1.50 m

ROAD (0.00 + 57.18 + 0.00) = 57.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	64.89	0.00	-3.40	-4.31	0.00	0.00	0.00	57.18

Segment Leq : 57.18 dBA

Total Leq All Segments: 57.18 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.42
(NIGHT): 57.18

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:25:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5.te Time Period: Day/Night 16/8 hours
Description: R5 OLA (Unattenuated)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -51.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.60 / 24.60 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 66.82 + 0.00) = 66.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-51	90	0.66	72.49	0.00	-3.57	-2.10	0.00	0.00	0.00	66.82

Segment Leq : 66.82 dBA

Total Leq All Segments: 66.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.82

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:26:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5w1.te Time Period: Day/Night 16/8 hours
Description: R5 OLA (2.2m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -51.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.60 / 24.60 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -51.00 deg Angle2 : 90.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 6.00 / 6.00 m
Source elevation : 106.50 m
Receiver elevation : 106.30 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.35	107.85

ROAD (0.00 + 59.95 + 0.00) = 59.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-51	90	0.53	72.49	0.00	-3.28	-1.94	0.00	0.00	-7.32	59.95

Segment Leq : 59.95 dBA

Total Leq All Segments: 59.95 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.95

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:26:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5w3.te Time Period: Day/Night 16/8 hours
Description: R5 OLA (3.7m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -51.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.60 / 24.60 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -51.00 deg Angle2 : 90.00 deg
Barrier height : 3.70 m
Barrier receiver distance : 6.00 / 6.00 m
Source elevation : 106.50 m
Receiver elevation : 106.30 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.35	107.85

ROAD (0.00 + 54.86 + 0.00) = 54.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-51	90	0.44	72.49	0.00	-3.09	-1.82	0.00	0.00	-12.72	54.86

Segment Leq : 54.86 dBA

Total Leq All Segments: 54.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.86

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:28:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te Time Period: Day/Night 16/8 hours
Description: R6 OLA (Unattenuated)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -18.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.10 / 31.10 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 63.82 + 0.00) = 63.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-18	90	0.66	72.49	0.00	-5.26	-3.41	0.00	0.00	0.00	63.82

Segment Leq : 63.82 dBA

Total Leq All Segments: 63.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.82

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:28:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6w.te Time Period: Day/Night 16/8 hours
Description: R6 OLA (2.2m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -18.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.10 / 31.10 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -18.00 deg Angle2 : 71.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 12.70 / 12.70 m
Source elevation : 106.50 m
Receiver elevation : 106.30 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.38	107.88

ROAD (0.00 + 57.42 + 52.08) = 58.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-18	71	0.53	72.49	0.00	-4.84	-3.59	0.00	0.00	-6.64	57.42
71	90	0.66	72.49	0.00	-5.26	-15.15	0.00	0.00	0.00	52.08

Segment Leq : 58.53 dBA

Total Leq All Segments: 58.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.53

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:29:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7.te Time Period: Day/Night 16/8 hours
Description: R7 OLA (Unattenuated)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -11.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 42.20 / 42.20 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 61.25 + 0.00) = 61.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-11	90	0.66	72.49	0.00	-7.46	-3.78	0.00	0.00	0.00	61.25

Segment Leq : 61.25 dBA

Total Leq All Segments: 61.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.25

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:31:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7w.te Time Period: Day/Night 16/8 hours
Description: R7 OLA (2.2m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -11.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 42.20 / 42.20 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -11.00 deg Angle2 : 29.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 23.70 / 23.70 m
Source elevation : 106.50 m
Receiver elevation : 106.27 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.40	107.90

ROAD (0.00 + 52.60 + 58.06) = 59.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-11	29	0.53	72.49	0.00	-6.86	-6.61	0.00	0.00	-6.42	52.60
29	90	0.66	72.49	0.00	-7.46	-6.97	0.00	0.00	0.00	58.06

Segment Leq : 59.15 dBA

Total Leq All Segments: 59.15 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.15

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:32:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te Time Period: Day/Night 16/8 hours
Description: R8 OLA (Unattenuated)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -5.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.60 / 52.60 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 59.30 + 0.00) = 59.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-5	90	0.66	72.49	0.00	-9.05	-4.14	0.00	0.00	0.00	59.30

Segment Leq : 59.30 dBA

Total Leq All Segments: 59.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.30

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:32:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8w.te Time Period: Day/Night 16/8 hours
Description: R8 OLA (2.2m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -5.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.60 / 52.60 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -5.00 deg Angle2 : 20.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 34.00 / 34.00 m
Source elevation : 106.50 m
Receiver elevation : 106.20 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.39	107.89

ROAD (0.00 + 49.27 + 57.38) = 58.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-5	20	0.53	72.49	0.00	-8.33	-8.61	0.00	0.00	-6.28	49.27
20	90	0.66	72.49	0.00	-9.05	-6.06	0.00	0.00	0.00	57.38

Segment Leq : 58.01 dBA

Total Leq All Segments: 58.01 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.01

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:33:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te Time Period: Day/Night 16/8 hours
Description: R9 OLA (Unattenuated)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 86.20 / 86.20 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 55.61 + 0.00) = 55.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-3	90	0.66	72.49	0.00	-12.61	-4.27	0.00	0.00	0.00	55.61

Segment Leq : 55.61 dBA

Total Leq All Segments: 55.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.61

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:33:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9w.te Time Period: Day/Night 16/8 hours
Description: R9 OLA (2.2m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 86.20 / 86.20 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -3.00 deg Angle2 : 8.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 67.80 / 67.80 m
Source elevation : 106.50 m
Receiver elevation : 106.16 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.42	107.92

ROAD (0.00 + 42.72 + 54.84) = 55.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-3	8	0.53	72.49	0.00	-11.60	-12.14	0.00	0.00	-6.01	42.72
8	90	0.66	72.49	0.00	-12.61	-5.04	0.00	0.00	0.00	54.84

Segment Leq : 55.10 dBA

Total Leq All Segments: 55.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.10

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:35:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te Time Period: Day/Night 16/8 hours
Description: R10 OLA (Unattenuated)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 92.40 / 92.40 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 55.11 + 0.00) = 55.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-3	90	0.66	72.49	0.00	-13.11	-4.27	0.00	0.00	0.00	55.11

Segment Leq : 55.11 dBA

Total Leq All Segments: 55.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.11

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:34:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10w.te Time Period: Day/Night 16/8 hours
Description: R10 OLA (2.2m Barrier)

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 92.40 / 92.40 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -3.00 deg Angle2 : 7.00 deg
Barrier height : 2.20 m
Barrier receiver distance : 74.00 / 74.00 m
Source elevation : 106.50 m
Receiver elevation : 106.16 m
Barrier elevation : 106.50 m
Reference angle : 0.00

Results segment # 1: Fernbank (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	1.43	107.93

ROAD (0.00 + 41.88 + 54.41) = 54.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-3	7	0.53	72.49	0.00	-12.07	-12.56	0.00	0.00	-5.98	41.88
7	90	0.66	72.49	0.00	-13.11	-4.97	0.00	0.00	0.00	54.41

Segment Leq : 54.65 dBA

Total Leq All Segments: 54.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.65

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:36:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11.te Time Period: Day/Night 16/8 hours
Description: R11 POW

Road data, segment # 1: Fernbank (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	: 80	km/h
Road gradient	: 2	%
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 # 1: Fernbank (day/night)

Angle1 Angle2	: 0.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 31.30 / 31.30	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 62.72 + 0.00) = 62.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	72.49	0.00	-5.30	-4.47	0.00	0.00	0.00	62.72

Segment Leq : 62.72 dBA

Total Leq All Segments: 62.72 dBA

Results segment # 1: Fernbank (night)

Source height = 1.50 m

ROAD (0.00 + 55.56 + 0.00) = 55.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	64.89	0.00	-5.02	-4.31	0.00	0.00	0.00	55.56

Segment Leq : 55.56 dBA

Total Leq All Segments: 55.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.72
(NIGHT): 55.56

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:35:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12.te Time Period: Day/Night 16/8 hours
Description: R12 POW

Road data, segment # 1: Fernbank (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	: 80	km/h
Road gradient	: 2	%
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 # 1: Fernbank (day/night)

Angle1 Angle2	: 0.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 80.10 / 80.10	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 55.94 + 0.00) = 55.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	72.49	0.00	-12.08	-4.47	0.00	0.00	0.00	55.94

Segment Leq : 55.94 dBA

Total Leq All Segments: 55.94 dBA

Results segment # 1: Fernbank (night)

Source height = 1.50 m

ROAD (0.00 + 49.15 + 0.00) = 49.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	64.89	0.00	-11.42	-4.31	0.00	0.00	0.00	49.15

Segment Leq : 49.15 dBA

Total Leq All Segments: 49.15 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.94
(NIGHT): 49.15

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:36:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r13.te Time Period: Day/Night 16/8 hours
Description: R13 POW

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 92.40 / 92.40 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 54.91 + 0.00) = 54.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	72.49	0.00	-13.11	-4.47	0.00	0.00	0.00	54.91

Segment Leq : 54.91 dBA

Total Leq All Segments: 54.91 dBA

Results segment # 1: Fernbank (night)

Source height = 1.50 m

ROAD (0.00 + 48.18 + 0.00) = 48.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.57	64.89	0.00	-12.40	-4.31	0.00	0.00	0.00	48.18

Segment Leq : 48.18 dBA

Total Leq All Segments: 48.18 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.91
(NIGHT): 48.18

STAMSON 5.0 NORMAL REPORT Date: 03-12-2018 10:38:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r14.te Time Period: Day/Night 16/8 hours
Description: R14 POW

Road data, segment # 1: Fernbank (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 : 80 km/h
Road gradient : 2 %
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 # 1: Fernbank (day/night)

Angle1 Angle2 : -49.00 deg -20.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 68.50 / 68.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Fernbank (day)

Source height = 1.50 m

ROAD (0.00 + 53.02 + 0.00) = 53.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-49	-20	0.66	72.49	0.00	-10.95	-8.52	0.00	0.00	0.00	53.02

Segment Leq : 53.02 dBA

Total Leq All Segments: 53.02 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.02

APPENDIX B

Building Component Assessment

TABLE 5: Acoustic Insulation Factor for Various Types of Windows

Window area as a percentage of total floor area of room[1]													
4	5	6	8	10	13	16	20	25	32	40	50	63	80
Acoustic Insulation Factor (AIF)[2]													
35	34	33	32	31	30	29	28	27	26	25	24	23	22
36	35	34	33	32	31	30	29	28	27	26	25	24	23
37	36	35	34	33	32	31	30	29	28	27	26	25	24
38	37	36	35	34	33	32	31	30	29	28	27	26	25
39	38	37	36	35	34	33	32	31	30	29	28	27	26
40	39	38	37	36	35	34	33	32	31	30	29	28	27
41	40	39	38	37	36	35	34	33	32	31	30	29	28
42	41	40	39	38	37	36	35	34	33	32	31	30	29
43	42	41	40	39	38	37	36	35	34	33	32	31	30
44	43	42	41	40	39	38	37	36	35	34	33	32	31
45	44	43	42	41	40	39	38	37	36	35	34	33	32
46	45	44	43	42	41	40	39	38	37	36	35	34	33
47	46	45	44	43	42	41	40	39	38	37	36	35	34
48	47	46	45	44	43	42	41	40	39	38	37	36	35
49	48	47	46	45	44	43	42	41	40	39	38	37	36
50	49	48	47	46	45	44	43	42	41	40	39	38	37

Single glazing	Double glazing of indicated glass thickness					Triple Glazing	
	2mm and 2mm glass	3mm and 3mm glass	4mm and 4mm glass	3mm and 6mm glass	6mm and 6mm glass	3mm, 3mm and 3mm glass	3mm, 3mm and 6mm glass
Thickness	Interpane spacing in mm[3]					Interpane spacings in mm[5]	
3mm	6						
	13						
3mm	19	6					
4mm, 6mm	18	13	6				
	22	16	13	6	6	6,6	
9mm[4]	28	20	16	13	13	6,10	6,6
	35	25	20	16	16	6,15	6,10
12mm[4]	42	32	25	20	20	6,20	6,15
	50	40	32	25	24	6,30	6,20
	63	50	40	32	30	6,40	6,30
	80	63	50	40	37	6,50	6,40
	100	80	63	55	50	6,65	6,50
	125	100	80	75	70	6,80	6,65
	130	125	100	95	90	6,100	6,80
		150	125	110	100		6,100
			150	135	125		

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.
3) If 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.
4) The AIF ratings for 9mm and 12mm glass are for laminated glass only; for solid glass subtract two (2) from the AIF values listed in the table.
5) 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.
6) 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 Insulation Factor											
39	38	37	36	35	34	33	32	31	30	29	EW1
41	40	39	38	37	36	35	34	33	32	31	EW2
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

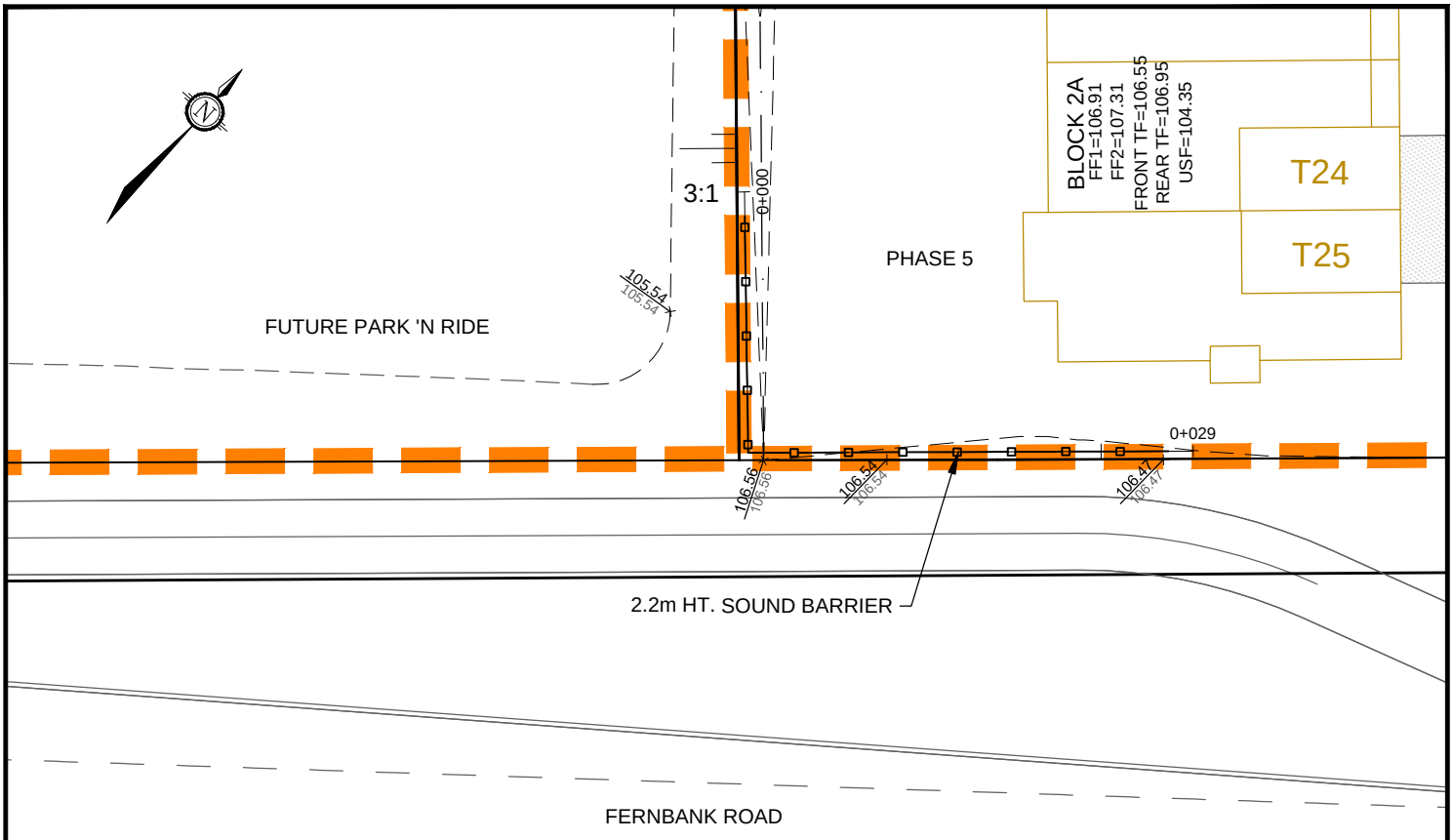
Source : National Research Council, Division of Building Research, December 1980.

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.

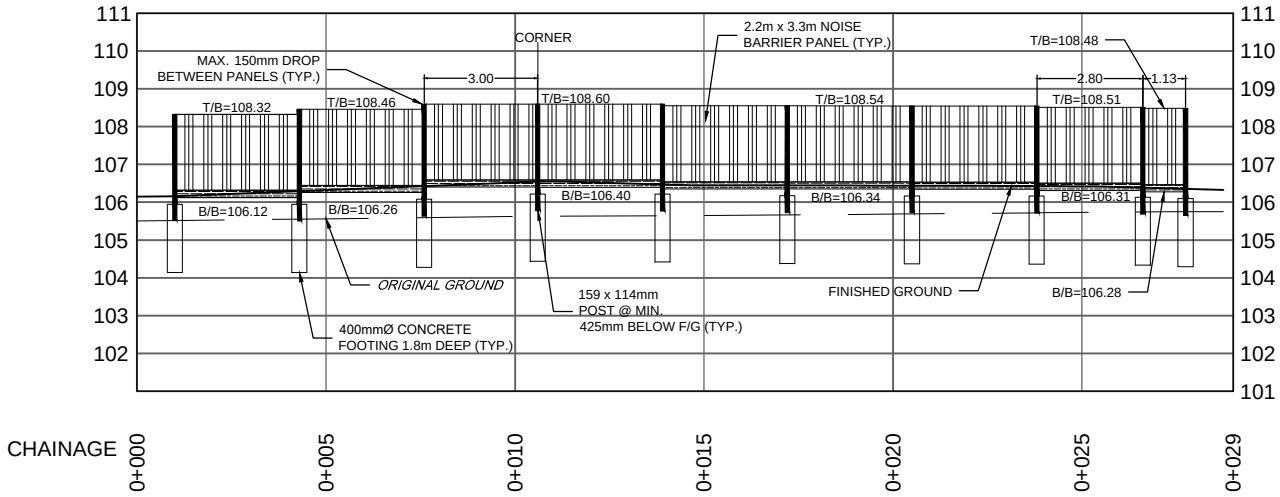
APPENDIX C

NB-1 (Noise Barrier Detail)
Prestige Sound Barrier Detail
Prestige Sound Barrier Images and Description
108180-19-GR (Grading Plan)



NOISE BARRIER NO.1 - PLAN VIEW

SCALE: 1:300



NOISE BARRIER NO.1 - PROFILE VIEW

SCALE: 1:200

NOVATECH
Engineers, Planners & Landscape Architects
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LEGEND

T/B = 106.48 - TOP OF BARRIER
B/B = 104.28 - BOTTOM OF BARRIER

NOTES

REFER TO PRESTIGE SOUND BARRIER DETAIL BY ART ENGINEERING INC. (DEC 16, 2008)

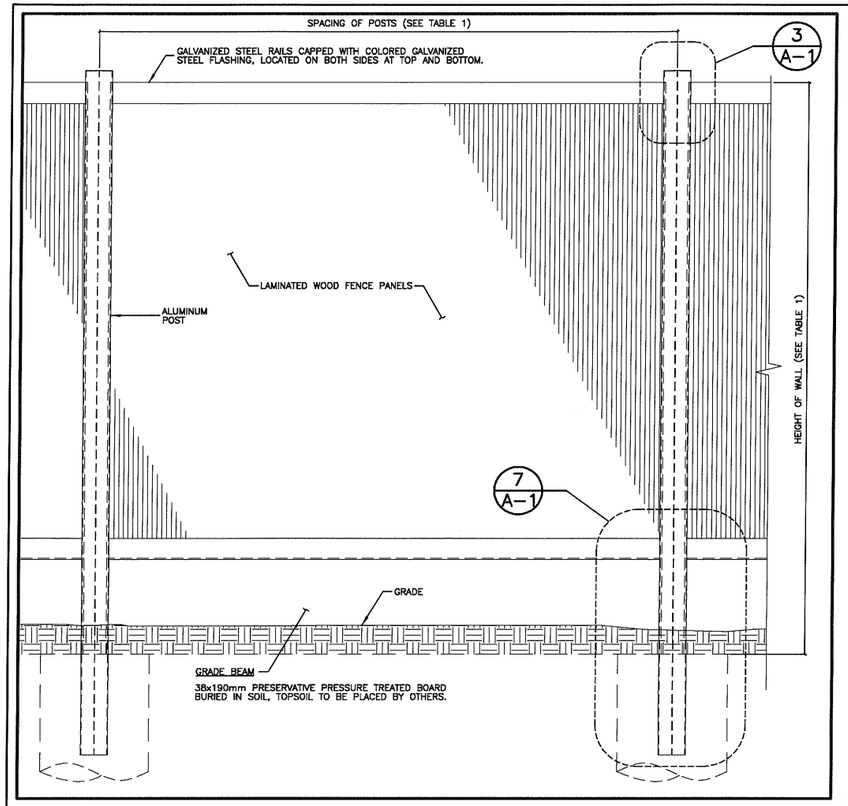
CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

NOISE BARRIER DETAIL LOT 25

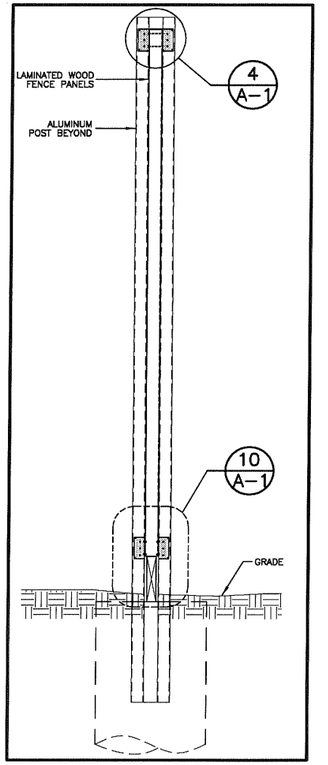
SCALE		
AS SHOWN		
DATE	JOB	FIGURE
DEC 2018	108180-19	NB-1

M:\2008\108180\Subdivision - Phase 5\CAD\Design\Figures\Noise\108180-19-Noise Fence Profile.dwg, Sheet 8x11 portrait, Dec 07, 2018 - 10:55am, jmarch

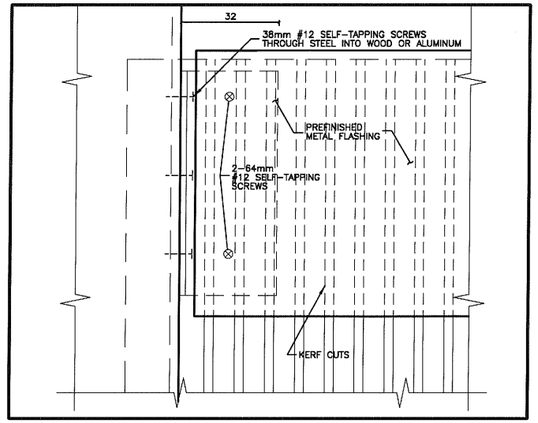
SHT8X11.DWG - 216mmx279mm



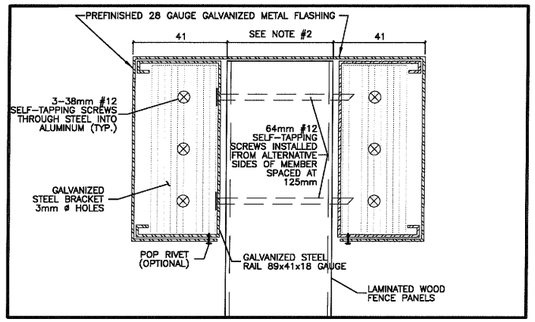
1 A-1 TYPICAL ELEVATION – FRONT & REAR
1:25



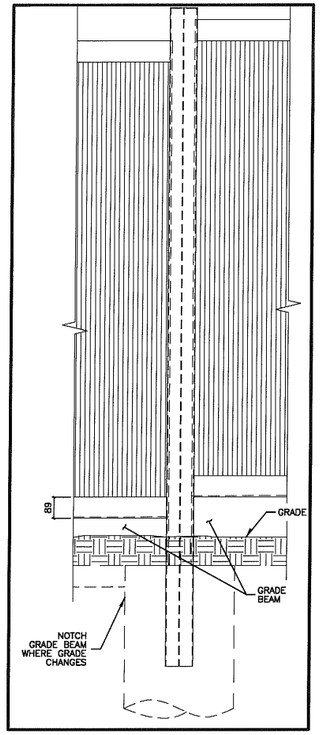
2 A-1 TYPICAL PANEL SECTION
1:25



3 A-1 TYPICAL RAIL TO POST DETAIL
1:2

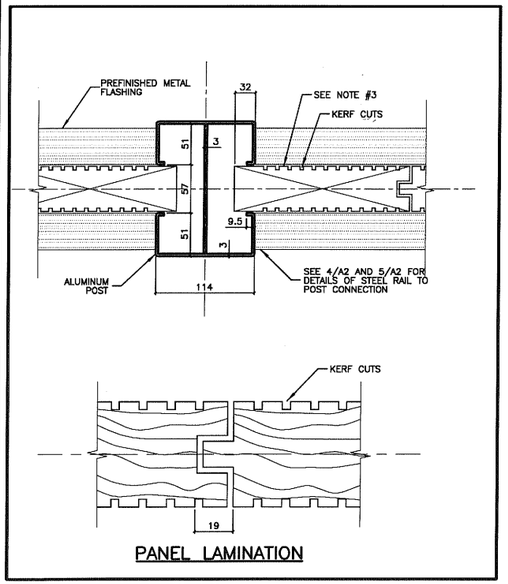


4 A-1 TYPICAL PANEL SECTION
1:3

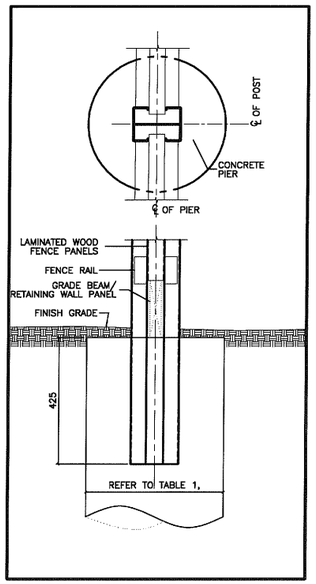


5 A-1 ELEVATION–TYPICAL STEP IN WALL
1:3

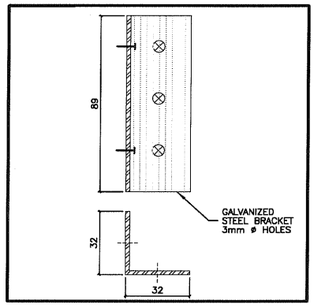
TABLE 1 SOUND BARRIER SCHEDULE			
HEIGHT OF WALL (m)	SPACING OF POSTS (m)	FOOTING DEPTH (m)	FOOTING DIAMETER (m)
1.8	3.6	1.8	0.4
2.2	3.3	1.8	0.4
2.4	3.0	1.8	0.4
3.0	2.4	1.8	0.4



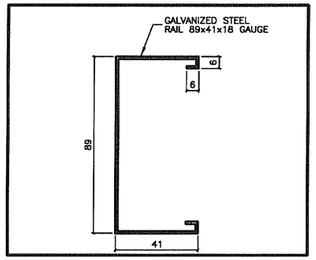
6 A-1 PLAN DETAILS
N.T.S.



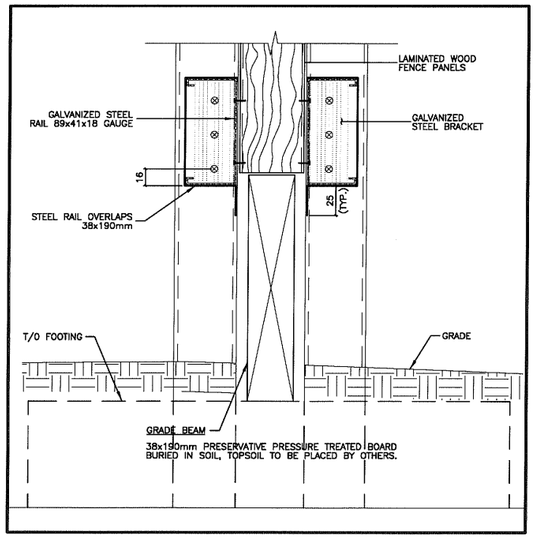
7 A-1 POST DETAIL
1:20



8 A-1 TYPICAL BRACKET DETAIL
1:3



9 A-1 TYPICAL RAIL SECTION
1:3



10 A-1 SKIRTING BOARD DETAIL – GRADE BEAM
1:5

NOTES:

1. ALL METAL COMPONENTS (EXCEPT FOR POSTS AND RETAINING WALL PANELS) WHERE INDICATED ON THIS DRAWING TO BE GALVANIZED STEEL MINIMUM 18 Ga. (UNLESS NOTED OTHERWISE) TO CAN/CSA-G164-M92.
2. ALLUMINUM SHALL BE ALLOY & TEMPER 6005-T5.
3. IN ORDER TO MEET DENSITY REQUIREMENTS OF 20 kg/m ^{2} WOOD SPECIES MUST HAVE THE FOLLOWING THICKNESSES: WHITE PINE – 50mm.
4. CLASS OF CONCRETE: 30 MPa c/w 7% ±1.5% AIR ENTRAINMENT.
5. ALLOWABLE HORIZONTAL BEARING PRESSURE OVER UPPER 2/3 OF FOOTINGS 75 KPa MIN.
6. DESIGN LOADING: ONTARIO BUILDING CODE 2006 AND CANADIAN HIGHWAY BRIDGE DESIGN CODE (CAN/CSA S6-06). BARRIERS SHALL BE INDIVIDUALLY ENGINEERED BASED ON LOCAL SOIL CONDITIONS AND BARRIER HEIGHTS.
7. FOR SOUND BARRIER WITHOUT RETAINING WALL, TOTAL FOOTING DEPTH SHALL BE 1.8 m. FOR SOUND BARRIER WITH RETAINING WALL, FOOTING DEPTH SHALL BE 2.1 m.

client
N.G.H. INDUSTRIES INC.
(PRESTIGE FENCE)
163 Cardevco Road
R.R.#2, Carp, Ontario
(613)831-2073

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163 Walgreen Road • Suite 203
Carp • Ontario • K0A 1L0 • Canada
(613) 836-0632 • Fax (613) 836-1226
www.artengineering.ca
BCIN: 32320

scale AS NOTED

revisions		date
1.	FOR CLIENTS REVIEW	20-11-08

A / B
A detail no.
no. de detail
B location drawing no.
sur dessin no.

project
PRESTIGE SOUND BARRIER
PATENT # 2146110

drawing
TYPICAL SOUND BARRIER WITH ALUMINUM POSTS

LICENSED PROFESSIONAL ENGINEER
A. IVANTCHOUK
100043720
16.12.08
PROVINCE OF ONTARIO

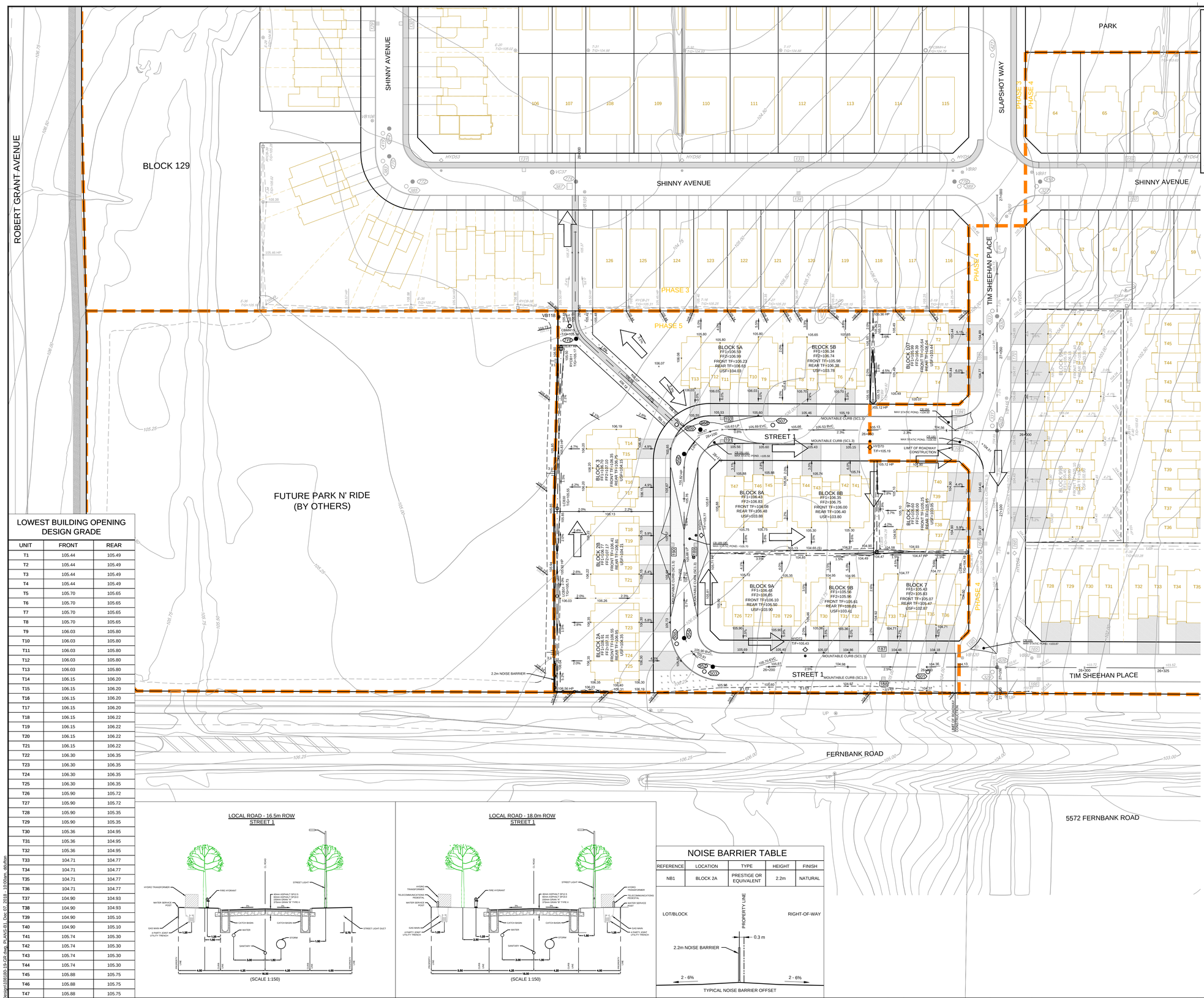
designed A. Ivantchouk
drawn S. Panov
date December 16, 2008
project number 0883
drawing number A-1

PRESTIGE SOUND BARRIER
FINISHED PRODUCT IMAGES AND DESCRIPTION

The wood is a natural eastern white pine. This wood will grey and fade over time if left untreated. No treatment is being proposed at this time.

Alternatively, the wood can be stained any color that is available as an exterior stain. This can be done at the time of installation or the homeowners can stain their side any colour they choose afterwards.

The aluminum posts and flashing are available in any colour. The colour being proposed for this particular project is tan at this time.



LOWEST BUILDING OPENING DESIGN GRADE

UNIT	FRONT	REAR
T1	105.44	105.49
T2	105.44	105.49
T3	105.44	105.49
T4	105.44	105.49
T5	105.70	105.65
T6	105.70	105.65
T7	105.70	105.65
T8	105.70	105.65
T9	106.03	105.80
T10	106.03	105.80
T11	106.03	105.80
T12	106.03	105.80
T13	106.03	105.80
T14	106.15	106.20
T15	106.15	106.20
T16	106.15	106.20
T17	106.15	106.20
T18	106.15	106.22
T19	106.15	106.22
T20	106.15	106.22
T21	106.15	106.22
T22	106.30	106.35
T23	106.30	106.35
T24	106.30	106.35
T25	106.30	106.35
T26	105.90	105.72
T27	105.90	105.72
T28	105.90	105.35
T29	105.90	105.35
T30	105.36	104.95
T31	105.36	104.95
T32	105.36	104.95
T33	104.71	104.77
T34	104.71	104.77
T35	104.71	104.77
T36	104.71	104.77
T37	104.90	104.93
T38	104.90	104.93
T39	104.90	105.10
T40	104.90	105.10
T41	105.74	105.30
T42	105.74	105.30
T43	105.74	105.30
T44	105.74	105.30
T45	105.88	105.75
T46	105.88	105.75
T47	105.88	105.75

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, 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.

LOCAL ROAD - 16.5m ROW
STREET 1

(SCALE 1:150)

LOCAL ROAD - 18.0m ROW
STREET 1

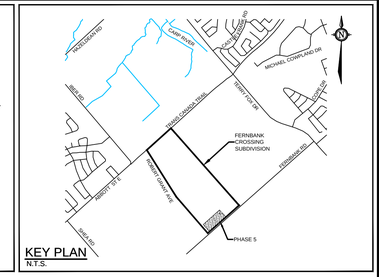
(SCALE 1:150)

NOISE BARRIER TABLE

REFERENCE	LOCATION	TYPE	HEIGHT	FINISH
NB1	BLOCK 2A	PRESTIGE OR EQUIVALENT	2.2m	NATURAL

TYPICAL NOISE BARRIER OFFSET

NORTH



LEGEND

- PROPOSED GRADE AND DIRECTION (2.5%)
- 105.59 HP — PROPOSED ELEVATION AT HIGH POINT
- 105.53 EXISTING ELEVATION — PROPOSED ELEVATION
- 105.59 PVI — PROPOSED ELEVATION AT POINT OF VERTICAL INFLECTION
- 105.59 BVC — PROPOSED ELEVATION AT BEGINNING OF VERTICAL CURVE
- 105.59 EVC — PROPOSED ELEVATION AT END OF VERTICAL CURVE
- VB — PROPOSED VALVE & VALVE BOX LOCATION
- VC — PROPOSED VALVE & VALVE CHAMBER LOCATION
- PROPOSED 2.2m HT. SOUND BARRIER FENCE
- PROPOSED 1.5m HT. BLACK VINYL CHAIN LINK FENCE
- PROPOSED 1.8m HT. GALVANIZED CHAIN LINK FENCE
- HYD — PROPOSED HYDRANT
- MH — PROPOSED SANITARY MANHOLE
- MH — PROPOSED STORM MANHOLE
- 95 — PROPOSED CATCHBASIN
- LCB30 TG= — PROPOSED LANDSCAPE TYPE CATCHBASIN WITH TOP OF GRATE ELEVATION
- MAJOR OVERLAND FLOW DIRECTION
- PHASE BOUNDARY LINE
- SOD

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. 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.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. 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.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. 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.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. 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 REINSTATED WITH 100mm OF TOPSOIL, SEED AND MULCH.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. ALL FENCING TO BE LOCATED 0.15m INSIDE PROPERTY LINE. REFER TO LANDSCAPING PLAN FOR DETAILS.
12. CONCRETE SIDEWALK TO BE CONSTRUCTED AS PER CITY STANDARD SC-2, SC-5, SC-6, SC-7.2 AND SC-8.
13. REFER TO GEOTECHNICAL INVESTIGATION (DATED NOVEMBER 19, 2018), PREPARED BY GEMTEC FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
14. 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.

GRADING AND PAVEMENT NOTES:

1. 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.
2. 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.
3. 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.
4. 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.
5. ASPHALTIC CONCRETE TO BE COMPACTED TO AT LEAST 97% OF MARSHALL DENSITY.
6. ALL ROADWAYS TO HAVE 3% CROSSFALL INCLUDING SUBGRADE AND GRANULAR BASE.
7. 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'
8. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
9. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
10. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
11. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
12. ALL CURBS SHALL BE MOUNTABLE CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.3).
13. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

PAVEMENT STRUCTURE:

TIM SHEEHAN PLACE 16.5m & 18.0 ROW - 8.5m PLATFORM		STREET 1 16.5m & 18m - 8.5m PLATFORM	
40mm	ASPHALT SP12.5	40mm	ASPHALT SP12.5
60mm	ASPHALT SP19.0	60mm	ASPHALT SP19.0
150mm	GRAN "A"	150mm	GRAN "A"
375mm	GRAN "B" TYPE II	375mm	GRAN "B" TYPE II
625mm	TOTAL DEPTH	625mm	TOTAL DEPTH

No.	REVISION	DATE	BY
1.	ISSUED FOR APPROVAL	DEC 7/18	MAB

SCALE 1:500

1:500
0 5 10 15 20

DESIGN LRW
CHECKED MAB
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — L. R. WILSON — 100160065 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — M.A. BISSETT — PROVINCE OF ONTARIO

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Website www.novatech-eng.com

CITY OF OTTAWA
FERNBANK CROSSING - PHASE 5

GRADING PLAN

PROJECT No. 108180-19
REV REV # 1
DRAWING No. 108180-19-GR

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FILENAME: Design - Submission Drawings