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39 Years

FERNBANK ZENS
5331 Fernbank Road
Detailed Noise Control Study

Prepared for: Claridge Homes

FERNBANK ZENS
5331 Fernbank Road

OTTAWA, ONTARIO

Detailed Noise Control Study

Prepared By:

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

June 2, 2021

Novatech File: 121011
Ref: R-2021-074

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June 2, 2021

City of Ottawa
Planning and Infrastructure Approvals
110 Laurier Street West, 4th Floor
Ottawa, ON, K1P 1J1

Attention: Santhosh Kuruvilla

Reference: Fernbank Zens
Detailed Noise Control Study
Our File No.: 121011

Please find enclosed for your review the Detailed Noise Control Study to support a Site Plan application for the Fernbank Zens at 5331 Fernbank Road. The site is bounded by Cope Drive to the north, the existing SOHO development to the east, Fernbank Road to the south and Terry Fox Drive to the west.

This study evaluates the environmental impact of noise from traffic on the outdoor living areas and discusses the mitigation measures to attenuate noise to acceptable levels.

This report is submitted in support of the engineering detailed design for the Claridge Homes site plan application.

Trusting this report is adequate for your purposes. Should you have any questions, or require additional information pertaining to the enclosed report, please contact us.

Yours truly,

NOVATECH

Steve Zorgel, P. Eng.
Project Coordinator, Land Development Engineering

Cc: Shawn Malhotra, Claridge Homes

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Appendices

Tables

Figures

Drawings

1.0 INTRODUCTION

This Detailed Noise Control Study was prepared as part of the engineering detailed design for the Fernbank Zens residential development at 5331 Fernbank Road. This report assesses the environmental impact of noise on the proposed development and outlines the recommended mitigation measures, if required.

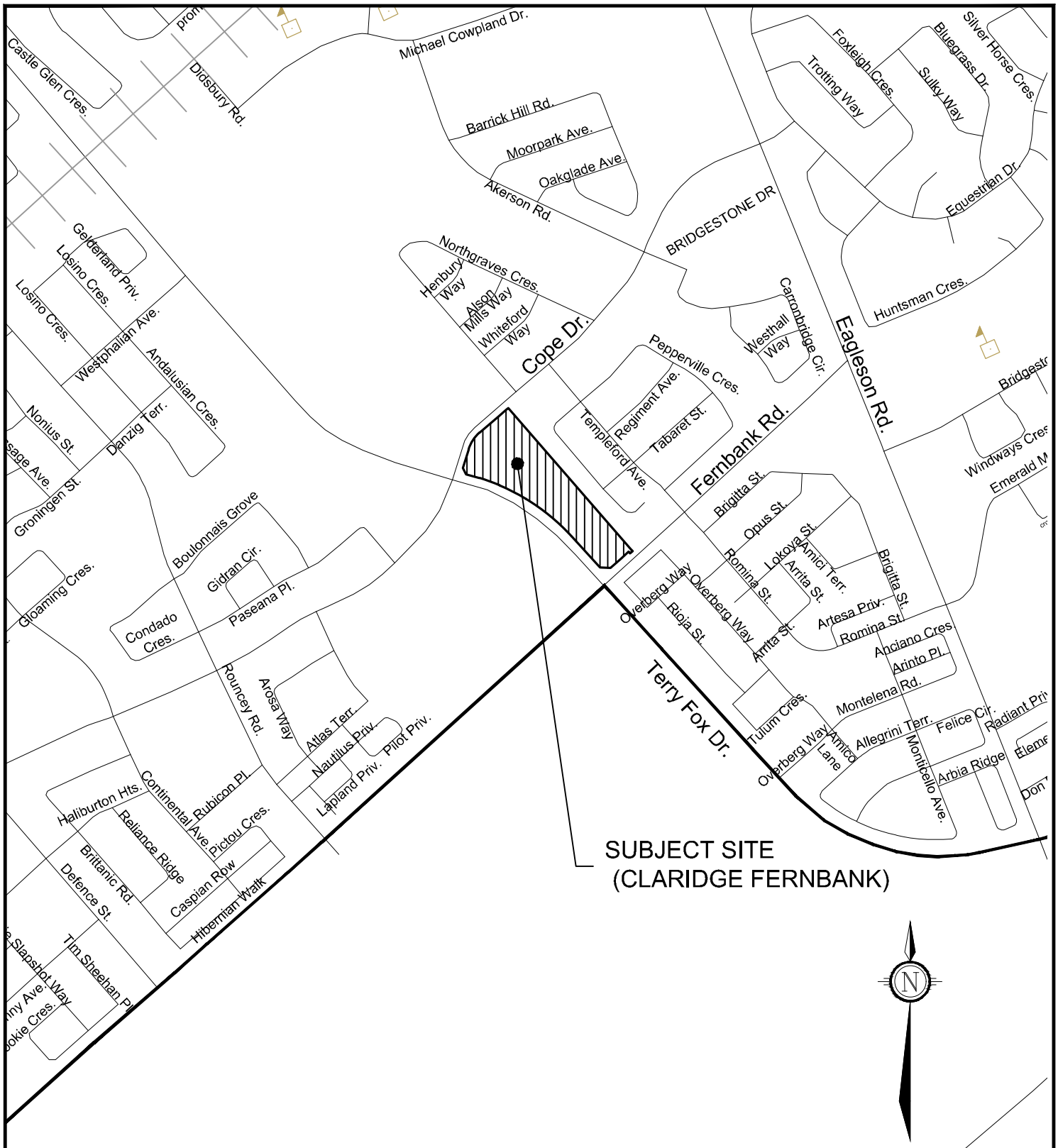
2.1 The Site

The proposed Fernbank Zens site (approximately 3.68 ha) is owned by Claridge Homes and located within the City of Ottawa. The site is bounded by Cope Drive to the north, the existing SOHO development to the east, Fernbank Road to the south and Terry Fox Drive to the west as shown on **Figure 1a/1b** – Key Plan.

Figure 1a – Key Plan

The legal description of the property is designated as Part of Lot 30 Concession 10, Goulbourn, Part 1 Plan 4R17373 , Except Part 4, Plan 4R20112; Ottawa. Subject to an Easement in Favour of Hydro Ottawa Limited Over Parts 5,6, 7, 8 and 9 Plan 4R20112 as in OC455206. Road Allowance Between Lots 30 and 31 Concession 10, Goulbourn Lying Between Parts 3 and 4 on 4R17373 and Part 2 on Plan 4R20112, as Closed by N599928; Ottawa. Part of Lot 31, Concession 10, Goulbourn, Part 1 on Plan 4R19334 City of Ottawa.

The Fernbank Zens site is proposed to be developed as a residential site plan which will consist of approximately 192 Zen type dwelling units within 16 low-rise buildings and on-site parking with access from Cope Drive and Terry Fox Drive as shown on **Figure 2** – Site Plan.



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CITY OF OTTAWA
CLARIDGE FERNBANK

KEY PLAN

SCALE: N.T.S.

DATE: MAY 2021 | JOB: 121011 | FIGURE: FIGURE 1B

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EXISITNG RESIDENTIAL LANDS

CLARIDGE FERNBANK SITE

FERNBANK ROAD

COPE DRIVE

TERRY FOX DRIVE

BLDG A
BLDG B
BLDG C
BLDG D
BLDG E
BLDG F
BLDG G
BLDG H
BLDG J
BLDG K
BLDG L
BLDG M
BLDG N
BLDG P
BLDG Q
BLDG R

M:\2021\121011\CAD\Design\Figures\Noise\121011-FIG2.dwg, FIG2, May 25, 2021 - 11:05am, rgrayton

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CITY OF OTTAWA
CLARIDGE FERNBANK

SITE PLAN

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE APR 2021 | JOB 121011 | FIGURE FIGURE 2

SHT11X17.DWG - 279mmX432mm

2.0 NOISE SOURCES

The City of Ottawa Official Plan stipulates that a noise study shall be prepared when a new development is proposed within 100 metres of an arterial, major collector or collector roadway, or a rapid-transit corridor.

The potential surface road noise sources that were considered for the purposes of this study are Terry Fox Drive, Fernbank Road, and Cope Drive as all other roadways within the zone of influence were not arterial or collector roadways.

Terry Fox Drive is classified as an urban arterial roadway with a 44.5m protected ROW in the City of Ottawa Transportation Master Plan and Official Plan and Official Plan. Terry Fox Drive is currently a 2-lane undivided arterial road with a posted speed of 80km/hr fronting the Fernbank Zens site. As per Map 10 in the Transportation Master Plan (TMP), Road Network – 2031 Network Concept, there are future plans to widen Terry Fox Drive to 4 lanes. Therefore, for the purposes of this report, a 4-lane divided arterial road with an AADT level of 35,000 veh/day and a posted speed of 80km/hr will be utilized. Refer to **Appendix A** for the excerpt from the TMP. A typical cross section for the Terry Fox Drive widening has been provided in **Appendix E.**

Fernbank Road is classified as an urban arterial roadway with a 30.0m protected ROW in the City of Ottawa Transportation Master Plan and Official Plan. Fernbank Road is currently a 2-lane undivided arterial road with a posted speed of 60km/hr fronting the Fernbank Zens site. Therefore, for the purposes of this report, a 2-lane undivided arterial road with an AADT level of 15,000 veh/day and a posted speed of 60km/hr will be utilized.

Cope Drive is classified as an urban collector roadway with a 24m protected ROW with an AADT level of 8,000 veh/day and a posted speed limit of 50km/hr.

There is no railway ROW within 250m that impacts the site.

There is no airport noise affecting this site.

There are no stationary noise sources that affect this site.

3.0 CITY OF OTTAWA NOISE CONTROL GUIDELINES

3.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, transitways, and railways, as expressed in Tables 2.2a: Sound Level Limit for Outdoor Living Areas – Road and Rail, Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail, and Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces – Road and Rail of the ENCG. The maximum suggested sound levels for outdoor and indoor living areas between 7am and 11pm are 55 dBA and 45 dBA, respectively. The maximum suggested sound level for indoor bedrooms is 40dBA between 11pm and 7am. For reference, Tables 2.2a, 2.2b and 2.2c of the ENCG are included in **Appendix A**.

Outdoor Living Area and Plane of Window receivers are defined as:

- **Outdoor Living Area (OLA):** The outdoor amenity area provided for quiet enjoyment of the outdoor environment during the daytime period (i.e., backyards, terraces and patios). OLA noise levels are considered 3.0m from the building façade (where applicable), 1.5m above grade.

- **Plane of Window (POW):** The indoor living space where the sound levels will affect the living room area during daytime hours and bedrooms during nighttime hours. Typically, POW noise levels are considered inside the building, 1.5m above the ground for the daytime and 4.5m above the ground for nighttime.

3.2 Alternative Methods for Noise Attenuation

When OLA sound levels are predicted to be approximately equal to or less than 55 dBA attenuation measures are not required. If the predicted noise levels are found to exceed 55 dBA, physical forms of mitigation is suggested and which may also include the provision of warning clauses to inform purchasers of the expected noise levels and specific mitigation measures.

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 zones;
- Construction of sound or acoustic barriers;
- Installation of air conditioning and ventilation; and
- Enhanced construction techniques and construction quality.

3.3 Noise Attenuation Requirements

When the noise attenuation measures listed above do not reduce noise levels below 55 dBA in the Outdoor Living Area, control measures (barriers) are required to reduce the Leq below or 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;
- Situated 0.30m inside the private property line;
- A surface mass density not less than 20kg/sq.m; and
- No holes or gaps.

3.4 Ventilation Requirements

A forced air heating system with provision for a central air conditioning system is required if the plane of window daytime noise levels are between 55 dBA and 65 dBA and/or the nighttime 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 the nighttime noise level exceeds 60 dBA.

3.5 Building Component Assessment

When plane of window noise levels exceeds 65 dBA (daytime) or 60 dBA (nighttime) the exterior cladding system of the building envelope must be acoustically assessed to ensure indoor sound criteria are 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} + 10 $\log_{10}$ (Number of Components) + 2dB

Where, N = Number of components (walls, windows and roof);

L = Sound Level expressed on a common decibel scale.

3.6 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 lease/rental/sale agreements to warn potential purchaser/buyers/tenants of the possible elevated noise levels.

Typical warning clauses should be registered as shown below. Warning clauses are extracted from Part 4, Appendix A the City of Ottawa ENCG and excerpts have been provided in **Appendix A** of this report**.** As stated in the City of Ottawa ENCG, due to the variation of noise impacts for any given site, it may be necessary to amend the example warning clauses to recognize the site conditions in each development.

It is recommended that the following noise clauses be registered on title and incorporated into the agreement of purchase and sales as required. Results can be found in **Table 3 and Table 8** from Section 4.3 of this report:

Type A

> "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."

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

- An acoustic barrier"

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

"The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original."

Additionally, if a tolerance of 5 dBA is being considered in some areas, it is recommended an additional noise clause be registered on title and incorporated into the agreement of purchase and sales:

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/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment by up to 5 dBA."

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

- An acoustic barrier"

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

"The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original."

Type C

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."

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

- Multi-pane glass
- Double brick veneer"

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

"This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment"

Type D

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."

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

- Multi-pane glass
- Double brick veneer
- High sound transmission class walls"

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

"This dwelling unit has also been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment"

For units with multiple types of warning clauses, similar/identical wording can be combined as to not duplicate wording/information.

3.7 Summary of Noise Attenuation Requirements

Table 1 summarizes the required noise attenuation measures and warning clauses should sound criteria be exceeded. Excerpts from the MOE NPC-300 and City of Ottawa ENCG documents are included in **Appendix A** for reference.

Table 1: Noise Attenuation Measure Requirements

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* or Type B**
	More than 60	Barriers required	N/A	N/A	Required if resultant L_{eq} exceeds 55 dBA Type A* or 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

*Type A warning clause refers to units requiring a noise barrier that mitigates noise below 55dBA.
**Type B warning clause refers to units requiring a noise barrier, but is technically or economically not feasible to reduce levels below 55dBA and a tolerance of up to 5dBA can be granted by the City.

4.0 PREDICTION OF OUTDOOR NOISE LEVELS

4.1 Roadway Traffic

Noise levels from Terry Fox Drive, Fernbank Road, and Cope Drive were assessed using the ultimate road (as per the 2031 Network Concept Plan in the TMP) and traffic parameters below from “Appendix B of the City of Ottawa’s Environmental Noise Control Guidelines, 2016”. The posted speed for Terry Fox Drive, Fernbank Road and Cope Drive are consistent with the current conditions. The traffic and roadway parameters used for sound level predictions are shown in Table 2.

EXISITNG RESIDENTIAL LANDS

PROPERTY LINE

PROPERTY LINE

PROPERTY LINE

FERNBANK ROAD

CLARIDGE FERNBANK SITE

BLDG-A
BLDG-B
BLDG-C
BLDG-D
BLDG-E
BLDG-F
BLDG-G
BLDG-H
BLDG-J
BLDG-K
BLDG-L
BLDG-M
BLDG-N
BLDG-P
BLDG-Q
BLDG-R

R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15

Concrete Sidewalk

PROPERTY LINE

PROPERTY LINE

TERRY FOX DRIVE

COPE DRIVE

NOTES:

1. ROADWAY CLASSIFICATION AS PER CITY OF OTTAWA OFFICIAL PLAN, SCHEDULE E, OFFICIAL PLAN, URBAN ROAD NETWORK.
2. REFER TO GRADING PLANS (121011-GR1-2) FOR ALL GRADING INFORMATION.
3. NOISE BARRIER REFERS TO ANY COMBINATION OF NOISE WALL, BERM AND/OR RETAINING WALL.

LEGEND

PROPERTY LINE

R1 RECEIVER LOCATION

AMENITY SPACE

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
CLARIDGE FERNBANK

SITE PLAN

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIGURE 3

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Table 2: Traffic and Roadway Parameters

	Terry Fox Drive	Fernbank Road	Cope Drive
Roadway Classification	4-Lane Urban Arterial Divided	2-Lane Urban Arterial Undivided	2-Lane Urban Collector
Annual Average Daily Traffic (AADT)	35,000 vehicles/day	15,000 vehicles/day	8,000 vehicles/day
Day/Night Split (%)	92/8	92/8	92/8
Medium Trucks (%)	7	7	7
Heavy Trucks (%)	5	5	5
Posted Speed	80 km/hr	60 km/hr	50 km/hr

For reference, excerpts from the ENCG confirming the Terry Fox Drive, Fernbank Road and Cope Drive AADT are included in **Appendix A.**

4.2 Noise Level Analysis

The noise levels were analyzed using Version 5.03 of the STAMSON computer program issued by the MOE. Proposed grades were required for the software and were obtained from elevations on the Grading Plans (121011-GR1-2), which have been included in **Appendix E** of this report.

For the purposes of this report, a zen unit within the development used as a barrier in the noise calculations have an assumed height of 8.0m. Refer to Appendix D for architectural elevations and drawings.

For the purposes of this report, Plane of Window calculations for the zen units have been taken at 3.5m for first floor units and 6.7m for the second-floor units. Below ground level units were best case scenario in comparison to the 2nd or 3rd level units as they are partially below grade and were not analyzed as part of this report. It was also determined through several receiver points that the top floor was the worst-case scenario for each unit, therefore, only the top floor was analyzed for some receiver points.

Receiver locations used in the noise simulations are shown on **Figure 3** – Receiver Location Plan.

4.3 Noise Level Results

Simulated noise levels for the units adjacent to Terry Fox Drive, Fernbank Road and Cope Drive exceed the allowable noise level criteria, resulting in the requirement for indoor noise mitigation, which include the installation of forced air ventilation, air conditioning, a building façade analysis and warning clauses.

Outdoor amenity space was identified as the open space area between the existing subdivision (SOHO) to the east and Buildings A-H. This area fulfills the communal outdoor amenity area requirement. R14 represents a node closest to Cope Drive while R15 represent the average (middle) of the amenity space.

The predicted outdoor noise levels at the selected receiver locations within the development are illustrated in **Table 3.**

Table 3: Simulation Results – Outdoor Living Areas

Receiver Location*	File	Calculated Noise Level (dBa) 7:00-23:00		Outdoor Mitigation Method
		Un-attenuated	Attenuated	
R14	R14.te	55.01	-	N/A
R15	R15.te	53.66	-	N/A

*Locations correspond to receivers found on Figure 3 – Receiver Location Plan

Figures in **Appendix B** show angles used in the detailed modeling calculations. The noise levels for all receiver locations generated from STAMSON are listed in **Table 3** with detailed modeling results in **Appendix B.**

The predicted daytime and nighttime noise levels and required mitigation for the Plane of Window are shown in **Table 4.**

Table 4: Simulation Results – Plane of Window

Receiver Location *	File	Calculated Noise Level 7:00-23:00 (dBa)	Calculated Noise Level 23:00-7:00 (dBa)	Mitigation Method
		Un-attenuated	Un-attenuated	
R1	R1TOP.te	73.08	65.49	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R1	R1BOT.te	72.63	65.03	
R2	R2TOP.te	76.28	68.69	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R2	R2BOT.te	76.15	68.56	
R3	R3TOP.te	73.72	66.12	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R3	R3BOT.te	73.29	65.69	
R4	R4TOP.te	64.41	56.82	• Provide Forced Air Ventilation with Provision of Air Conditioning • Warning Clauses as per Section 3.6 – Type C
R4	R4BOT.te	64.41	56.82	
R5**	R5BAR.te	70.51	62.91	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R5**	R5ROW.te	70.43	62.83	
R6	R6.te	68.30	60.70	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D

				Building Façade Analysis
R7	R7.te	64.44	56.85	• Provide Forced Air Ventilation with Provision of Air Conditioning Warning Clauses as per Section 3.6 – Type C
R8	R8.te	63.90	56.30	• Provide Forced Air Ventilation with Provision of Air Conditioning • Warning Clauses as per Section 3.6 – Type C
R9	R9.te	66.26	58.67	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R10	R10.te	73.64	66.04	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R11	R11.te	65.72	58.12	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R12	R12.te	66.95	59.35	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
R13	R13.te	68.07	60.48	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis

*Locations correspond to receivers found on **Figure 3** – Receiver Location Plan
**Two different methods of shielding were utilized; Considering the adjacent buildings as a barrier; Or considering adjacent buildings as a row of houses at a certain density.

Since considering adjacent units as barriers or a row of houses at a certain density yielded similar results, the method of considering adjacent units as a row of houses was considered for the remainder of receiver points.

Figures in **Appendix B** show angles used in the detailed modeling calculations. The noise levels for all receiver locations generated from STAMSON are listed in **Table 3 and 4** with detailed modeling results in **Appendix B.**

4.4 Implementation

The City of Ottawa ENCG requires that noise clauses be applied when noise levels are above minimum requirements outlined in **Table 1**, and wall & window construction be reviewed when noise levels exceed minimum requirements outlined in **Table 1.** The acoustical insulation factor (AIF) method recognized by the City of Ottawa is used to assess the wall and window requirements.

The Acoustic Insulation Factor (AIF) is used as a measure of the reduction of outdoor noise provided by the elements of the outer surface of a building. The difference between the indoor noise criterion and the outdoor noise level establishes the acoustical insulation requirement for the exterior shell. The exterior shell is comprised of primarily two components; windows and walls (patio doors are treated as windows). Canada Mortgage and Housing (CMHC) Standards [1] require that no component transmit more than 1/N of the total sound power that would give the maximum acceptable noise level inside the room. Thus, in a room with two exterior components, neither should transmit more than one-half of the total allowable sound power.

Mathematically, this Acoustical Insulation Factor can be expressed as:

Required AIF = L_{eq} (Outside) – L_{eq} (Inside) + 10 $\log_{10}$ (N) +2dBA

Where, N = Number of components;
L = Sound Level expressed on a common decibel scale.

Since noise levels and unit types vary over the site, acoustical insulation factors have been separated depending on exposure to different noise sources.

The largest acoustical insulation factors for the back to back units in close proximity to Fernbank Road and Terry Fox Drive (as represented by R2) are calculated as follows:

- $AIF_{Residential(day)}$ = 76 dBA – 45 dBA + 10log(2) dBA + 2dBA = 36 dBA
- $AIF_{Residential(night)}$ = 69 dBA – 40 dBA + 10log(2) dBA + 2dBA = 34 dBA

Other AIF values calculated using the same method above are presented in **Table 5**:

Table 5: AIF Results

Receiver	$AIF_{Residential (Day)}$	$AIF_{Residential (Night)}$
R1	33	30
R2	36	34
R3	34	31
R5	30	28
R6	28	26
R9	26	24
R10	34	31
R11	26	23
R12	27	24
R13	28	25

For the purposes of this report, R2 building components will be considered standalone, R1, R3 and R10 building components will be considered to have the similar results, and R5 will be a standalone building and R6, R9, R11, R12 and R13 will be considered to have the similar results.

[1] Road and Rail Noise: Effects on Housing, CMHC, Ottawa. Publication NHA #185 1/78, 1978

Tables from the document entitled “Acoustic Insulation Factor: A Rating for the Insulation of Buildings Against Outdoor Noise”, produced by the Division of Building Research, National Research Council of Canada, June 1980 (J.D. Quirt) were used to assess the exterior facade against the required AIF. This reference material is included in **Appendix C**.

In order to assess the façade against the required AIF respective Leq values, the number of components in a wall, the calculated required AIF, percentage of window to room areas and exterior wall to room areas are required. Exterior facade analysis data is presented in **Tables 6.**

Table 6: Exterior Façade Analysis Data – Zen Units

Description	Residential Living Room	Residential Bedroom 1	Residential Bedroom 2
Number and Type of Components Forming Building Envelope.	2 – Windows and Exterior Walls	2 – Windows and Exterior Walls	2 – Windows and Exterior Walls
Percentage of Window Area to Total Floor Area of Room.	25%	30%	**49%**
Percentage of Wall Area to Total Floor Area of Room.	25%	63%	**125%**

Architect unit floor plans were reviewed to calculate the window and wall to floor ratios (as seen above). The architect plans are included in **Appendix D.**

Using the percentage of window area to room area, and the required acoustical insulation factor (AIF), **Table 5** in **Appendix C** was used to identify the various window assemblies that would satisfy the required AIF. Similarly, **Table 6.3** in **Appendix C** was used to select the typical wall assembly that would satisfy the required AIF.

The results of this analysis requiring attenuation measures for several areas / units within the site are provided in **Table 7.**

Table 7: Selected Window and Wall Assemblies to Meet Maximum Attenuation Requirements

Description	AIF (day/night)	Double Pane Window Assembly Options	Typical Wall Assembly
R1 & R10 – Exposed to Terry Fox Drive and Cope Drive, R3 – Exposed to Terry Fox Drive	33*/31	▪ 2 mm – 35 mm – 2 mm ▪ 3 mm – 25 mm – 3 mm ▪ 4 mm – 20 mm – 4 mm ▪ 3 mm – 16 mm – 6 mm ▪ 6 mm – 16 mm – 6 mm	EW2
R2 – Exposed to Fernbank Road and Terry Fox Drive	36/34	▪ 2 mm – 80 mm – 2 mm ▪ 3 mm – 63 mm – 3 mm ▪ 4 mm – 50 mm – 4 mm ▪ 3 mm – 40 mm – 6 mm ▪ 6 mm – 37 mm – 6 mm	EW3
R5– Exposed to Fernbank Road and Terry Fox Drive	28*/28	▪ 2 mm – 22 mm – 2 mm ▪ 3 mm – 16 mm – 3 mm ▪ 4 mm – 13 mm – 4 mm ▪ 3 mm – 6 mm – 6 mm ▪ 6 mm – 6 mm – 6 mm	EW1
R6, R11, R12 – Exposed to Terry Fox Drive, R9 – Exposed to Cope Drive and Terry Fox Drive, R13 – Exposed to Fernbank Road and Terry Fox Drive	26*/25*	▪ 2 mm – 6 mm – 2 mm	EW1

Notes:e

I. EW1 type wall consisting of 12.7mm gypsum board, vapour barrier, 38x89mm studs with 50mm (or thicker) mineral wool or glass fibre batts in inter stud cavities plus rigid insulation (25-30mm).

EW2 type wall consists of EW1 materials plus rigid insulation (25-30mm), and wood siding or metal siding and fibre backer board.

EW3 consists of simulated mansard with same materials as EW1 plus sheathing, 28x89mm framing, sheathing and asphalt roofing material.

II. "2 mm – 6 mm – 2 mm" denotes 2 mm glass, 6 mm air space and 2 mm glass.

*AIF value based on AIF redistribution between walls and windows, refer to Table 4 in Appendix C

The above results specify the smallest wall assembly available. If the proposed building requires larger wall assemblies such as concrete which has higher attenuation effects, the window assembly options may be reduced. In order to determine the reduction of the required window specification, the proposed wall assembly would need to be determined.

Tables 11 and 12 in **Appendix C** were used to convert the AIF values to Sound Transmission Class or STC values. The largest STC results for several areas within the site and for specific unit types are summarized in **Table 8.**

Table 4 in Appendix C was also used to redistribute AIF requirements between the walls and windows. Based on correspondence from the architect, the walls have an STC value of 37. Refer to **Appendix D** for correspondence. In some cases, the AIF was redistributed to allow for a lower STC value for the windows, which are reflected in **Table 8**. Refer to Appendix C for details.

EXISITNG RESIDENTIAL LANDS

PROPERTY LINE

PROPERTY LINE

PROPERTY LINE

FERNBANK ROAD

R14

R15

BLDG-A

BLDG-B

BLDG-C

BLDG-D

BLDG-E

BLDG-F

BLDG-G

BLDG-H

BLDG-J

R4

R8

R11

R12

R6

R13

R5

CLARIDGE FERNBANK SITE

BLDG-K

R2

BLDG-R

BLDG-Q

BLDG-L

R7

R9

BLDG-M

R3

PROPERTY LINE

TERRY FOX DRIVE

BLDG- N

R10

PROPERTY LINE

BLDG-P

R1

COPE DRIVE

LEGEND

PROPERTY LINE

R1 RECEIVER LOCATION

AMENITY SPACE

MITIGATION METHODS INCLUDE:

- PROVIDE FORCED AIR VENTILATION WITH THE PROVISION OF CENTRAL AIR CONDITIONING
- WARNING CLAUSE TYPE C BE REGISTERED ON TITLE AND INCORPORATED INTO THE AGREEMENT OF PURCHASE AND SALES

MITIGATION METHODS INCLUDE:

- INSTALLATION OF CENTRAL AIR CONDITIONING
- WARNING CLAUSE TYPE D BE REGISTERED ON TITLE AND INCORPORATED INTO THE AGREEMENT OF PURCHASE AND SALES
- ACOUSTICALLY SELECTED WALLS AND WINDOWS FOR ALL ROOMS. SEE NOISE REPORT FOR DETAILS.

NOTES:

1. ROADWAY CLASSIFICATION AS PER CITY OF OTTAWA OFFICIAL PLAN, SCHEDULE E, OFFICIAL PLAN, URBAN ROAD NETWORK.
2. REFER TO GRADING PLANS (121011-GR1-2) FOR ALL GRADING INFORMATION.

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CITY OF OTTAWA
CLARIDGE FERNBANK

NOISE ATTENUATION MEASURES PLAN

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIGURE 4

SHT11X17.DWG - 279mmX432mm

M:\2021\121011\CAD\Design\Figures\Noise\121011-FIG4-Noise Attenuation.dwg, FIG4, May 25, 2021 - 10:59am, rgrayton

Table 8: Equivalent Sound Transmission Class, STC Values

		Windows			Walls	
	AIF*	**Conversion**	**STC**	**AIF***	**Conversion**	**STC**
R1 & R10 – Exposed to Terry Fox Drive and Cope Drive, R3 – Exposed to Terry Fox Drive	31	STC-3 = AIF	34	31	STC-8 = AIF	39
R2 – Exposed to Fernbank Road and Terry Fox Drive	34	STC-3 = AIF	37	34	STC-8 = AIF	42
R5– Exposed to Fernbank Road and Terry Fox Drive	28	STC-3 = AIF	31	28	STC-8 = AIF	36
R6, R11, R12 – Exposed to Terry Fox Drive, R9 – Exposed to Cope Drive and Terry Fox Drive, R13 – Exposed to Fernbank Road and Terry Fox Drive	25	STC-3 = AIF	28	26	STC-8 = AIF	34

*Refers to governing AIF between living room and bedroom

The attenuation measures required to satisfy the City of Ottawa noise criteria and the noise clauses that are to be included on title and in the Agreement of Purchase and Sale for the various dwelling units are summarized in **Table 9**.

Table 9 – Required Attenuation Measures and Associated Warning Clauses

Buildings*	**Attenuation Measure**	**Notice on Title**
Buildings A, B and R	• Forced Air Ventilation with Provision for Central Air Conditioning.	C
Buildings C, D, E, F, G, H, J, K, L, M, N, P, Q	• Central Air Conditioning. • Acoustically selected walls and windows for all rooms.	D

*Building numbers correspond to **Figure 2** – Site Plan.

Refer to **Figure 4** – Noise Attenuation Measures Plan for locations and details of required mitigation measures.

5.0 CONCLUSIONS

An analysis of the roadway traffic along Terry Fox Drive, Fernbank Road, and Cope Drive indicates indoor noise attenuation measures will be necessary for the Fernbank Zens development. No outdoor noise attenuation is required.

The following is a summary of the attenuation measures and notice requirements to be placed on title for the following units. Block numbers correspond to **Figure 2** – Site Plan:

Residential – Buildings L, M, N and P

- Provide central air conditioning;
- Type D Warning Clause (refer to Section 3.6);
- Provide window assembly to meet a sound transmission class, STC of 34;
- Provide wall assembly to meet a sound transmission class, STC of 39;

Residential – Building K

- Provide central air conditioning;
- Type D Warning Clause (refer to Section 3.6);
- Provide window assembly to meet a sound transmission class, STC of 37;
- Provide wall assembly to meet a sound transmission class, STC of 42;

Residential – Building J

- Provide central air conditioning;
- Type D Warning Clause (refer to Section 3.6);
- Provide window assembly to meet a sound transmission class, STC of 31;
- Provide wall assembly to meet a sound transmission class, STC of 36;

Residential – Buildings C, D, E, F, G, H, Q

- Provide central air conditioning;
- Type D Warning Clause (refer to Section 3.6);
- Provide window assembly to meet a sound transmission class, STC of 28;
- Provide wall assembly to meet a sound transmission class, STC of 34;

Residential – Buildings A, B and R

- Provide forced air ventilation with provision for central air conditioning;
- Type C Warning Clause (refer to Section 3.6);

In closing, Novatech respectfully requests the City of Ottawa accept the findings of this Detailed Noise Control Study for the Fernbank Zens residential development at 5331 Fernbank Road as part of the Site Plan application.

NOVATECH

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APPENDIX A

EXCERPTS FROM THE CITY OF OTTAWA ENVIRONMENTAL NOISE CONTROL GUIDELINES, THE MOE'S NPC-300, THE CITY OF OTTAWA'S TRANSPORTATION MASTER PLAN AND OFFICIAL PLAN

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

ENVIRONMENTAL NOISE CONTROL GUIDELINES: Introduction and Glossary

January 2016

Table 2.2a: Sound Level Limit for Outdoor Living Areas - Road and Rail
(from NPC-300, 2013 Table C-1)

Time Period	Required L_{eq} (16) (dBA)
16-hour, 07:00 – 23:00	55

Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail
(from NPC-300, 2013 Table C-2)

		Required L_{eq} (dBA)	
Type of Space	Time Period	Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

The Province also provides for supplementary indoor sound level limits for land uses not generally considered noise sensitive (see Table 2.2c below). These good practice design objectives should be addressed in any noise study prepared for the City. These supplementary sound level limits are based on the windows and doors to an indoor space being closed.

Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces - Road and Rail (adapted from NPC-300 Table C-9)

		Required L_{eq} (dBA)	
Type of Space	Time Period	Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 – 23:00	50	45
Theatres, places of worship, libraries, individual or semi- private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 – 07:00	40	35

Appendix B: Table of Traffic and Road Parameters To Be Used For Sound Level Predictions

Table B1 Traffic And Road Parameters To Be Used For Sound Level Predictions

Row Width (m)	Implied Roadway Class	AADT Vehicles/Day	Posted Speed Km/Hr	Day/Night Split %	Medium Trucks %	Heavy Trucks % [1]
NA [2]	Freeway, Queensway, Highway	18,333 per lane	100	92/8	7	5
37.5-44.5	6-Lane Urban Arterial-Divided (6 UAD)	50,000	50-80	92/8	7	5
34-37.5	4-Lane Urban Arterial-Divided (4-UAD)	35,000	50-80	92/8	7	5
23-34	4-Lane Urban Arterial-Undivided (4-UAU)	30,000	50-80	92/8	7	5
23-34	4-Lane Major Collector (4-UMCU)	24,000	40-60	92/8	7	5
30-35.5	2-Lane Rural Arterial (2-RAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Urban Arterial (2-UAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Major Collector (2-UMCU)	12,000	40-60	92/8	7	5
30-35.5	2-Lane Outer Rural Arterial (near the extremities of the City) (2-RAU)	10,000	50-80	92/8	7	5
20-30	2-Lane Urban Collector (2-UCU)	8,000	40-50	92/8	7	5

[1] The MOE Vehicle Classification definitions should be used to estimate automobiles, medium trucks and heavy trucks.

[2] The number of lanes is determined by the future mature state of the roadway.

Environmental Noise Guideline

Stationary and Transportation Sources – Approval and Planning

Publication NPC-300

Ontario

Table C-10
Supplementary Indoor Aircraft Noise Limits
(Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

* The indoor NEF/NEP values listed in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.

C7 Noise Control Measures

The following sections provide MOE guidance for appropriate noise control measures. These sections constitute requirements that are applied to MOE approvals for stationary sources. This information is also provided as guidance which land use planning authorities may consider adopting.

The definition in Part A describes the various types and application of noise control measures. All the noise control measures described in the definition are appropriate to address the impact of noise of transportation sources (road, rail and aircraft) on planned sensitive land uses. Only some of the noise control measures described in the definition are appropriate to address the noise impact of stationary sources on planned sensitive land uses.

C7.1 Road Noise Control Measures

C7.1.1 Outdoor Living Areas

If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 55 dBA and less than or equal to 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA.

C7.1.2 Plane of a Window – Ventilation Requirements

C7.1.2.1 Daytime Period, 07:00 – 23:00 Hours

Noise control measures may not be required if the L_{eq} (16) daytime sound level in the plane of a bedroom or living/dining room window is less than or equal to 55 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the daytime sound level in the plane of a bedroom or living/dining room window is greater than 65 dBA, installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.2.2 Nighttime Period, 23:00 – 07:00 Hours

Noise control measures may not be required if the L_{eq} (8) nighttime sound level in the plane of a bedroom or living/dining room window is less than or equal to 50 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 50 dBA and less than or equal to 60 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the nighttime sound level in the plane of a bedroom or living/dining room window is greater than 60 dBA, installation of central air conditioning should be implemented, with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.3 Indoor Living Areas – Building Components

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 60 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 65 dBA, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the

sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

C7.2 Rail Noise Control Measures

C7.2.1 Outdoor Living Areas

Whistle noise is not included in the determination of the outdoor daytime sound level due to railway trains. All the provisions of Section C7.1.1 apply also to noise control requirements for rail noise.

C7.2.2 Plane of a Window – Ventilation Requirements

Whistle noise is not included in the determination of the sound level in the plane of a window. All the provisions of Section C7.1.2 apply also to noise control requirements for rail noise.

C7.2.3 Indoor Living Areas – Building Components

The sound level, L_{eq}, during the daytime (16-hour) and nighttime (8-hour) periods is determined using the prediction method STEAM, Reference [34], immediately outside the dwelling envelope. Whistle noise is included in the determination of the sound level.

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 55 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 60 dBA, building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified.

In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic L_{eq} (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

C7.3 Combination of Road and Rail Noise

The noise impact in the OLA and in the plane of a window, and the requirements for outdoor measures, ventilation measures and warning clauses, should be determined by combining road and rail traffic sound levels.

The assessment of the indoor sound levels and the resultant requirement for the acoustical descriptors of the building components should be done separately for road

In Class 4 areas, where windows for noise sensitive spaces are assumed to be closed, the use of central air conditioning may be acceptable if it forms an essential part of the overall building designs.

C7.9 Verification of Noise Control Measures

It is recommended that the implementation of noise control measures be verified by qualified individuals with experience in environmental acoustics.

C8 Warning Clauses

The use of warning clauses or easements in respect of noise are recommended when circumstances warrant. Noise warning clauses may be used to warn of potential annoyance due to an existing source of noise and/or to warn of excesses above the sound level limits. Direction on the use of warning clauses should be included in agreements that are registered on title to the lands in question. The warning clauses would be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. Alternatively, the use of easements in respect of noise may be appropriate in some circumstances. Additional guidance on the use of noise warning clauses is provided in Section C7.1.1, Section C7.1.2.1, Section C7.1.2.2, Section C7.3 and Section C7.4.

C8.1 Transportation Sources

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

TYPE A: (see Section C7.1.1)

> "Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

TYPE B: (see Section C7.1.1 and Section C7.4)

> "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 (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

TYPE C: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

> "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 in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

TYPE D: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

"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 sound level limits of the Municipality and the Ministry of the Environment."

C8.2 Stationary Sources

It is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits. Warning clause (Type E) for stationary sources may identify a potential concern due to the proximity of the facility but it is not acceptable to justify exceeding the sound level limits.

TYPE E: (see Section C7.6)

"Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible."

C8.3 Class 4 Area Notification

TYPE F: (see Section B9.2 and Section C4.4.2)

"Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."

Appendix A: Warning Clauses

Under the Official Plan and this guideline warning clauses may be required to be incorporated into development through development agreements, registration on title and inclusion in Agreements of Purchase and Sale. This requirement may be included in any development, regardless of whether it is considered a noise sensitive land use.

A warning clause provides recognition for the City, Province landowner or tenants that noise may be a concern, that noise may be audible at times or even quite loud, and, depending on the type of development, provincial guidelines for noise may be exceeded. Warning clauses also recognize that environmental noise is a potential health hazard that does impact people and neighbourhoods. It is for this reason that, unless a non-noise sensitive land use is established, a warning clause should also include noise mitigation.

A warning clause is not considered a form of noise mitigation. It is not acceptable therefore to use warning clauses in place of physical noise control measures to identify an excess over the MOE or City noise limits. The reason for a warning clause on all development is twofold. Firstly, it is important to note that a land use that although the development may not be considered noise sensitive it may include employees or tenants that are personally sensitive to noise. A warning clause provides protection against complaints to the ministry of Environment should provincial guidelines be exceeded. Secondly, a warning clause on title could obviate the need for a new noise study in the future. In a redevelopment scenario the warning clause would provide recognition of the extent noise conditions.

Given the variation in potential intensity and impact of noise it will often be necessary to amend warning clauses to recognize the site specific conditions in each development. Final wording of any warning clause is to be approved by the City.

The following subsections provide example text to be adapted into warning clauses.

Surface Transportation Warning Clauses

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
Generic	*Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment.* *To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area that is within provincial guidelines. Measures for sound attenuation include:* • *A setback of buildings from the noise source and* • *An acoustic barrier.* *To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features.* *The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.* *Additionally this development includes trees and shrubs to screen the source of noise from occupants.*	The generic warning clause outlines that MOE sound levels may be exceeded but the indoor environment and outdoor amenity areas are within guidelines. Mitigation measures are described including urban design features. Mention is also made of landscaping to screen the development visually from the source of noise.
Extensive mitigation of indoor and	*"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units,*	The warning clause makes reference to MOE sound levels

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
outdoor amenity area	*sound levels due to increasing road/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.* *To help address the need for sound attenuation this development includes:* • *multi-pane glass;* • *double brick veneer;* • *an earth berm; and* • *an acoustic barrier.* *To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.* *The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.* *This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.*	being exceeded from time to time and that there are sound attenuation features and landscaping within the development that should be maintained. An option for air conditioning is noted as well as landscaping to screen the source of noise.

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
	Additionally this development includes trees and shrubs to screen the source of noise from occupants.	
No outdoor amenity area	*Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic will interfere with outdoor activities as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.* *To help address the need for sound attenuation this development includes:* • *multi-pane glass;* • *double brick veneer;* • *high sound transmission class walls.* *To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.* *This dwelling unit has been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment*	This warning clause notes that only an indoor environment is being provided for.

Stationary Source Warning Clauses

The Province notes that it is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits for stationary sources. The generic warning clause for stationary sources (called Type E in NPC-300) may identify a potential concern due to the proximity of the facility but it is not possible to justify exceeding the sound level limits.
The wording of the generic stationary noise warning clause may also be used as the basis for new development adjacent to areas licensed for mineral aggregate extraction.

Note:
1) This schedule forms part of the Official Plan of the City of Ottawa and must be read in conjunction with the text.
2) This schedule is intended as a framework for planning and design; consequently alignments of proposed roads are approximate and subject to detailed study.
3) An unidentified new facility from Highway 416 to Highway 417 East is not shown.

Note:
1) La présente annexe fait partie du Plan officiel de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente annexe doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.
3) Une nouvelle installation non identifiée et située entre l'autoroute 416 et l'autoroute 417E n'apparaît pas.

SEE MAP 6
VOIR CARTE 6

City of / Ville de GATINEAU

Rivière des Outaouais / Ottawa River

CARP
HUNTMAR
MARCH
CARLING
CAMPEAU
PALADIUM
HAZELDEAN
TERRY FOX
EAGLESON
TIMM
ROBERTSON
STITTSVILLE MAIN
FERNBANK
OLD RICHMOND
WEST HUNT CLUB
CEDARVIEW
GREENBANK
BASELINE
MEADOWLANDS
WOODROFFE
MERIVALE
FISHER
SCOTT
HOLLAND
KIRKWOOD
CROKER
BANK
MAIN
RIVERSIDE
HEMLOCK
MONTREAL
McARTHUR
ST LAURENT
INDUSTRIAL
SMYTH
HERON
WALKLEY
HUNT CLUB
CONROY
HAWTHORNE
OGILVIE
BLAIR
INNES
BLACKBURN BYPASS
ANDERSON
ST JOSEPH
JEANNE D'ARC
ORLEANS
TENTH LINE
TRIM
MER BLEUE
NAVAN
RUSSELL
RAMSAYVILLE
ALBION
LEITRIM
FALLOWFIELD
MOODIE
PRINCE OF WALES
RIVER
EARL ARMSTRONG
PERTH
BROPHY
BANKFIELD
MITCH OWENS
MILTON
FRANK KENNY

Official Plan for the City of Ottawa
Consolidation and Amendments

Plan officiel de la Ville d'Ottawa
Amendement au plan directeur approuvé

 # 150 (07/2019) **# 192** (08/2017)
 # 173 (01/2017) **# 213** (07/2018)

OFFICIAL PLAN - Schedule E
URBAN ROAD NETWORK

PLAN OFFICIEL - Annexe E
RÉSEAU ROUTIER - URBAIN

Provincial Highway	Chemins de propriété fédéral
Federally Owned Road	Route provinciale
City Freeway	Autoroute de ville

Arterial - Existing	Artère - Établie
Arterial - Proposed (alignment defined)	Artère - Proposé (alignement déterminée)
Arterial - Conceptual (alignment undefined)	Artère - Conceptuelle (alignement à déterminée)
Major Collector - Existing	Grande collectrice - Établie
Major Collector - Proposed	Grande collectrice - Proposé
Collector - Existing	Collectrice - Établie
Collector - Proposed	Collectrice - Proposé
New Interchange	Nouvel échangeur

Ottawa
1 0.5 0 1 2 3 km

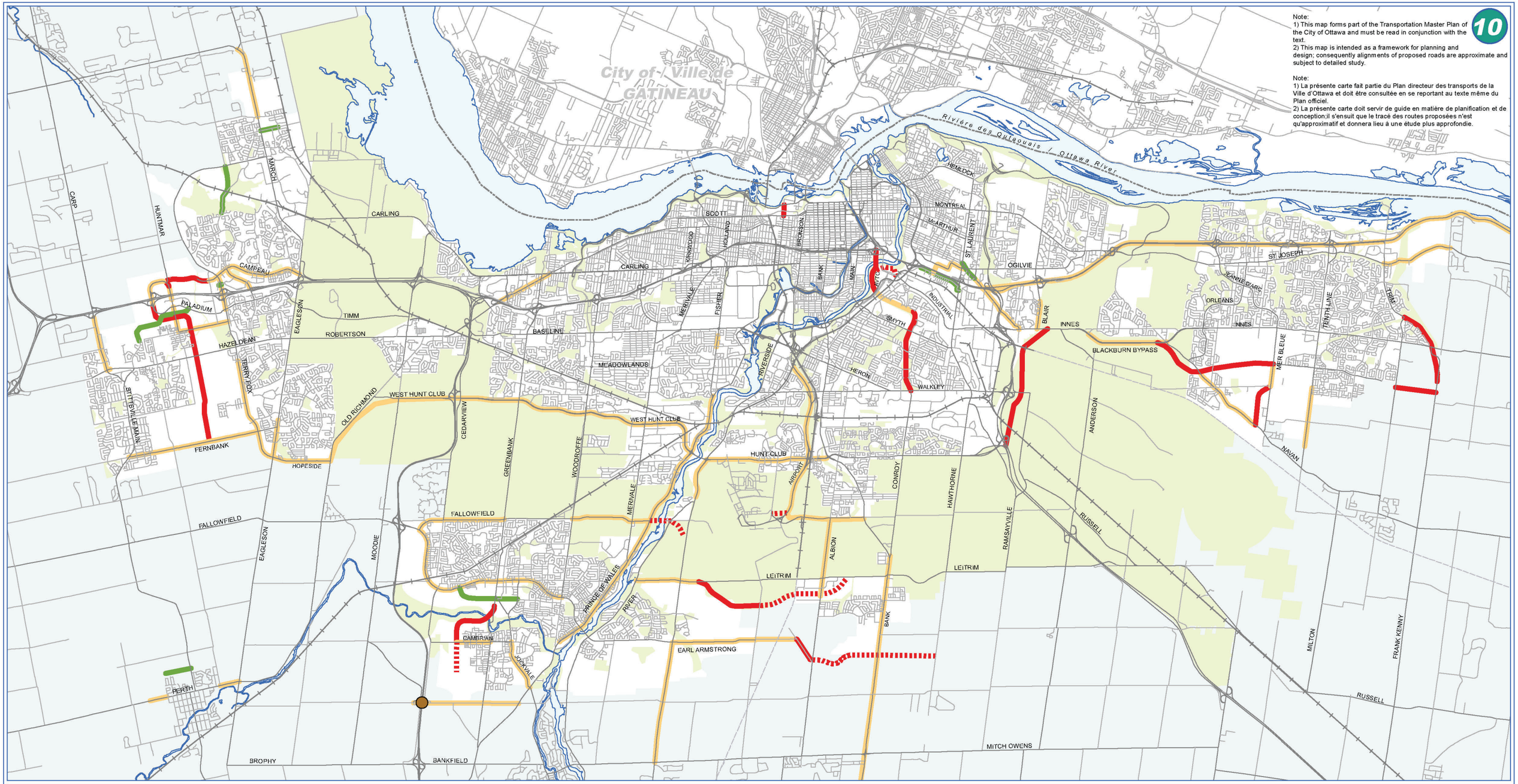
Planning, Infrastructure and Economic Development Department, GIS and Data Management

Services de la planification, de l'infrastructure et du développement économique, SIG et Gestion des données

10

Note:
1) This map forms part of the Transportation Master Plan of the City of Ottawa and must be read in conjunction with the text.
2) This map is intended as a framework for planning and design; consequently alignments of proposed roads are approximate and subject to detailed study.

Note:
1) La présente carte fait partie du Plan directeur des transports de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente carte doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.



Ottawa

1 0.5 0 1 2 3 km

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2015 Revision
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, Révision 2015

New Arterials	Nouvelles artères
Widened Arterial	Artères élargies
Conceptual Arterial	Conception d'artères
New or Widened Collector	Artères élargies ou nouvelles
New Interchange	Nouvel échangeur

TRANSPORTATION MASTER PLAN - Map 10
ROAD NETWORK – 2031 NETWORK CONCEPT

PLAN DIRECTEUR DES TRANSPORTS - Carte 10
RÉSEAU ROUTIER - CONCEPT DU RÉSEAU 2031

Note:
1) This map forms part of the Transportation Master Plan of the City of Ottawa and must be read in conjunction with the text.
2) This map is intended as a framework for planning and design; consequently alignments of proposed roads are approximate and subject to detailed study.

Note:
1) La présente carte fait partie du Plan directeur des transports de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente carte doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.

11

City of / Ville de GATINEAU

Rivière des Outaouais / Ottawa River

MARCH
CARP
HUNTMAR
CARLING
CAMPEAU
PALADIUM
HAZELDEAN
EAGLESON
TIMM
ROBERTSON
BASELINE
MEADOWLANDS
TERRY FOX
STITTSVILLE MAIN
FERNBANK
HOPESIDE
OLD RICHMOND
WEST HUNT CLUB
CEDARVIEW
GREENBANK
WOODROFFE
MERIVALE
FISHER
KIRKWOOD
HOLLAND
SCOTT
BRONSON
BANK
MAIN
RIVERSIDE
HEMLOCK
MONTREAL
McARTHUR
ST LAURENT
INDUSTRIAL
SMYTH
HERON
WALKLEY
HUNT CLUB
AIRPORT
CONROY
HAWTHORNE
OGILVIE
BLAIR
INNES
BLACKBURN BYPASS
ANDERSON
ST JOSEPH
JEANNE D'ARC
ORLEANS
TRIM
MER BLEUE
TENTH LINE
NAVAN
RUSSELL
RAMSAYVILLE
ALBION
LEITRIM
FALLOWFIELD
MOODIE
PRINCE OF WALES
CAMBRIAN
JOCKVALE
EARL ARMSTRONG
BANK
MILTON
FRANK KENNY
PERTH
BROPHY
BANKFIELD
MITCH OWENS

Phase 1 (2014 - 2019) Widening
Phase 1 (2014 - 2019) New Road
Phase 1 (2014 - 2019) Élargissement
Phase 1 (2014 - 2019) Nouvelle route

Phase 2 (2020 - 2025) Widening
Phase 2 (2020 - 2025) New Road
Phase 2 (2020 - 2025) Élargissement
Phase 2 (2020 - 2025) Nouvelle route

Phase 3 (2026 - 2031) Widening
Phase 3 (2026 - 2031) New Road
Phase 3 (2026 - 2031) Élargissement
Phase 3 (2026 - 2031) Nouvelle route

1 0.5 0 1 2 3 km

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2015 Revision
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, Révision 2015

TRANSPORTATION MASTER PLAN - Map 11

ROAD NETWORK – 2031 AFFORDABLE NETWORK

PLAN DIRECTEUR DES TRANSPORTS - Carte 11

RÉSEAU ROUTIER - RÉSEAU ABORDABLE 2031

Table A3 Road Projects

Project	General Description	Rationale	EA Status
Rideau River Crossing (Network Concept)	New four lane bridge and approaches between Prince of Wales Drive and Limebank Road	Provides for increased capacity across Rideau River screenline.	Not started
Riverside Drive (Network Concept)	Widen from four to six lanes between River Road and Hunt Club Road	Provides capacity for growth in Riverside South	Complete
Strandherd Drive (Affordable Network and Network Concept)	**Affordable:** Widen from two to four lanes between Fallowfield Road and Jockvale Road	Addresses capacity deficiencies at the Rideau River South and Manotick screenlines, in conjunction with a Strandherd-Earl Armstrong Rideau River Bridge and Earl Armstrong Road widening	Complete
	Concept: Widen from four to six lanes between Jockvale Road and Woodroffe Avenue		
Stittsville Main Street Extension (Affordable Network and Network Concept)	New two-lane road between Palladium Drive and Maple Grove Road	Provides capacity for development in Stittsville	Not started
Stittsville North-South Arterial (Affordable Network and Network Concept)	New two-lane road between Palladium Drive and Fernbank Road	Provides capacity for development in Stittsville and provides a bypass for Stittsville Main Street congestion	Complete
Tenth Line Road (Affordable Network and Network Concept)	Widen from two to four lanes between Harvest Valley Drive and the urban boundary	Services growth south of Innes Road	Complete
Terry Fox Drive (Network Concept)	Widen from two to four lanes between Winchester Drive and Eagleson Road	Provides access to adjacent developments	Complete
	Widen from four to six lanes between Campeau Drive and Palladium Drive	Accommodates Kanata West Development	Not started
Tremblay Road (Affordable Network and Network Concept)	Widen from two to four lanes between Pickering Place and St. Laurent Boulevard	Addresses the needs identified by the St. Laurent Station Transit-Oriented Development study and accommodates new employment land at St. Laurent Blvd at Tremblay Road	Not started
West Hunt Club Road (Network Concept)	Widen from four to six lanes between Highway 416 and Prince of Wales Drive	Services on-going development/ redevelopment along corridor and makes full use of Rideau River Bridge	Not started

APPENDIX B

SOUND LEVEL CALCULATIONS

- Part 1 - Modelling Results
- Part 2 - Stamson Modelling Angles

PART 1 (APPENDIX B)

Stamson Modelling Results

STAMSON 5.0 SUMMARY REPORT Date: 17-05-2021 13:44:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1bot.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563 veh/TimePeriod	*
Medium truck volume	:	515/45 veh/TimePeriod	*
Heavy truck volume	:	368/32 veh/TimePeriod	*
Posted speed limit	:	50 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

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

Data for Segment # 1: Cope Dr (day/night)

Angle1 Angle2	:	-36.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	23.10 / 23.10	m
Receiver height	:	3.50 / 3.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Road data, segment # 2: Terry Fox N (day/night)

Car traffic volume	:	28336/2464 veh/TimePeriod	*
Medium truck volume	:	2254/196 veh/TimePeriod	*
Heavy truck volume	:	1610/140 veh/TimePeriod	*
Posted speed limit	:	80 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)	:	35000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

```
Data for Segment # 2: Terry Fox N (day/night)
---------------------------------------------
Angle1   Angle2           : -79.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  27.70 / 27.70  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 3: Terry Fox S (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Terry Fox S (day/night)
---------------------------------------------
Angle1   Angle2           : -79.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.20 / 40.20  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Cope Dr          !     1.50 !    60.22 !    60.22
 2.Terry Fox N      !     1.50 !    70.46 !    70.46
 3.Terry Fox S      !     1.50 !    67.88 !    67.88
--------------------+---------+---------+---------
```

	Total		72.63 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	52.62	52.62
2.Terry Fox N	1.50	62.87	62.87
3.Terry Fox S	1.50	60.28	60.28
	Total		65.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.63
(NIGHT): 65.03

STAMSON 5.0 SUMMARY REPORT Date: 17-05-2021 13:44:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1top.te Time Period: Day/Night 16/8 hours
Description:

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

```
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

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

Data for Segment # 1: Cope Dr (day/night)

```
Angle1   Angle2           : -36.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  23.10 / 23.10  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Road data, segment # 2: Terry Fox N (day/night)

```
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

Data for Segment # 2: Terry Fox N (day/night)

Angle1 Angle2	: -79.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 27.70 / 27.70	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 3: Terry Fox S (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 80	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)	35000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

Data for Segment # 3: Terry Fox S (day/night)

Angle1 Angle2	: -79.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 40.20 / 40.20	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	60.52	60.52
2.Terry Fox N	1.50	70.87	70.87
3.Terry Fox S	1.50	68.44	68.44

Total		73.08 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	52.93	52.93
2.Terry Fox N	1.50	63.28	63.28
3.Terry Fox S	1.50	60.84	60.84
Total			65.49 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.08
(NIGHT): 65.49

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 08:53:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2bot.te Time Period: Day/Night 16/8 hours
Description:

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	: 60	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

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

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

Data for Segment # 1: Fernbank (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	: 33.40 / 33.40	m
Receiver height	: 3.50 / 3.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox N (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 80	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: Terry Fox N (day/night)

Angle1 Angle2	: -90.00 deg	85.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 20.40 / 20.40	m
Receiver height	: 3.50 / 3.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 3: Terry Fox S (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 80	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 3: Terry Fox S (day/night)

Angle1 Angle2	: -90.00 deg	85.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 2	(Reflective ground surface)
Receiver source distance	: 32.90 / 32.90	m
Receiver height	: 3.50 / 3.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fernbank	1.50	66.52	66.52
2.Terry Fox N	1.50	72.65	72.65
3.Terry Fox S	1.50	72.63	72.63
Total			76.15 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fernbank	1.50	58.92	58.92
2.Terry Fox N	1.50	65.05	65.05
3.Terry Fox S	1.50	65.04	65.04
Total			68.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 76.15
(NIGHT): 68.56

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 08:54:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2top.te Time Period: Day/Night 16/8 hours
Description:

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	: 60	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

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

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

Data for Segment # 1: Fernbank (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	: 33.40 / 33.40	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Terry Fox N (day/night)

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 80	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

```
Data for Segment # 2: Terry Fox N (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   85.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.40 / 20.40  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: Terry Fox S (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Terry Fox S (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   85.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  32.90 / 32.90  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Fernbank         !     1.50 !    66.52 !    66.52
 2.Terry Fox N      !     1.50 !    72.94 !    72.94
 3.Terry Fox S      !     1.50 !    72.63 !    72.63
--------------------+----------+----------+----------
                      Total                  76.28 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fernbank	1.50	58.92	58.92
2.Terry Fox N	1.50	65.35	65.35
3.Terry Fox S	1.50	65.04	65.04
Total			68.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 76.28
(NIGHT): 68.69

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 13:29:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3bot.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
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: TerryFox N (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 : 24.20 / 24.20 m
Receiver height : 3.50 / 3.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Terry Fox S (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  :  36.70 / 36.70  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	71.49	71.49
2.Terry Fox S	1.50	68.59	68.59
Total			73.29 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	63.89	63.89
2.Terry Fox S	1.50	61.00	61.00
Total			65.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.29
(NIGHT): 65.69

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:02:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3top.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
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: TerryFox N (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 : 24.20 / 24.20 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Terry Fox S (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  :  36.70 / 36.70  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	71.86	71.86
2.Terry Fox S	1.50	69.14	69.14
Total			73.72 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	64.26	64.26
2.Terry Fox S	1.50	61.54	61.54
Total			66.12 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.72
(NIGHT): 66.12

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:07:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4bot.te Time Period: Day/Night 16/8 hours
Description:

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

```
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

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

Data for Segment # 1: Cope Dr (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  :  20.40 / 20.40  m
Receiver height           :   3.50 / 3.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	64.41	64.41
Total			64.41 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)

1.Cope Dr	1.50	56.82	56.82
Total			56.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.41
(NIGHT): 56.82

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:08:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4top.te Time Period: Day/Night 16/8 hours
Description:

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

```
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

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

Data for Segment # 1: Cope Dr (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  :  20.40 / 20.40  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	64.41	64.41
Total			64.41 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)

1.Cope Dr	1.50	56.82	56.82
Total			56.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.41
(NIGHT): 56.82

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:17:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5bar.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Fenrbank RD (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 : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: Fenrbank RD (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 : 26.90 / 26.90 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

```
Data for Segment # 2: TerryFoxN (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   11.00 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           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: TerryFoxS (day/night)
-------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: TerryFoxS (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   11.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.10 / 65.10  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Road data, segment # 4: TerryFoxN B (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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 # 4: TerryFoxN B (day/night)

Angle1 Angle2 : 11.00 deg 74.00 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 : 6.70 / 6.70 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 11.00 deg Angle2 : 74.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 6.90 / 6.90 m
Source elevation : 97.61 m
Receiver elevation : 98.00 m
Barrier elevation : 98.00 m
Reference angle : 0.00

Road data, segment # 5: TerryFoxS B (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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 # 5: TerryFoxS B (day/night)
----------------------------------------------
Angle1   Angle2           :  11.00 deg   74.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.10 / 65.10  m
Receiver height           :   6.70 / 6.70   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  11.00 deg   Angle2 : 74.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :   6.90 / 6.90   m
Source elevation          :  97.61 m
Receiver elevation        :  98.00 m
Barrier elevation         :  98.00 m
Reference angle           :   0.00

Road data, segment # 6: TerryFox N (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  35000
    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 # 6: TerryFox N (day/night)
----------------------------------------------
Angle1   Angle2           :  74.00 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           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Road data, segment # 7: TerryFox S (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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 # 7: TerryFox S (day/night)

Angle1 Angle2 : 74.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.10 / 65.10 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fenrbank RD	1.50	67.46	67.46
2.TerryFoxN	1.50	64.42	64.42
3.TerryFoxS	1.50	63.03	63.03
4.TerryFoxN B	1.50	54.63	54.63
5.TerryFoxS B	1.50	54.28	54.28
6.TerryFox N	1.50	52.88	52.88
7.TerryFox S	1.50	51.49	51.49
Total			70.51 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fenrbank RD	1.50	59.86	59.86
2.TerryFoxN	1.50	56.82	56.82
3.TerryFoxS	1.50	55.43	55.43
4.TerryFoxN B	1.50	47.04	47.04
5.TerryFoxS B	1.50	46.68	46.68
6.TerryFox N	1.50	45.28	45.28
7.TerryFox S	1.50	43.89	43.89
Total			62.91 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.51
(NIGHT): 62.91

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:22:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5row.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Fenrbank RD (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 : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: Fenrbank RD (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 : 26.90 / 26.90 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 36 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.60 / 52.60 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 36 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.10 / 65.10 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fenrbank RD	1.50	67.46	67.46
2.TerryFoxN	1.50	65.00	65.00
3.TerryFoxS	1.50	63.64	63.64
Total			70.43 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fenrbank RD	1.50	59.86	59.86
2.TerryFoxN	1.50	57.41	57.41
3.TerryFoxS	1.50	56.04	56.04
Total			62.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.43
(NIGHT): 62.83

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:22:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
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: TerryFox N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.30 / 52.30 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: TerryFox S (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 20 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 64.80 / 64.80	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	65.93	65.93
2.TerryFox S	1.50	64.53	64.53
Total			68.30 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	58.33	58.33
2.TerryFox S	1.50	56.93	56.93
Total			60.70 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.30
(NIGHT): 60.70

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 09:24:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 50	km/h
Road gradient	: 1	%
Road pavement	: 1	(Typical asphalt or concrete)

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

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

Data for Segment # 1: Cope Dr (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 21.80 / 21.80	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

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

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 80	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)	: 35000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

Data for Segment # 2: TerryFox N (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 72 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 98.80 / 98.80	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

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

Car traffic volume	: 28336/2464	veh/TimePeriod *
Medium truck volume	: 2254/196	veh/TimePeriod *
Heavy truck volume	: 1610/140	veh/TimePeriod *
Posted speed limit	: 80 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)	35000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

Data for Segment # 3: TerryFox S (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 72 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 111.30 / 111.30	m
Receiver height	: 6.70 / 6.70	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	62.12	62.12
2.TerryFox N	1.50	57.96	57.96
3.TerryFox S	1.50	57.22	57.22
Total			64.44 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	54.53	54.53
2.TerryFox N	1.50	50.36	50.36
3.TerryFox S	1.50	49.63	49.63
Total			56.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.44
(NIGHT): 56.85

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 15:40:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: Cope Dr (day/night)

Angle1 Angle2 : -79.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 59 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 68.00 / 68.00 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

```
Data for Segment # 2: TerryFox N (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     88 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 111.00 / 111.00 m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: TerryFox S (day/night)
----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: TerryFox S (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     88 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 123.50 / 123.50 m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	55.44	55.44
2.TerryFox N	1.50	60.41	60.41
3.TerryFox S	1.50	60.03	60.03
Total			63.90 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	47.84	47.84
2.TerryFox N	1.50	52.81	52.81
3.TerryFox S	1.50	52.43	52.43
Total			56.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.90
(NIGHT): 56.30

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2021 11:50:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: Cope Dr (day/night)

Angle1 Angle2 : -80.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 58 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 59.00 / 59.00 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

```
Data for Segment # 2: TerryFox N (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     79 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  83.20 / 83.20  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: TerryFox S (day/night)
-----------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: TerryFox S (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     79 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  95.80 / 95.80  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	56.15	56.15
2.TerryFox N	1.50	63.07	63.07
3.TerryFox S	1.50	62.52	62.52
Total			66.26 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	48.56	48.56
2.TerryFox N	1.50	55.48	55.48
3.TerryFox S	1.50	54.92	54.92
Total			58.67 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.26
(NIGHT): 58.67

STAMSON 5.0 SUMMARY REPORT Date: 19-05-2021 10:10:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: Cope Dr (day/night)

Angle1 Angle2 : -10.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 61 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.70 / 70.70 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox N (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Terry Fox N (day/night)

Angle1 Angle2 : -78.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.10 / 24.10 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Terry Fox S (day/night)

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 3: Terry Fox S (day/night)

Angle1 Angle2 : -78.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 36.60 / 36.60 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	48.37	48.37
2.Terry Fox N	1.50	71.77	71.77
3.Terry Fox S	1.50	69.04	69.04
Total			73.64 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	40.78	40.78
2.Terry Fox N	1.50	64.17	64.17
3.Terry Fox S	1.50	61.44	61.44
Total			66.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.64
(NIGHT): 66.04

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2021 09:20:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
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: TerryFox N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 76 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 94.80 / 94.80 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: TerryFox S (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 76 %	
Surface	: 2	(Reflective ground surface)
Receiver source distance	: 107.30 / 107.30 m	
Receiver height	: 6.70 / 6.70 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	62.95	62.95
2.TerryFox S	1.50	62.45	62.45
Total			65.72 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	55.35	55.35
2.TerryFox S	1.50	54.86	54.86
Total			58.12 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.72
(NIGHT): 58.12

STAMSON 5.0 SUMMARY REPORT Date: 20-05-2021 16:17:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
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: TerryFox N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 74 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 73.20 / 73.20 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: TerryFox S (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     74 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  85.70 / 85.70  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	64.25	64.25
2.TerryFox S	1.50	63.60	63.60
Total			66.95 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFox N	1.50	56.65	56.65
2.TerryFox S	1.50	56.01	56.01
Total			59.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.95
(NIGHT): 59.35

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2021 09:28:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Fenrbank RD (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 : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

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

Data for Segment # 1: Fenrbank RD (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 60 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 77.40 / 77.40 m
Receiver height : 6.70 / 6.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

```
Data for Segment # 2: TerryFoxN (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     28 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  52.20 / 52.20  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: TerryFoxS (day/night)
---------------------------------------------
Car traffic volume  : 28336/2464  veh/TimePeriod  *
Medium truck volume :  2254/196   veh/TimePeriod  *
Heavy truck volume  :  1610/140   veh/TimePeriod  *
Posted speed limit  :    80 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: TerryFoxS (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     28 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  64.70 / 64.70  m
Receiver height           :   6.70 / 6.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fenrbank RD	1.50	54.55	54.55
2.TerryFoxN	1.50	65.50	65.50
3.TerryFoxS	1.50	64.12	64.12
Total			68.07 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Fenrbank RD	1.50	46.96	46.96
2.TerryFoxN	1.50	57.91	57.91
3.TerryFoxS	1.50	56.52	56.52
Total			60.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.07
(NIGHT): 60.48

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2021 10:02:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

```
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
```

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

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

Data for Segment # 1: Cope Dr (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     39 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  41.20 / 41.20  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	55.01	55.01
Total			55.01 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Cope Dr	1.50	47.41	47.41
Total			47.41 dBA

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

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2021 10:14:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r15.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
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: TerryFoxN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 95 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 123.30 / 123.30 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 80 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1 / 1	
House density	: 95 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 135.80 / 135.80 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFoxN	1.50	50.95	50.95
2.TerryFoxS	1.50	50.33	50.33
Total			53.66 dBA

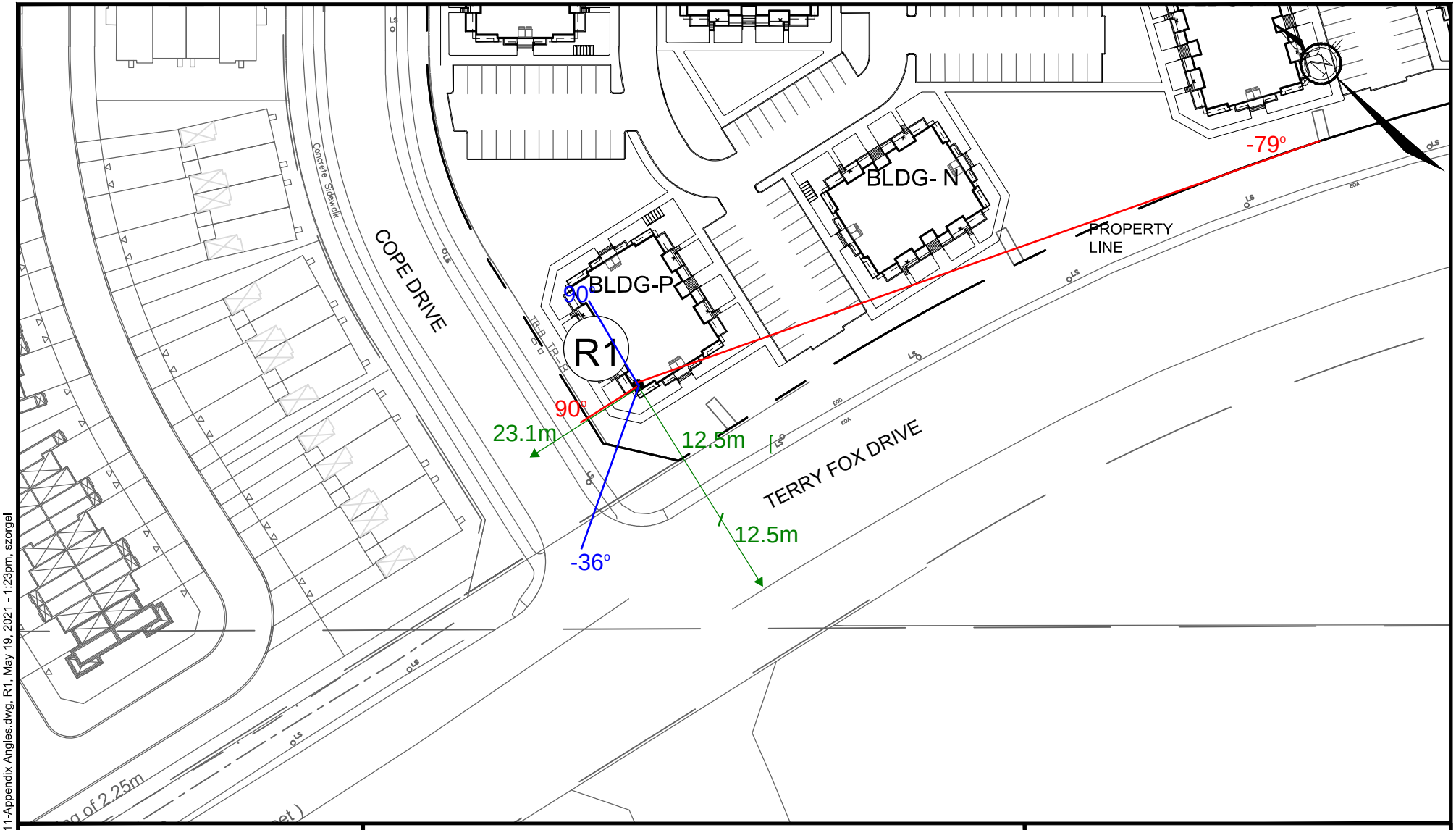
Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.TerryFoxN	1.50	43.35	43.35
2.TerryFoxS	1.50	42.74	42.74
Total			46.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.66
(NIGHT): 46.07

PART 2 (APPENDIX B)

Stamson Modelling Angles



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TERRY FOX DRIVE ANGLES

COPE DRIVE ANGLES

CITY OF OTTAWA
CLARIDGE FERNBANK

RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R1

SHT8X11.DWG - 216mmx279mm

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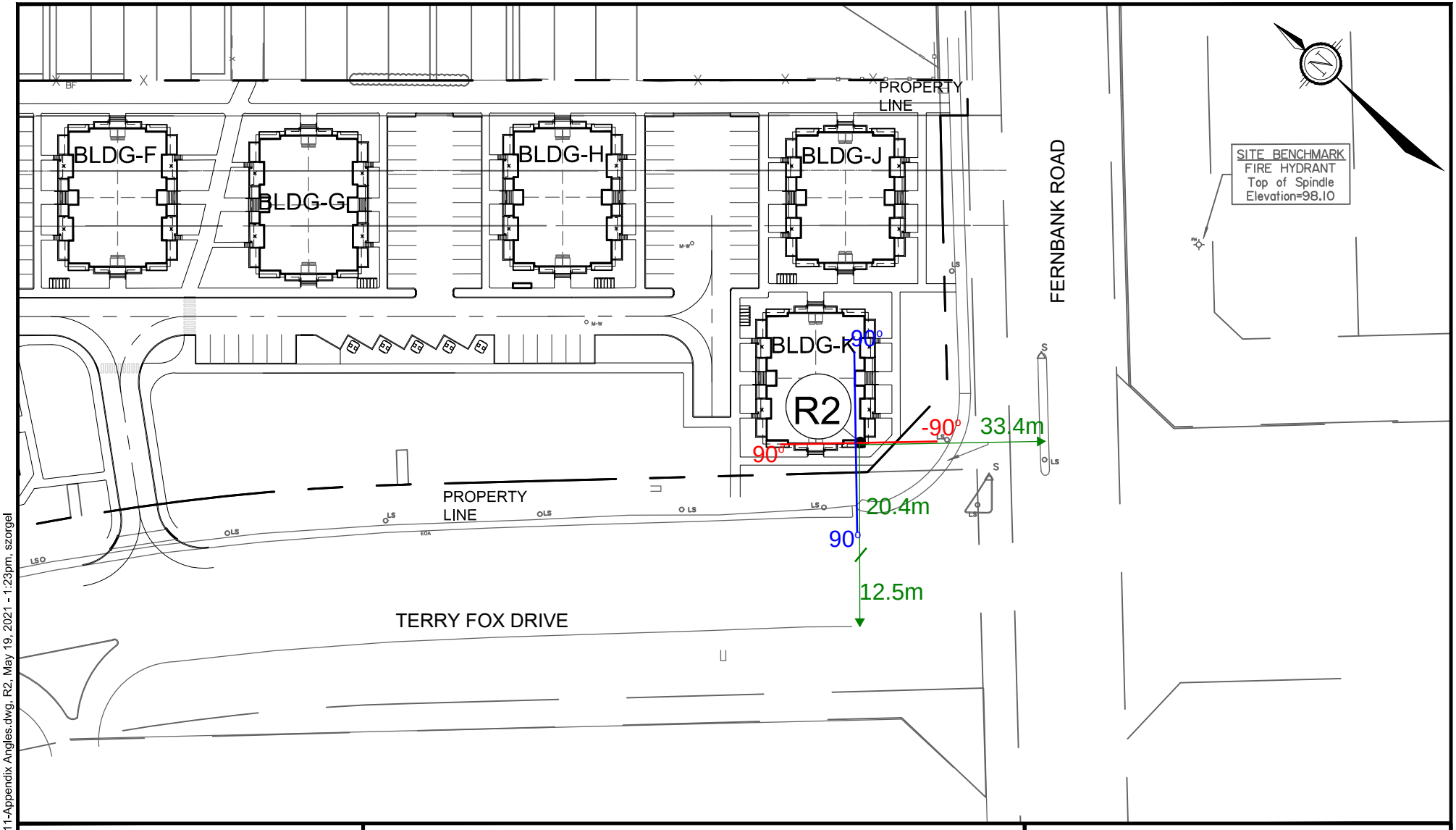

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FERNBANK ROAD ANGLES

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SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R2

SHT8X11.DWG - 216mmx279mm

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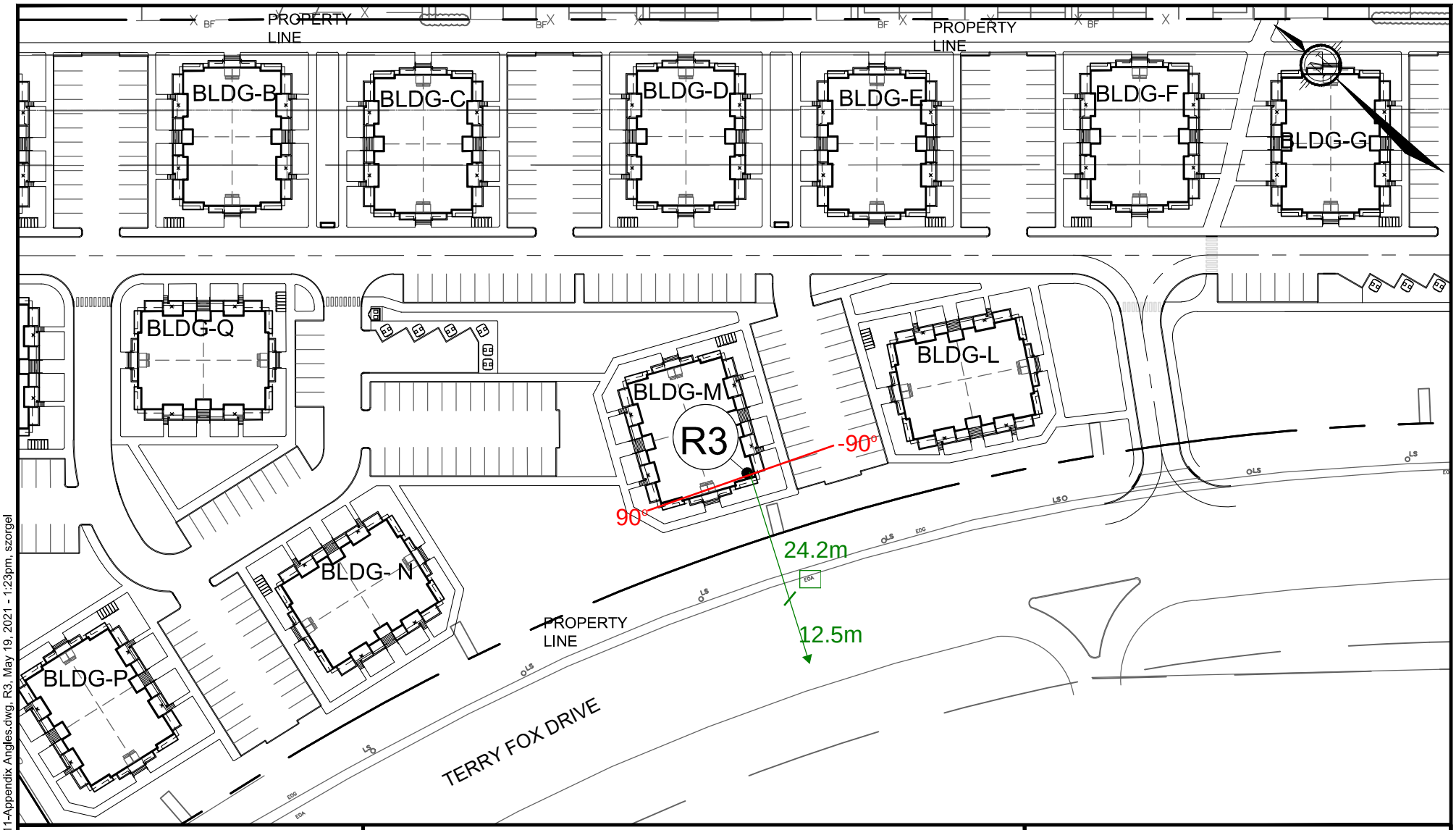

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0 10 20 30 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R3

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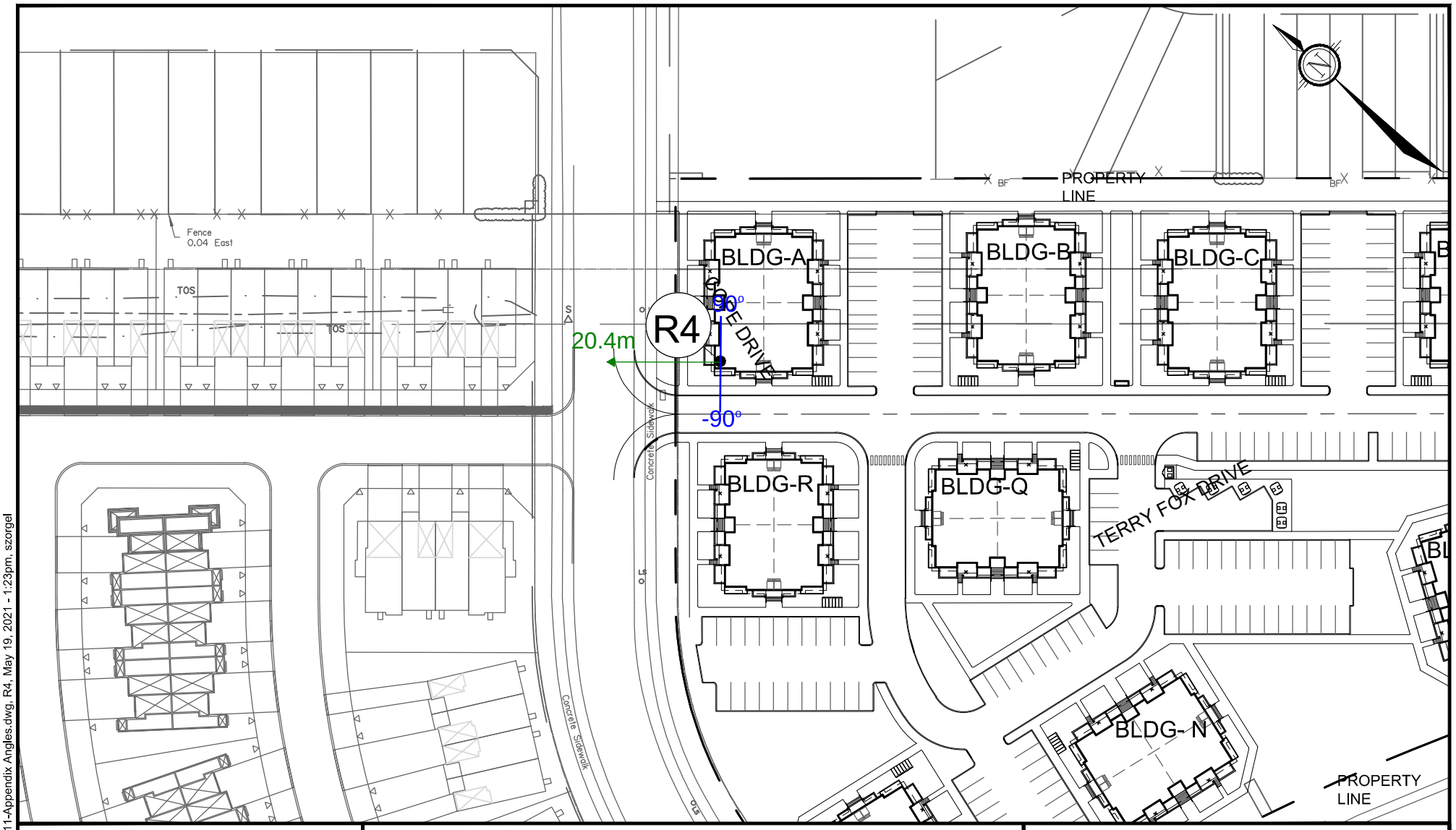

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R4

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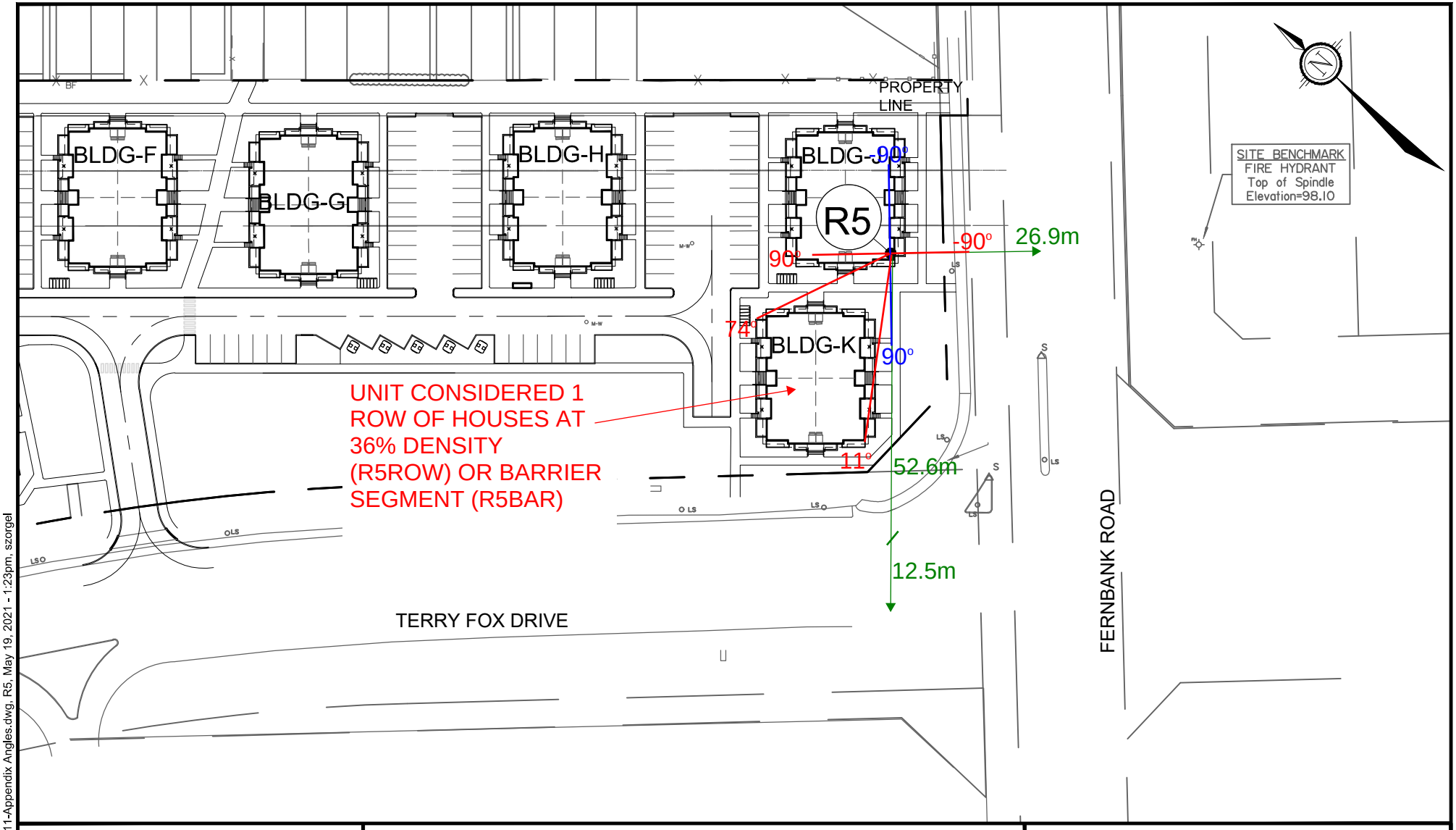

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FERNBANK ROAD ANGLES

CITY OF OTTAWA
CLARIDGE FERNBANK

RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0 10 20 30 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R5

SHT8X11.DWG - 216mmx279mm

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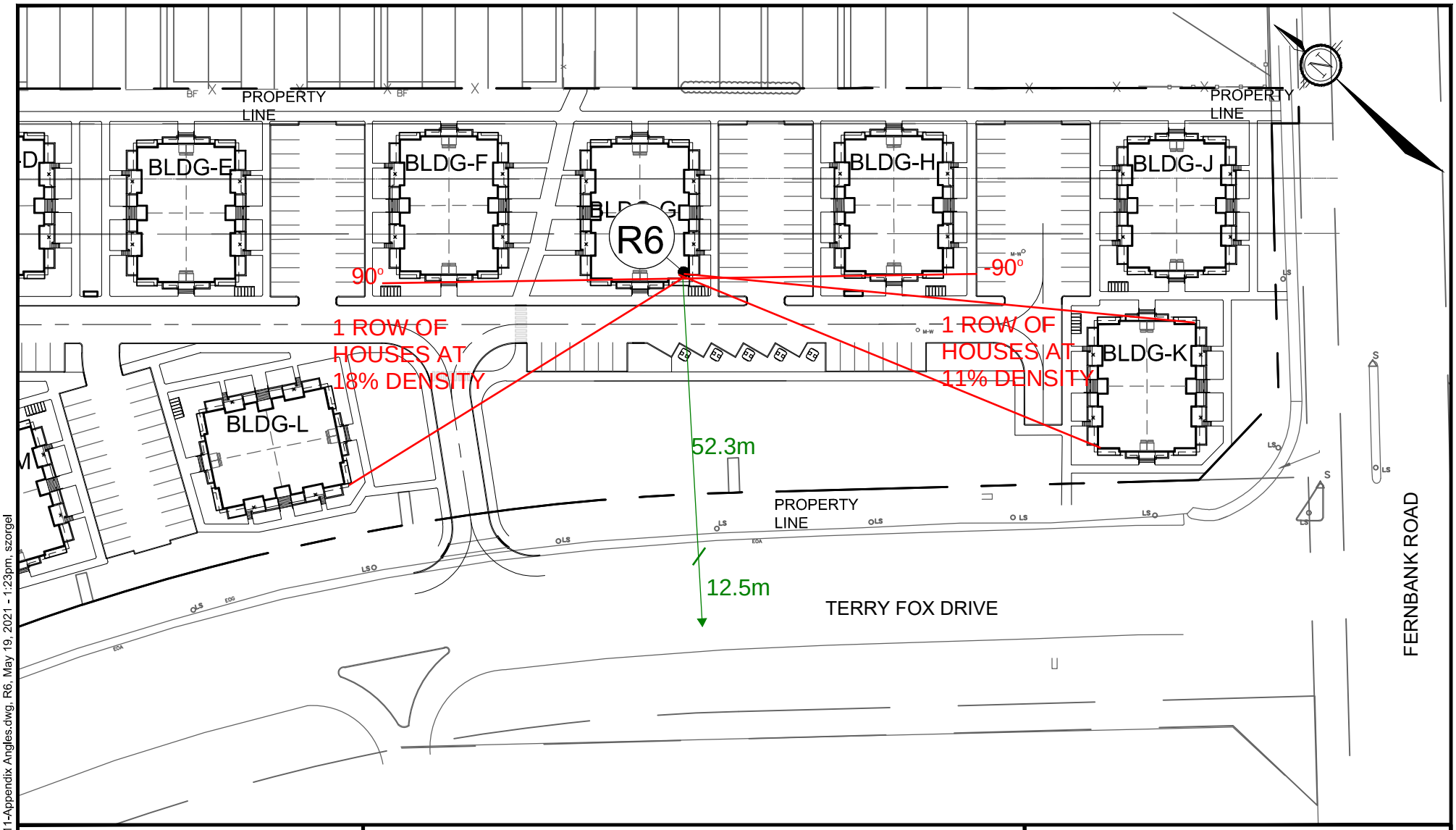

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0 10 20 30 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R6

SHT8X11.DWG - 216mmx279mm

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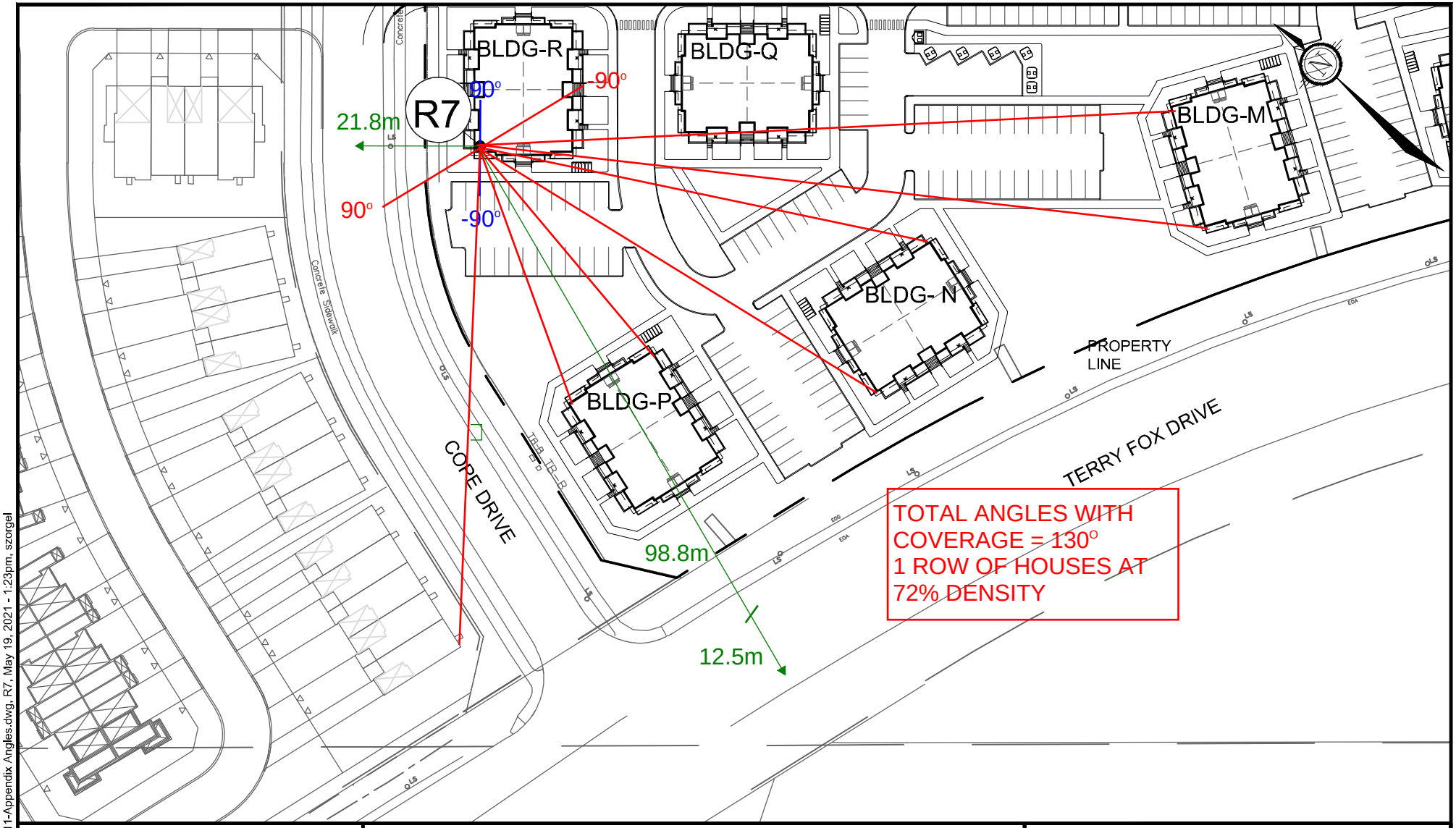

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R7

SHT8X11.DWG - 216mmx279mm

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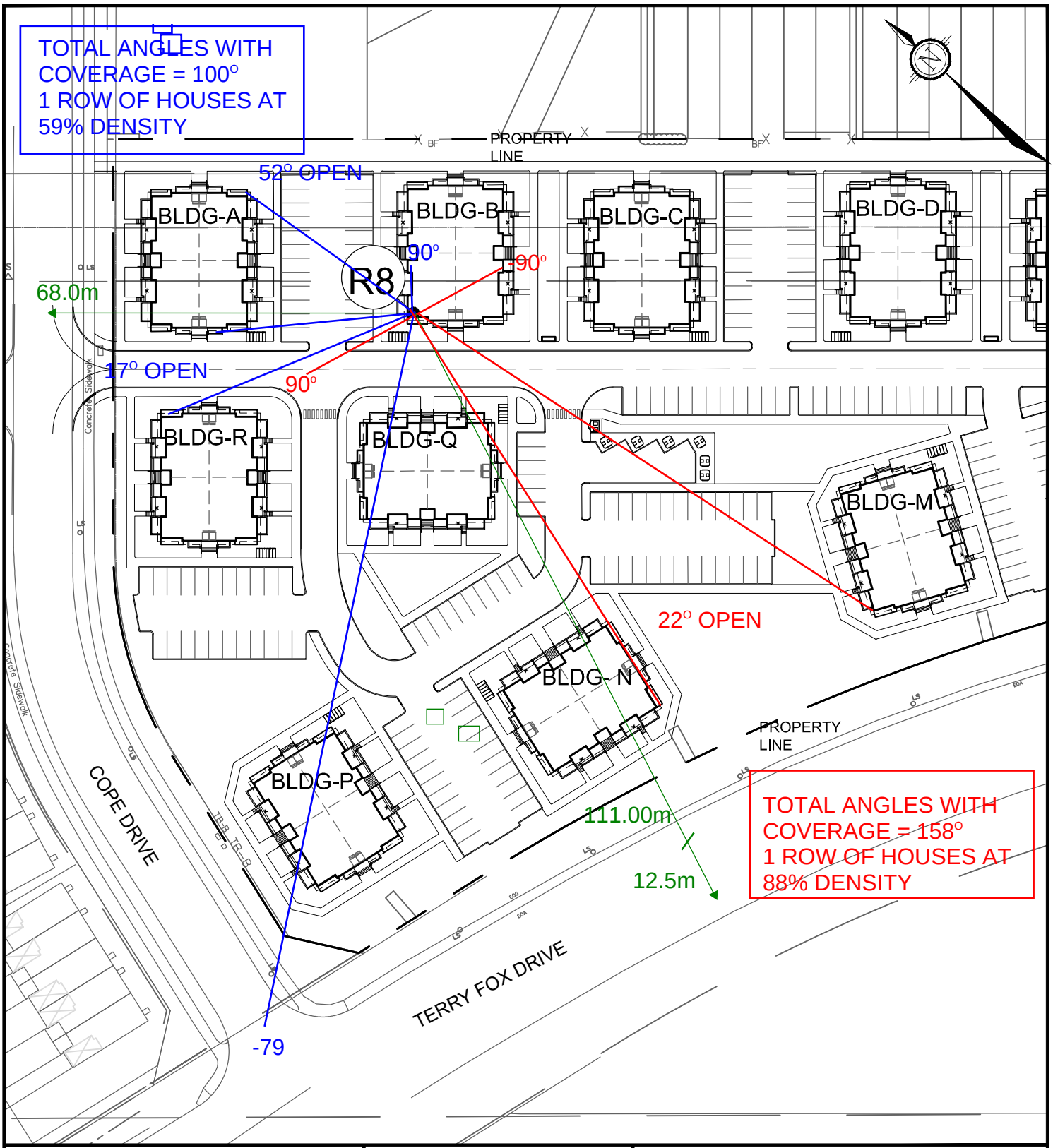

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R8

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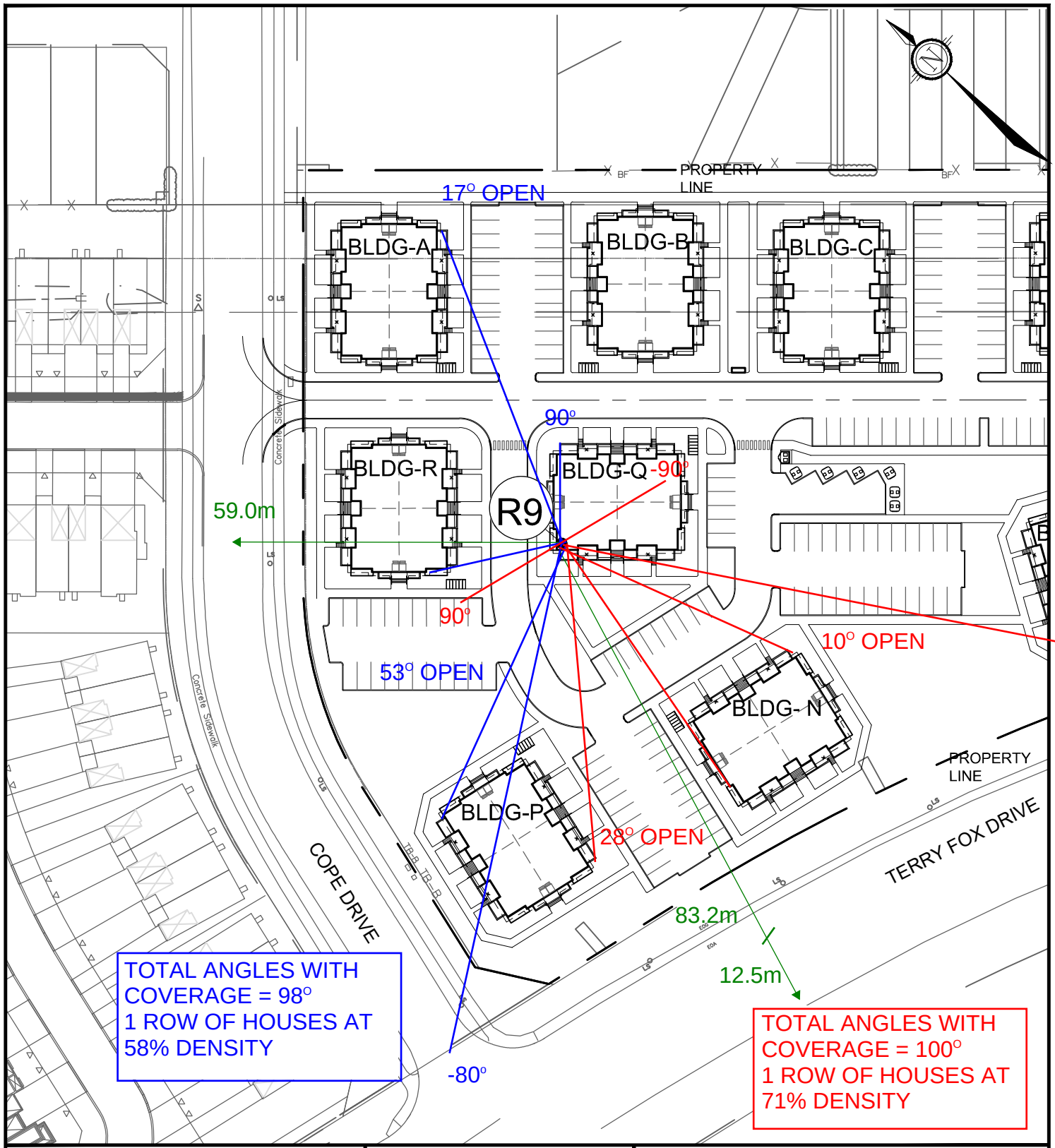

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R9

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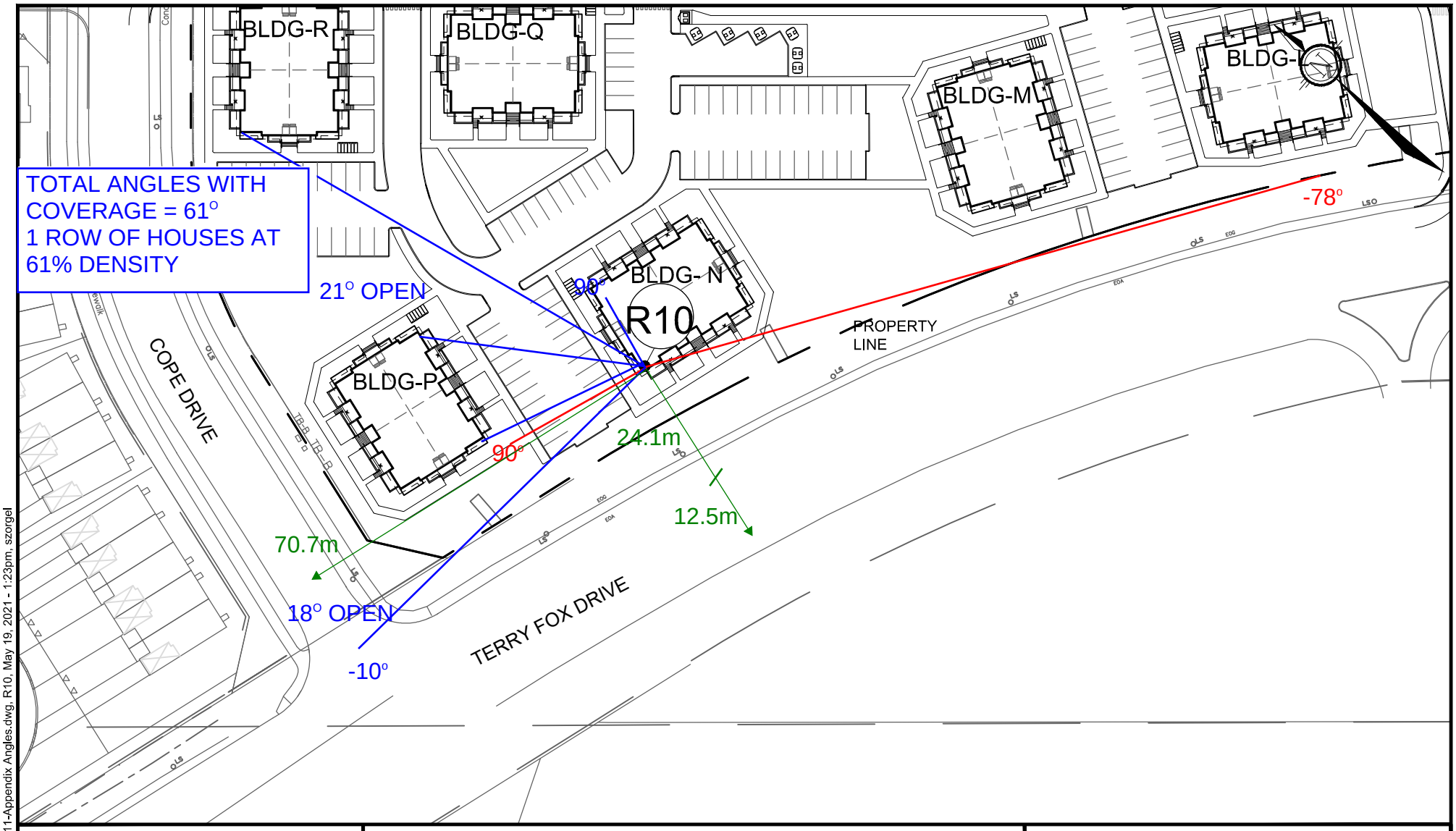

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CITY OF OTTAWA
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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0 10 20 30 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R10

SHT8X11.DWG - 216mmx279mm

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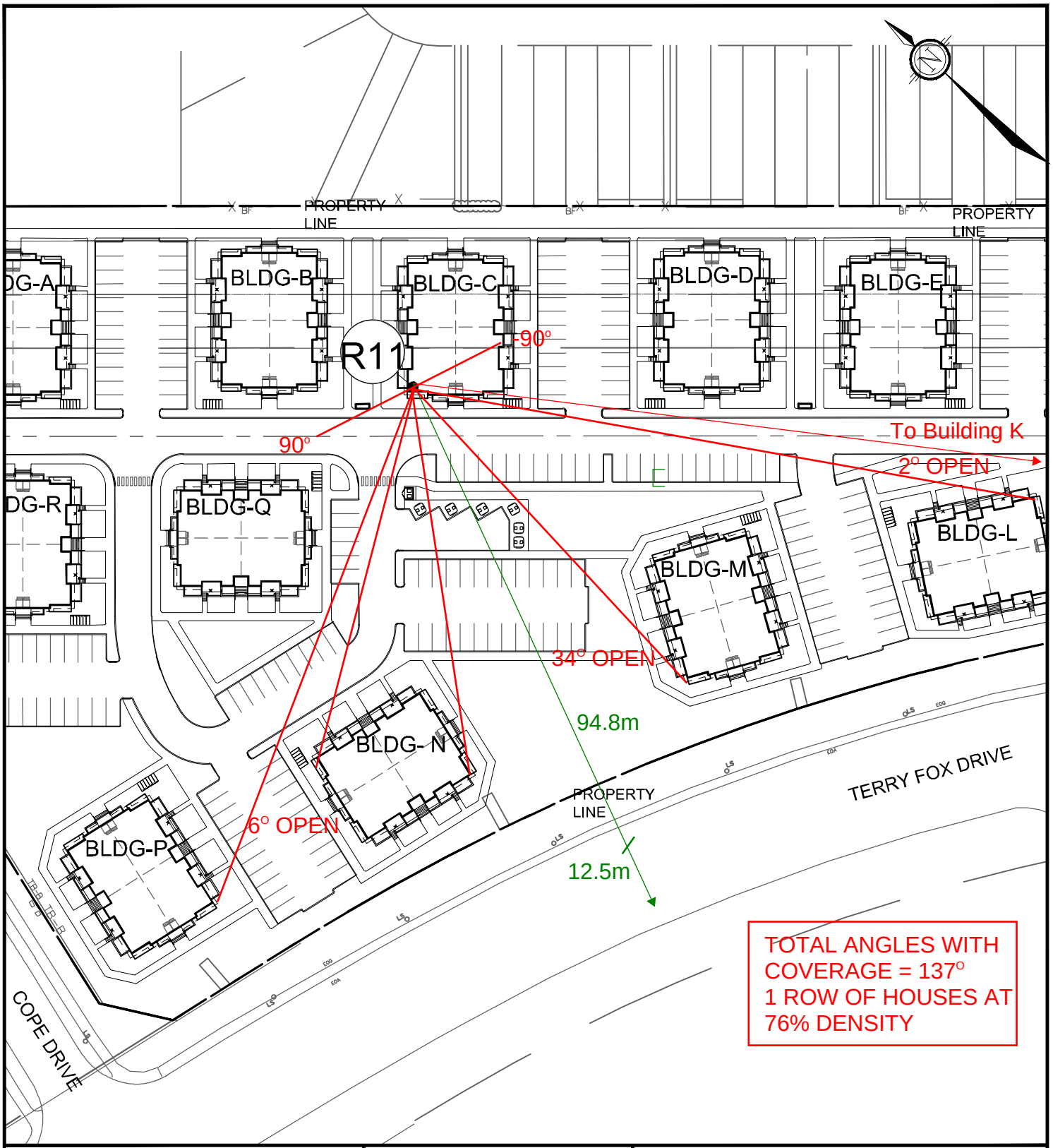

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R11

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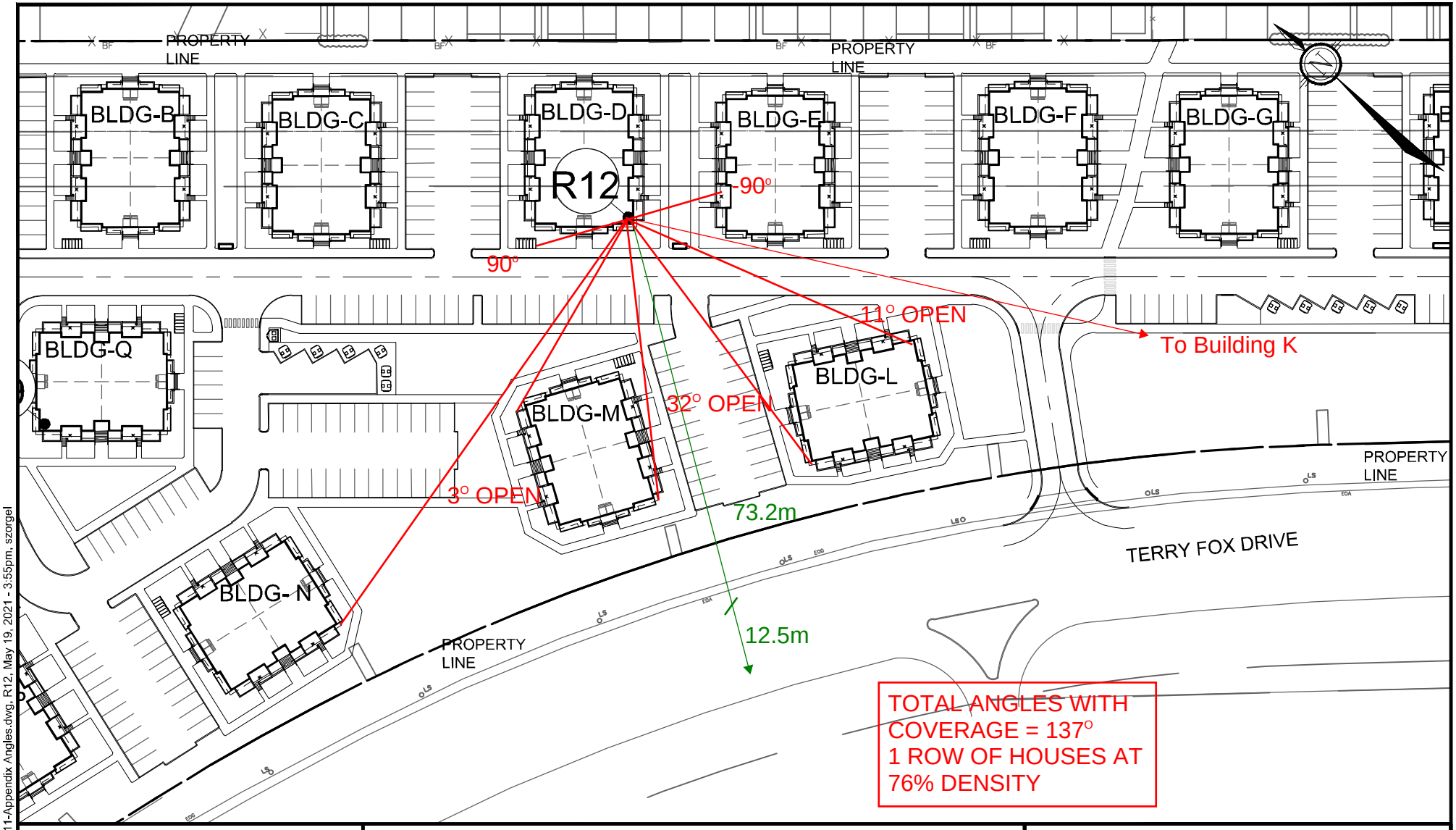

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R12

SHT8X11.DWG - 216mmx279mm

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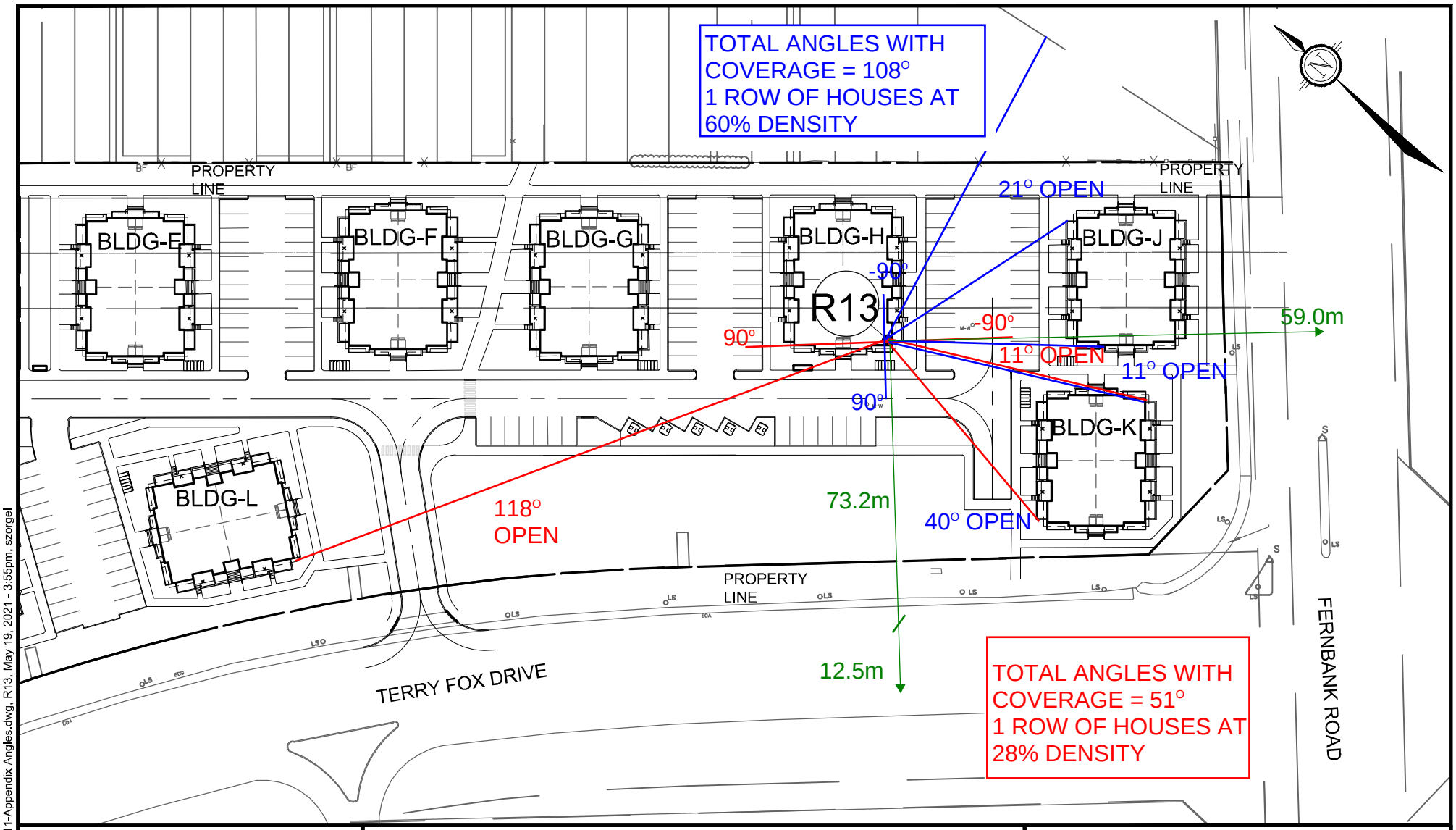

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE MAY 2021 | JOB 121011 | FIGURE FIG-R13

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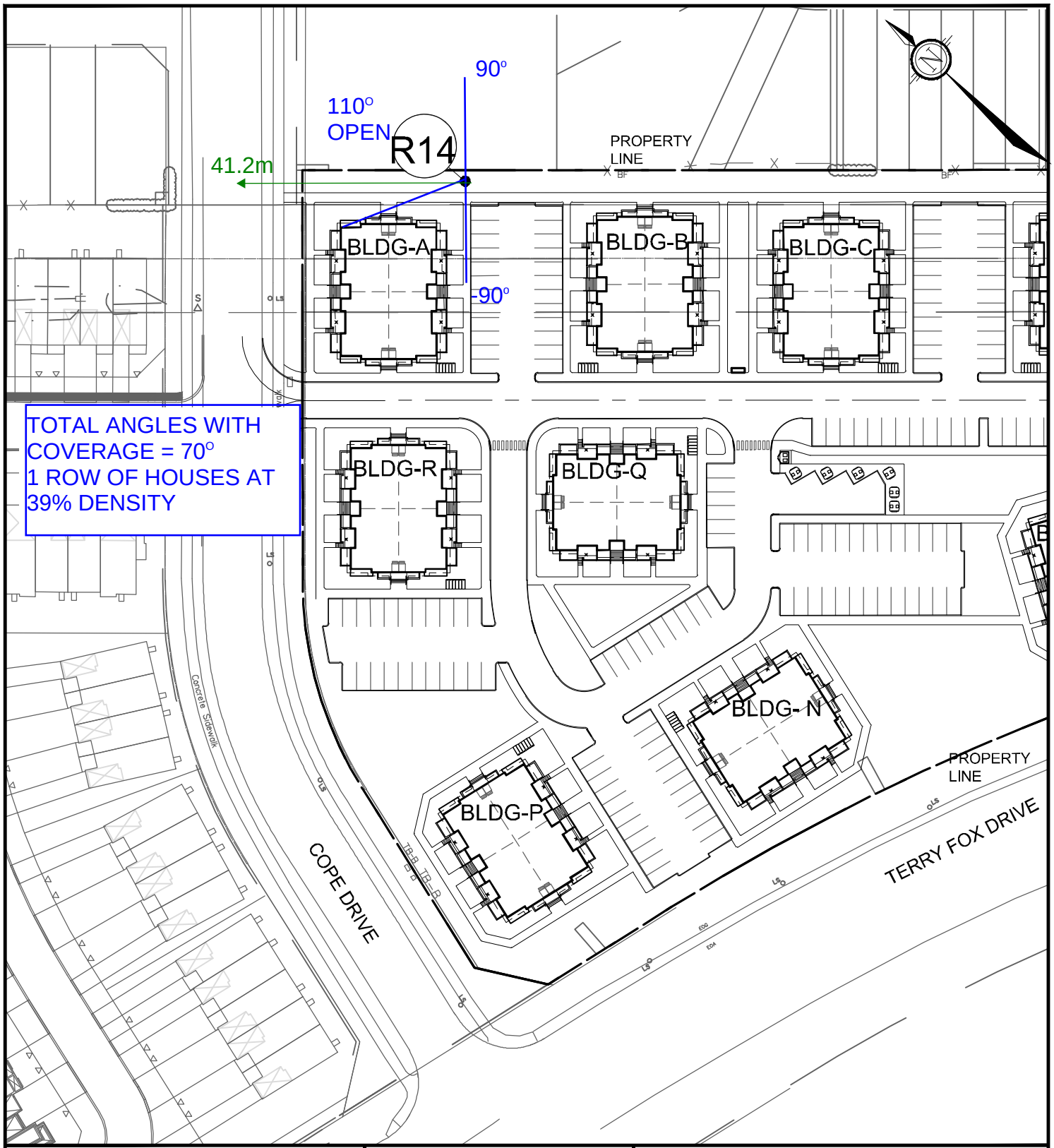

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RECEIVER DISTANCE AND ANGLES

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R14

SHT8X11.DWG - 216mmx279mm

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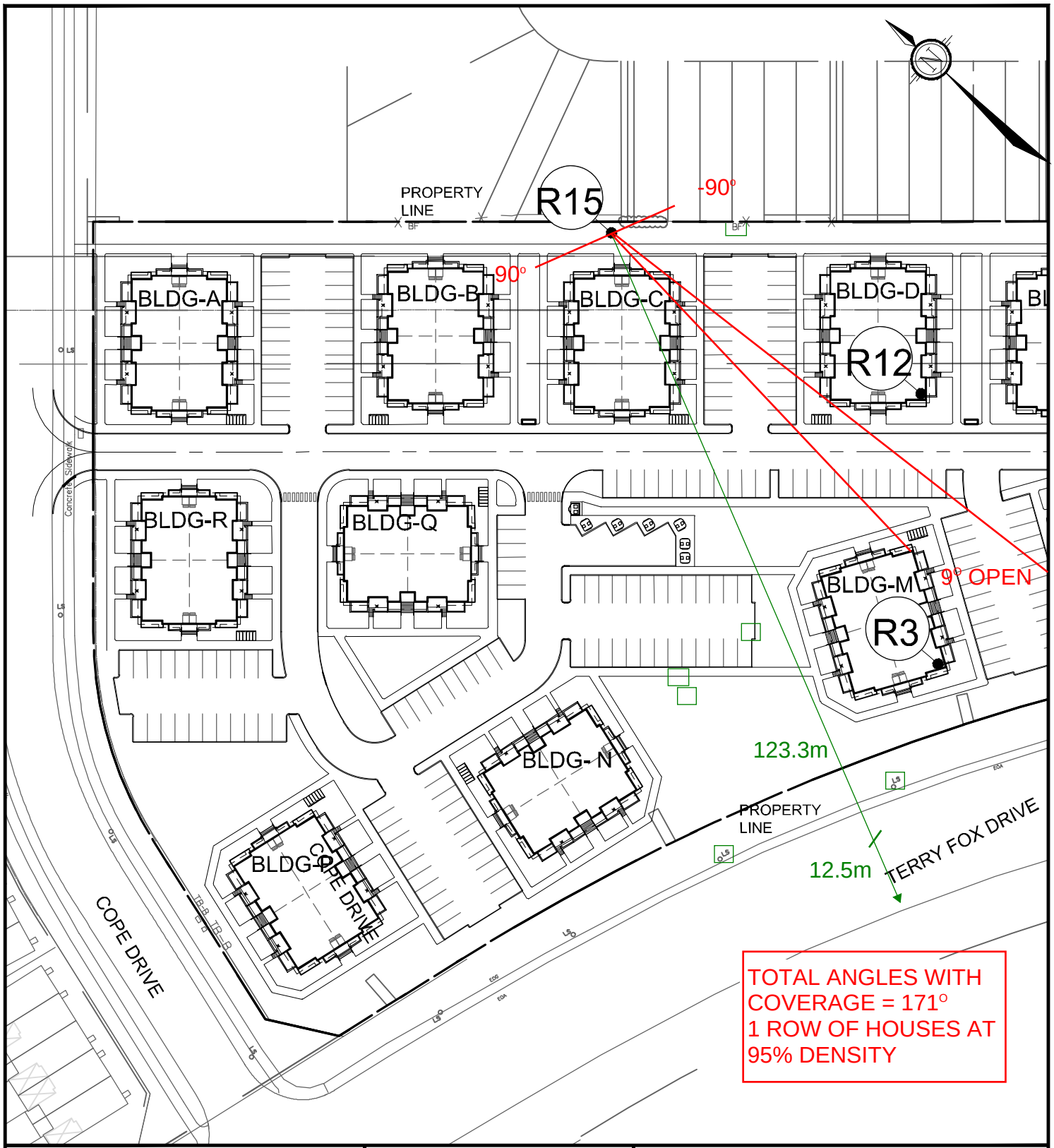

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SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE	JOB	FIGURE
MAY 2021	121011	FIG-R15

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SHT8X11.DWG - 216mmx279mm

APPENDIX C

Acoustic Insulation Factor Tables

Residential Living Room - Building P, M, N, L

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Living Room of Dining Room

Averaged Required AIF 34 (from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	36	2	-18.0%
Windows	33	-1	+13.0%

Overall increase in total transmitted sound power = -5.0%
(sum of column above)

Residential Living Room - Building P, M, N, L

AIF Redistribution = 33
Refer to Table 4 for Details

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)	
2mm	6						
	13						
3mm	15	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
	150	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.

Residential Living Room - Building P, M, N, L

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC
STC = 33

AIF Redistribution = 33
Refer to Table 4 for Details

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.

Residential Living Room - Building P, M & N, L

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC-1
STC = 35

Residential Bedroom - Building P, M, N, L

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Bedroom

Averaged Required AIF 31
(from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	29	-2	N/A
Windows		Redistribution not applicable	

Overall increase in total transmitted sound power = N/A
(sum of column above)

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)	
2mm	6						
	13						
3mm	15	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
	150	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.

Residential Bedroom - Building P, M, N, L

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC-3
STC = 34

Residential Bedroom - Building P, M, N, L

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.

Residential Bedroom - Building P, M, N, L

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC-8
STC = 39

Residential - Living Room - Building K

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Living Room or Dining Room

Averaged Required AIF 36 (from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	36	Redistribution not applicable	

Overall increase in total transmitted sound power = N/A
(sum of column above)

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)	
2mm	6						
	13						
3mm	15	6					
4mm, 6mm	19	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
	150	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.

Residential - Living Room - Building K

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC
STC = 36

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.

Residential - Living Room - Building K

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC -1
STC = 37

Residential - Bedroom - Building K

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
(-5) N/A	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Bedroom

Averaged Required AIF 34 (from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	29	-5	
		Redistribution not applicable	

Overall increase in total transmitted sound power = _____ (sum of column above)

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)	
2mm	6						
	13						
3mm	15	6					
4mm, 6mm	19	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
	150	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.

Residential - Bedroom - Building K

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC-3
STC = 37

Residential - Bedroom - Building K

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.

Residential - Bedroom - Building K

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC -8
STC = 42

Residential - Living Room - Building J

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Living Room or Dining Room

Averaged Required AIF 30 (from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	36	+6	-37%
Windows	28	-2	+29%

Overall increase in total transmitted sound power = -8%
(sum of column above)

Residential - Living Room - Building J

AIF Redistribution = 28
Refer to Table 4 for Details

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)	
2mm	6						
	13						
3mm	15	6					
4mm, 6mm	19	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
	150	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.

Residential - Living Room - Building J

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC
STC = 28

AIF Redistribution = 28
Refer to Table 4 for Details

Residential - Living Room - Building J

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.

Residential - Living Room - Building J

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC -1
STC = 31

Residential - Bedroom - Building J

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	N/A 13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Living Room or Dining Room

Averaged Required AIF 28 (from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	29	+1	-10%
Windows		Redistribution not applicable	

Overall increase in total transmitted sound power = _____ (sum of column above)

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)	
2mm	6						
	13						
3mm	15	6					
4mm, 6mm	19	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
	150	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.

Residential - Bedroom - Building J

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC-3
STC = 31

Residential - Bedroom - Building J

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

28

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.

Residential - Bedroom - Building J

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC -8
STC = 36

Residential Living Room - Building G,Q,C,D & H

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Living Room of Dining Room

Averaged Required AIF 28 (from Table 3)

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	36	8	-42.0%
Windows	26	-2	+29.0%

Overall increase in total transmitted sound power = -13.0%
(sum of column above)

Residential Living Room - Building G,Q,C,D,E,F & H

AIF Redistribution = 26
Refer to Table 4 for Details

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)	
2mm	6						
	13						
3mm	15	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
	150	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.

Residential Living Room - Building G,Q,C,D,E,F & H

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC
STC = 26

AIF Redistribution = 26
Refer to Table 4 for Details

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

28

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.

Residential Living Room - Building G,Q,C,D,E,F & H

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC-1
STC = 29

TABLE 4: Chart for redistributing AIF requirements to compensate for components whose AIF's deviate from the average required value. Values in the body of the table indicate the percentage of transmitted sound power above (+ve) or below (-ve) the specified average sound power per component

Component AIF minus Average Required AIF	Total No. of Components 2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14-	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17
-4	76	50	38	30	25
-5	108	72	54	43	36

Percentage change in total transmitted sound power

Worksheet for Table 4 (using Example I)

Outdoor Noise Exposure Forecast _____
Number of components 2
Type of Room Living Room of Dining Room

Averaged Required AIF (from Table 3) 26

Component	AIF	AIF Minus Average Required AIF	Increase in Transmitted Sound
Walls	29	3	-25.0%
Windows	25	-1	+13.0%

Overall increase in total transmitted sound power = -12.0%
(sum of column above)

Residential Bedroom - Building G,Q,C,D,E,F & H

AIF Redistribution = 25
Refer to Table 4 for Details

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)	
2mm	6						
	13						
3mm	15	6					
4mm, 6mm	19	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
	150	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.

Residential Bedroom - Building G,Q,C,D,E,F & H

TABLE 11: Approximate conversion from STC to AIF for windows and doors:

Window (or door) area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
80	STC-5
63	STC-4
50	STC-3
40	STC-2
32	STC-1
25	STC
20	STC+1
16	STC+2
12.5	STC+3
10	STC+4
8	STC+5
6.3	STC+6
5	STC+7
4	STC+8

Note: For area percentages not listed in the table use the nearest listed value.

Examples: For a window whose area = 20% of the room floor area and STC = 32 the AIF is 32 + 1 = 33.

For a window whose area = 60% of the room floor area and STC = 29 the AIF is 29 - 4 = 25.

AIF = STC-3
STC = 28

AIF Redistribution = 25
Refer to Table 4 for Details

Residential Bedroom - Building G,Q,C,D,E,F & H

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

26

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.

Residential Bedroom - Building G,Q,C,D,E,F & H

TABLE 12: Approximate conversion from STC to AIF for exterior walls:

Exterior wall area expressed as percentage of room floor area	Acoustic Insulation Factor (AIF)
200	STC-10
160	STC-9
125	STC-8
100	STC-7
80	STC-6
63	STC-5
50	STC-4
40	STC-3
32	STC-2
25	STC-1
20	STC
16	STC+1
12.5	STC+2
10	STC+3
8	

Note: For area percentages not listed in the table use the nearest listed value.

Example: For a wall whose area = 120% of room floor area and STC = 48 the AIF is 48 - 8 = 40.

AIF = STC-8
STC = 34

APPENDIX D

Architectural Drawings & Correspondence

From: Steve Zorgel
Sent: Tuesday, May 25, 2021 1:53 PM
To: Steve Zorgel
Subject: FW: Hydro Pole Anchors - 5331 Fernbank

From: Colleen McKeracher <cmckeracher@rlaarchitecture.ca>
Sent: Thursday, May 6, 2021 6:14 PM
To: Drew Blair <D.Blair@novatech-eng.com>
Subject: RE: Hydro Pole Anchors - 5331 Fernbank

Hi Drew,

At Bridlewood we required a few windows with an STC not less than 31, and being around the same neighbourhood and facing the same road as this project I would expect a similar requirement and hope we wouldn't need higher than that. We don't typically specify an STC performance for our woodframe buildings, but the base products would be around the 27 STC range, although the shop drawings we receive for these often don't carry that information. Our walls themselves are around a max of 37 STC (for the Hardie board and siding, the brick will perform better) our problem being finding a tested assembly that fits our wall types exactly.

Colleen McKeracher *M.Arch, OAA*
Architect
RLA/ Architecture
Tel: 613.724.9932 x 316

From: Drew Blair <D.Blair@novatech-eng.com>
Sent: May 6, 2021 11:45 AM
To: Colleen McKeracher <cmckeracher@rlaarchitecture.ca>
Subject: RE: Hydro Pole Anchors - 5331 Fernbank

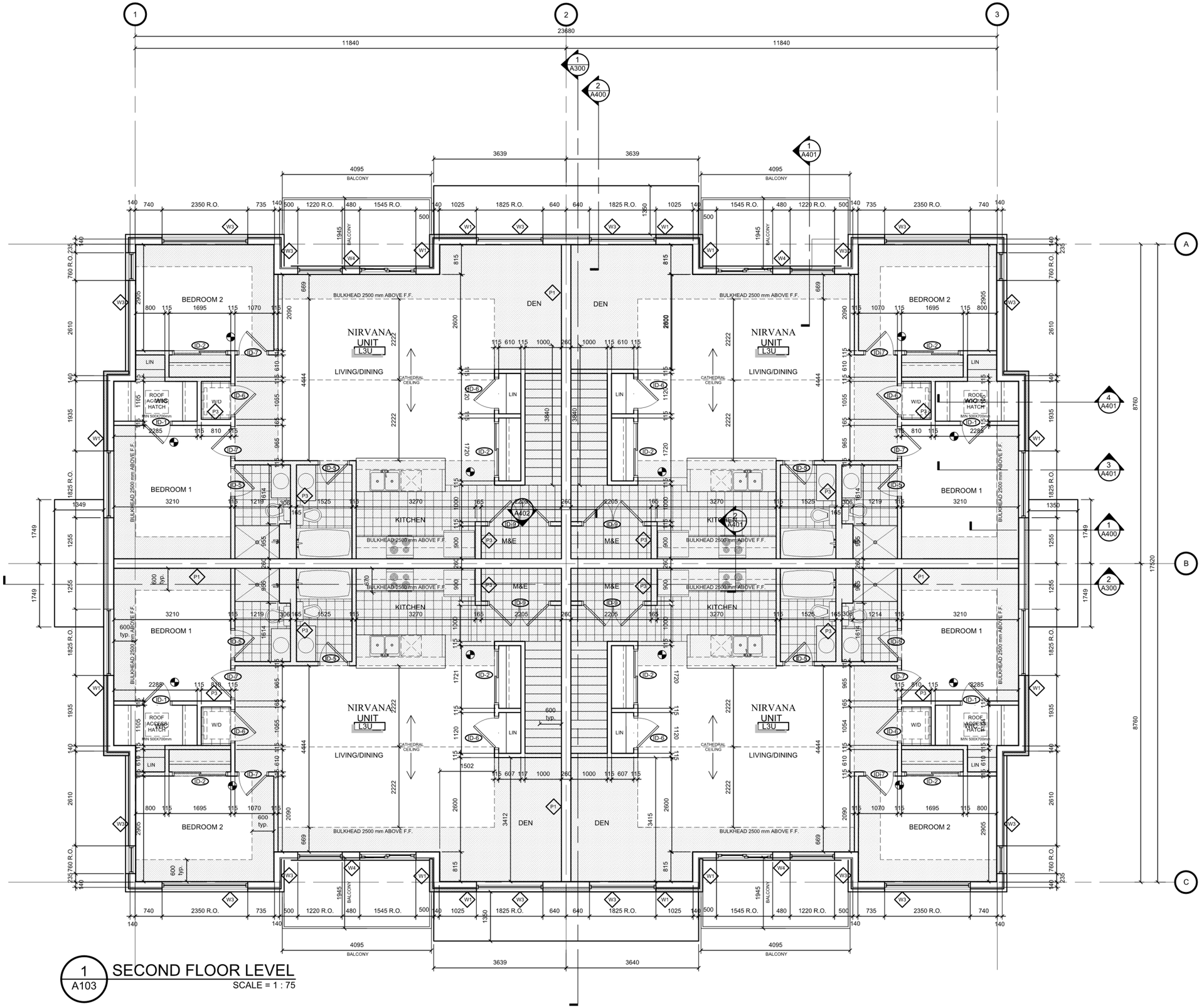
Thanks Colleen,

Early question but do you have typical STC window values? Do you have a range that you use? Is there a maximum you'd like to stay below? We have our noise study to perform but I'm curious about what architect's would normally prescribe.

Thanks,

Drew

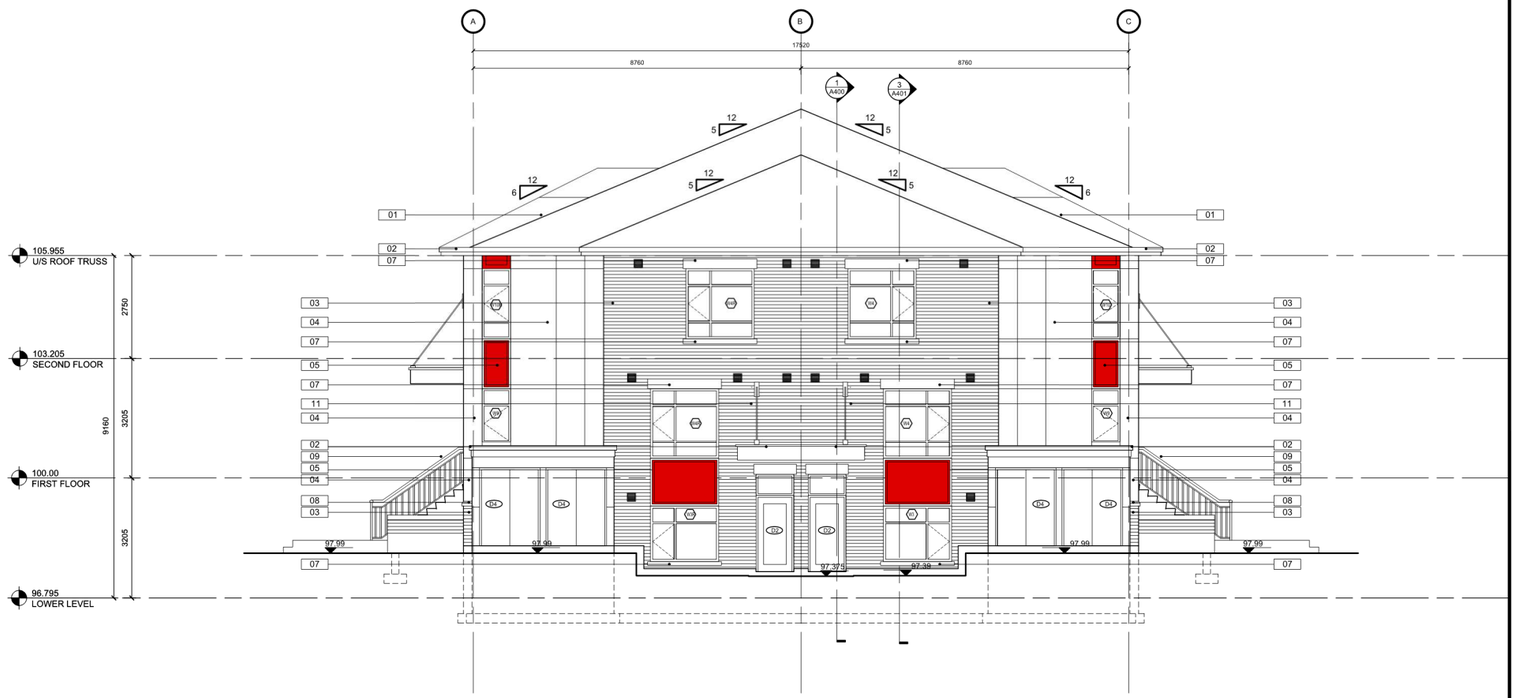
Drew Blair, P.Eng., Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 236 | Fax: 613.254.5867

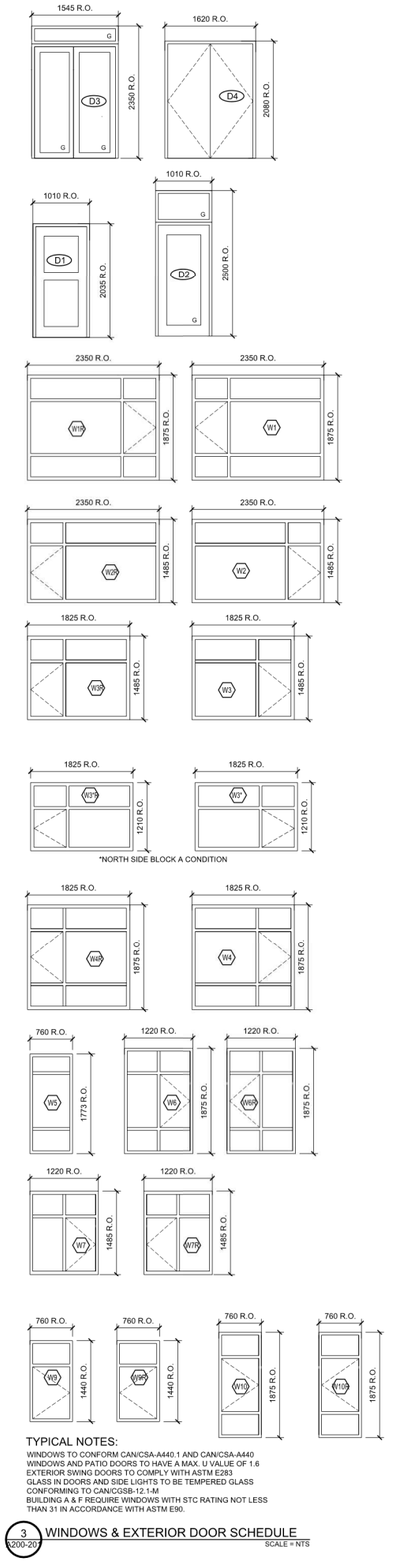


1 A103 SECOND FLOOR LEVEL

SCALE = 1 : 75

TERRY FOX ZEN BLOCK A
ARCH ELEV. 100.00 = 100.00 GEO





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BUILDING A & F REQUIRE WINDOWS WITH STC RATING NOT LESS THAN 31 IN ACCORDANCE WITH ASTM E90.

3 A200-20 WINDOWS & EXTERIOR DOOR SCHEDULE
SCALE = NTS

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No.	DESCRIPTION	DATE
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REVISIONS:

ARCHITECT SEAL:
ONTARIO ASSOCIATION OF ARCHITECTS
RODERICK LAHEY
LICENCE
4375
SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT:
CLARIDGE HOMES

ARCHITECT:
rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t.613.724.9932 f.613.724.1209 rlaarchitecture.ca

PROJECT TITLE:
(LARGE)
TERRY FOX ZEN
BLOCK A
OTTAWA ONTARIO

SHEET TITLE:
EAST & SOUTH SIDE ELEVATIONS
WINDOW & DOOR SCHEDULE

DRAWN:	CHECKED:
CM	RLA
SCALE: 1:75	SHEET No. A200
PROJECT No. 2101	

TERRY FOX ZEN BLOCK A
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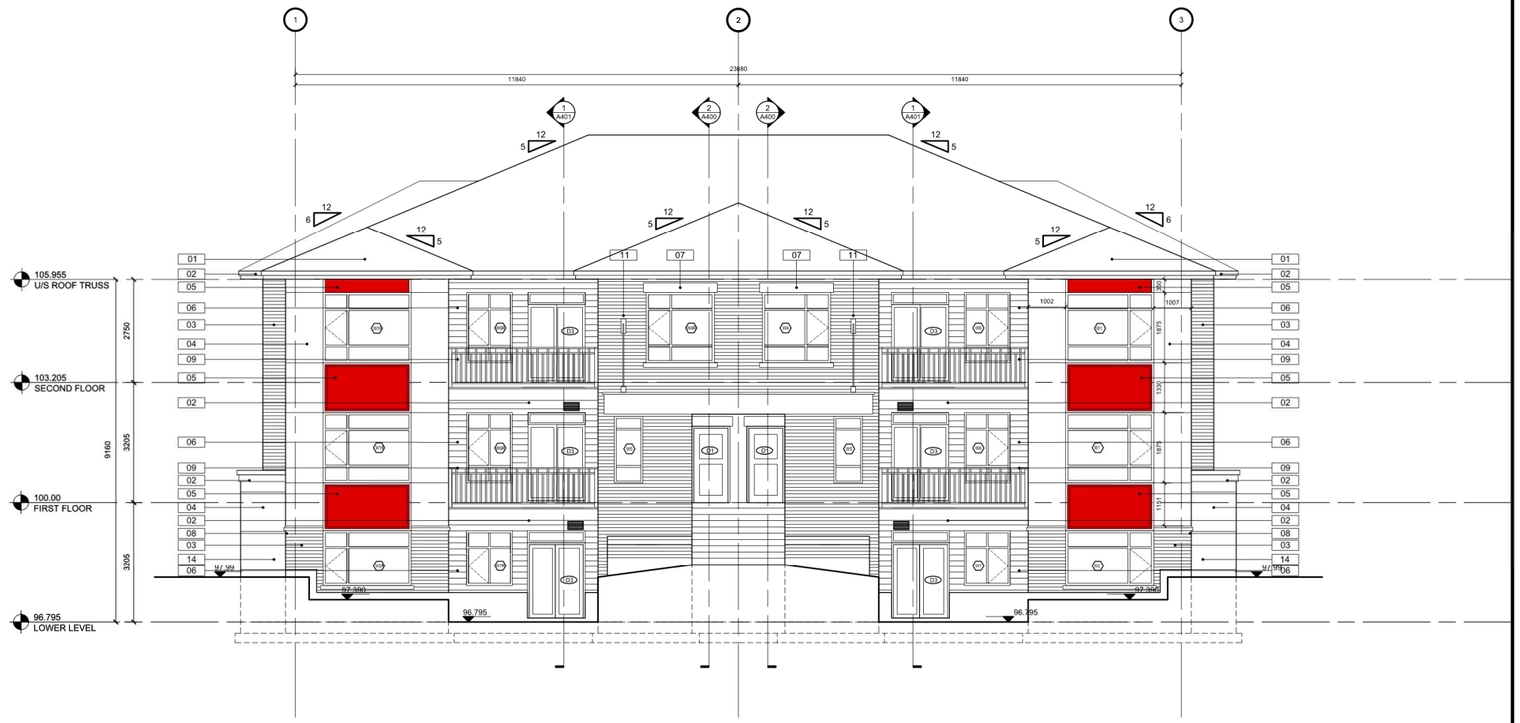

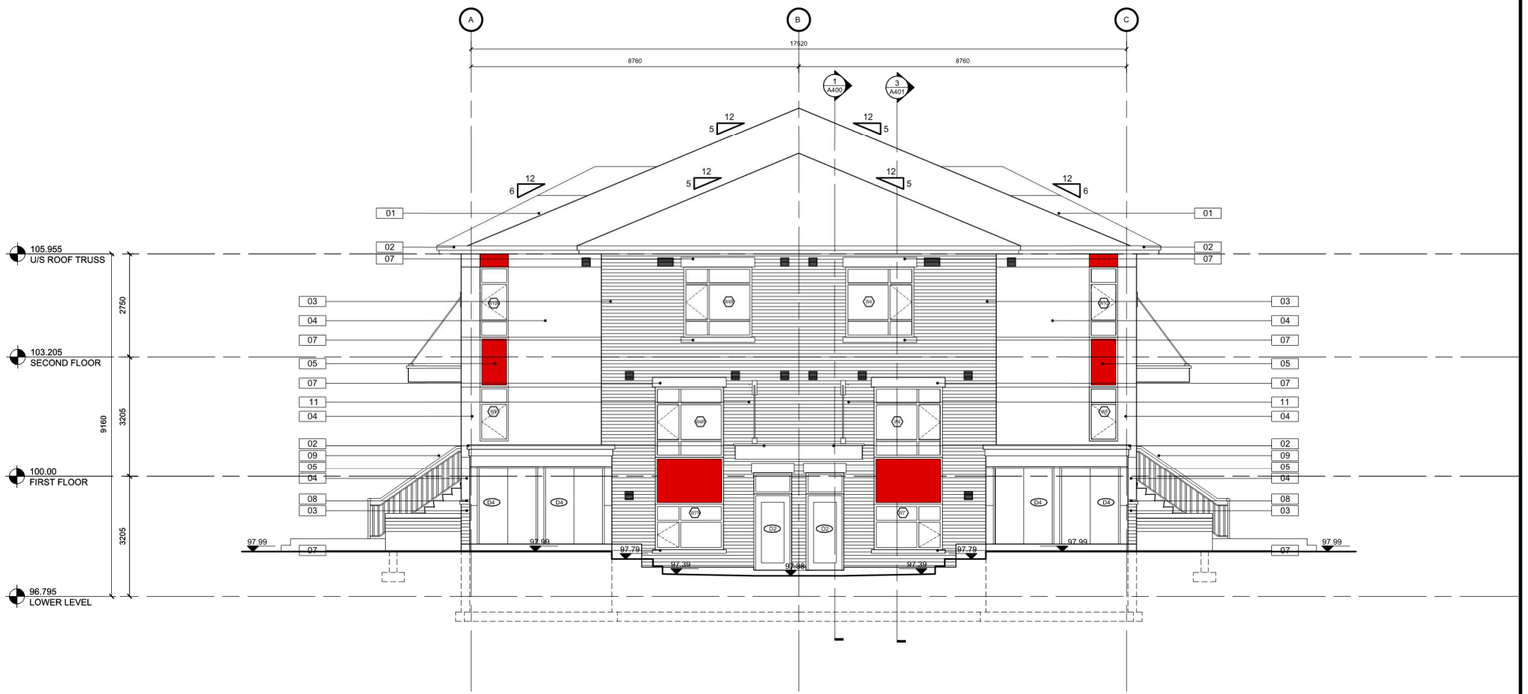

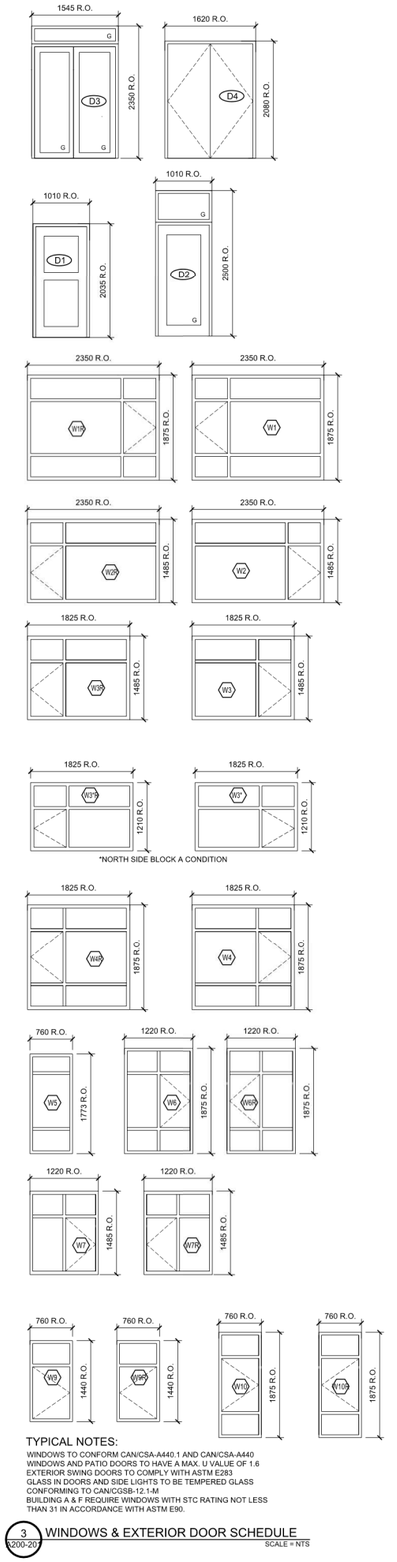

*NORTH SIDE BLOCK A CONDITION

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A200-201 SCALE = NTS

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REVISIONS:

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NORTH ARROW:

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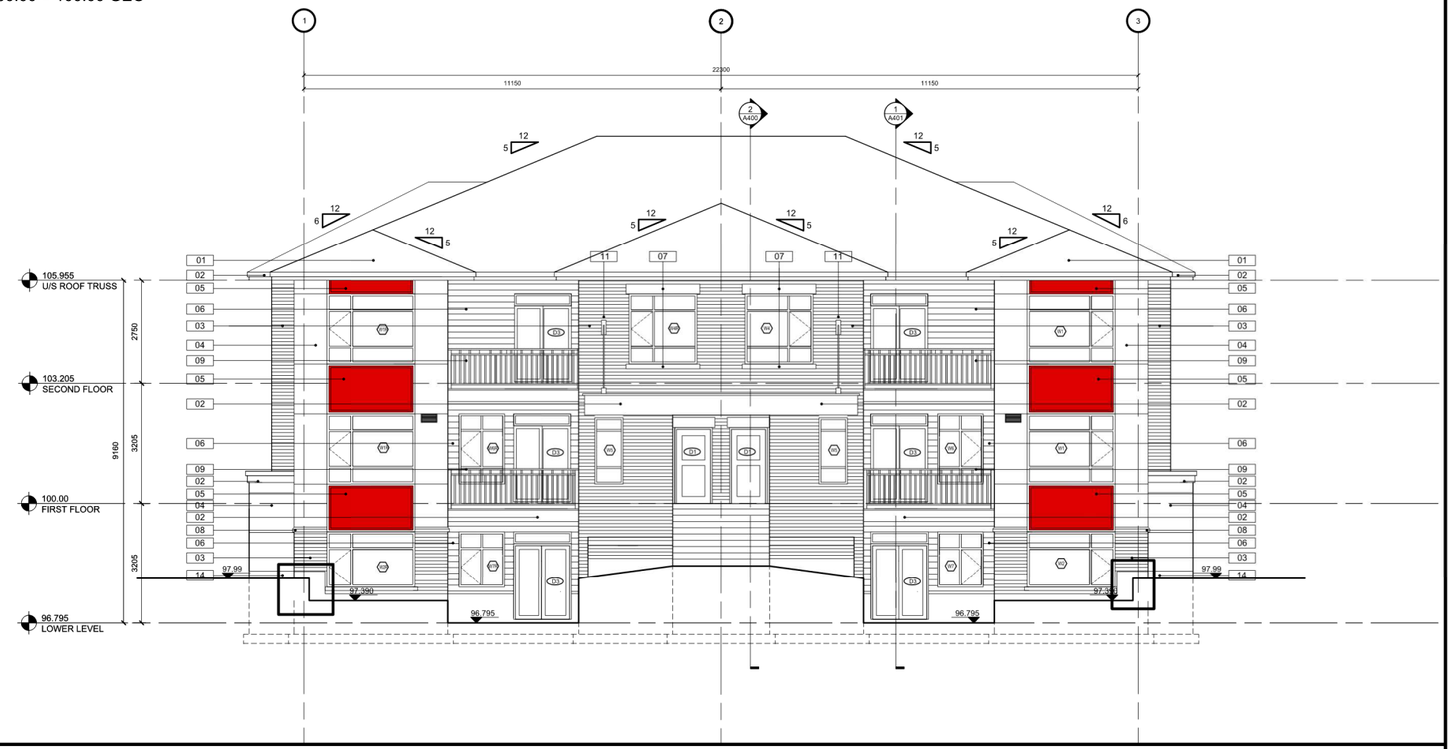
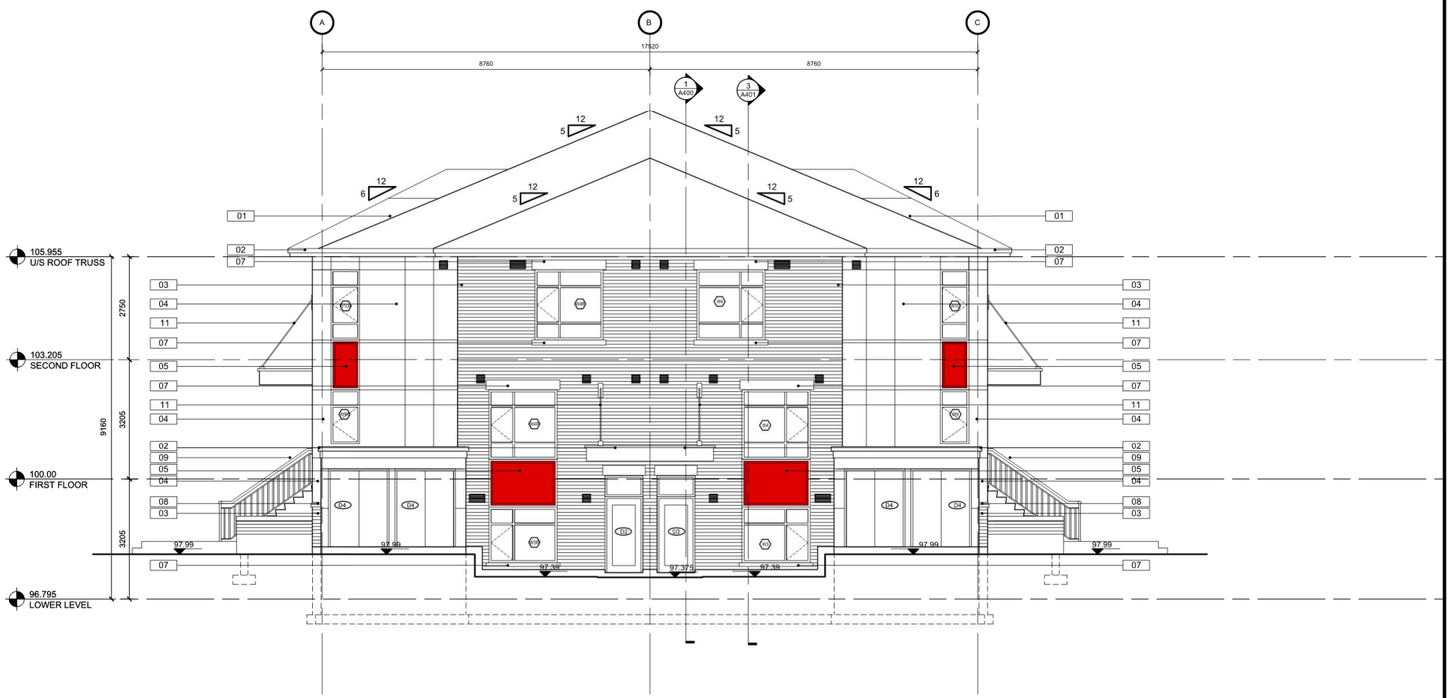
PROJECT TITLE: (LARGE)
TERRY FOX ZEN
BLOCK A
OTTAWA ONTARIO

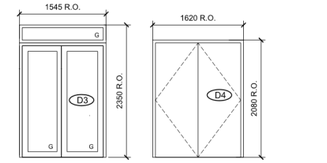
SHEET TITLE:
WEST & NORTH SIDE ELEVATIONS
WINDOW & DOOR SCHEDULE

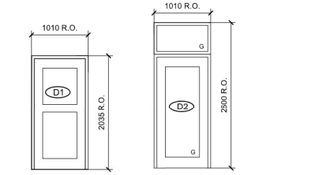
DRAWN:	CHECKED:
CM	RLA
SCALE: 1:75	SHEET No. A201
PROJECT No. 2101	

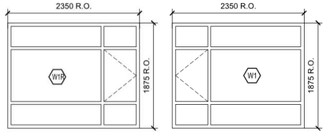
TERRY FOX ZEN BLOCK J
ARCH ELEV. 100.00 = 100.00 GEO

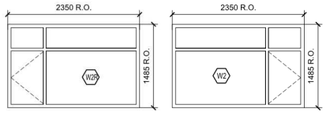


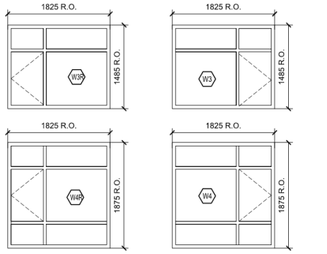


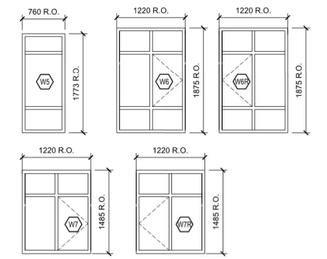


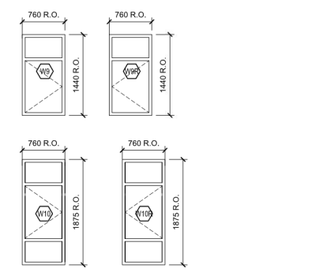












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PROJECT TITLE:
(SMALL)
TERRY FOX ZEN
BLOCK J
OTTAWA ONTARIO

SHEET TITLE:
EAST & SOUTH SIDE ELEVATIONS
WINDOW & DOOR SCHEDULE

DRAWN:	CHECKED:
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PROJECT No. 2101	

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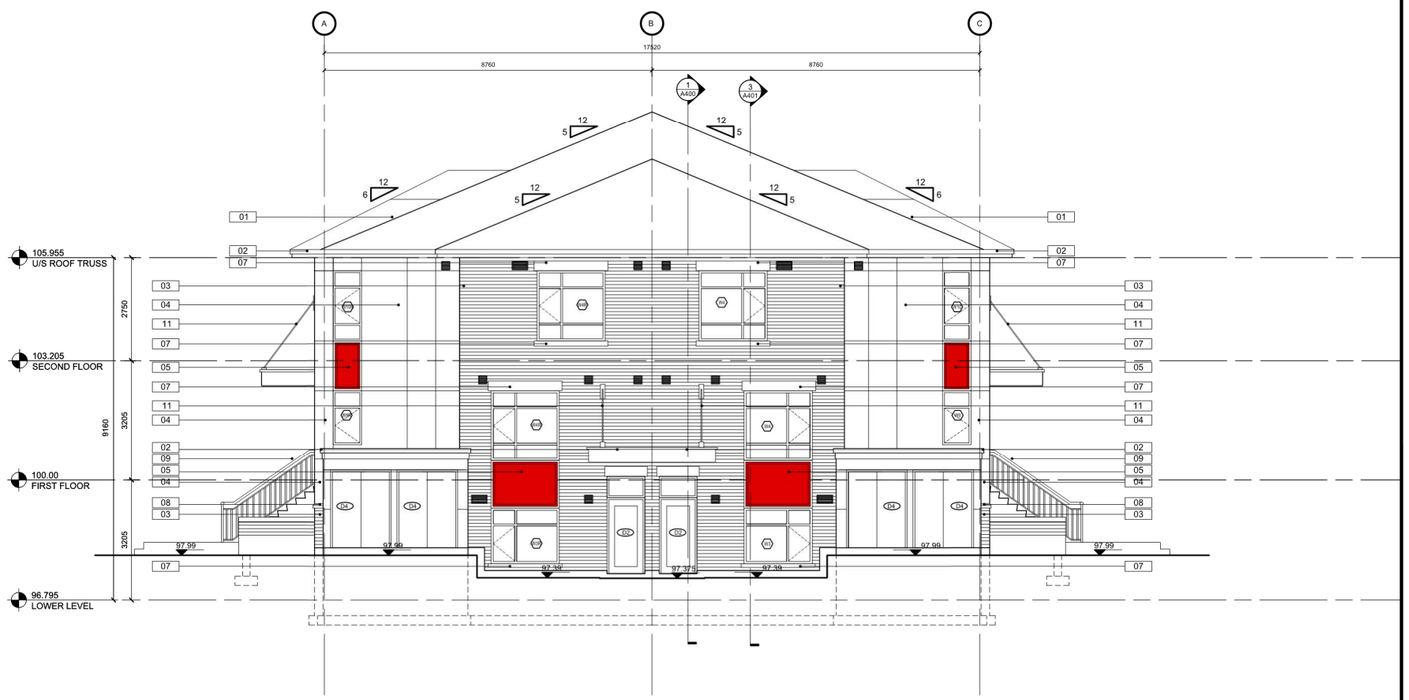

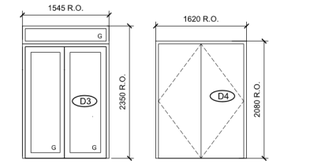

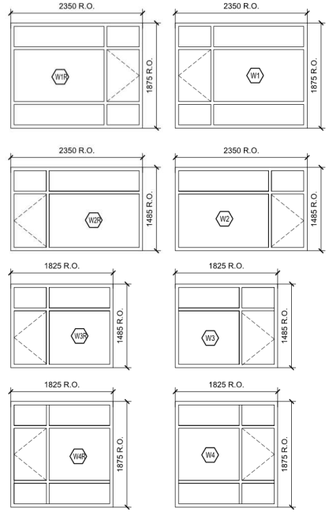

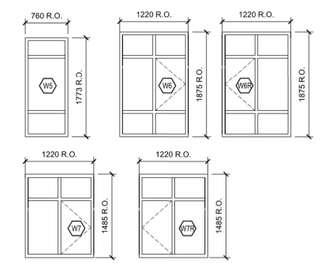

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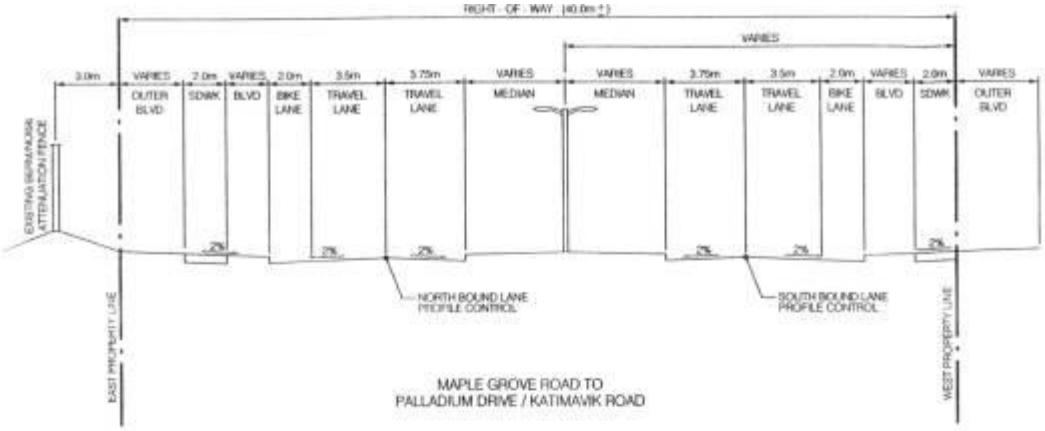
PROJECT TITLE: (SMALL) TERRY FOX ZEN BLOCK J — OTTAWA ONTARIO

SHEET TITLE: WEST & NORTH SIDE ELEVATIONS WINDOW & DOOR SCHEDULE

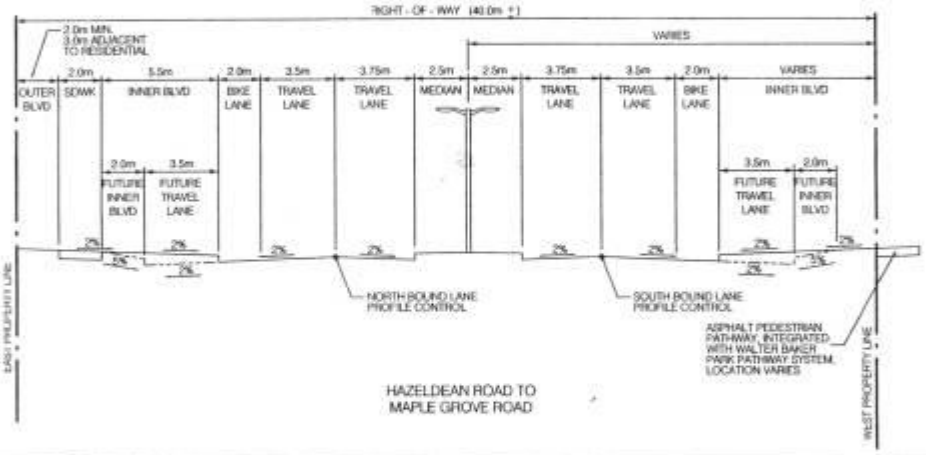
DRAWN:	CHECKED:
CM	RLA
SCALE: 1:75	SHEET No. A201
PROJECT No. 2101	

APPENDIX E

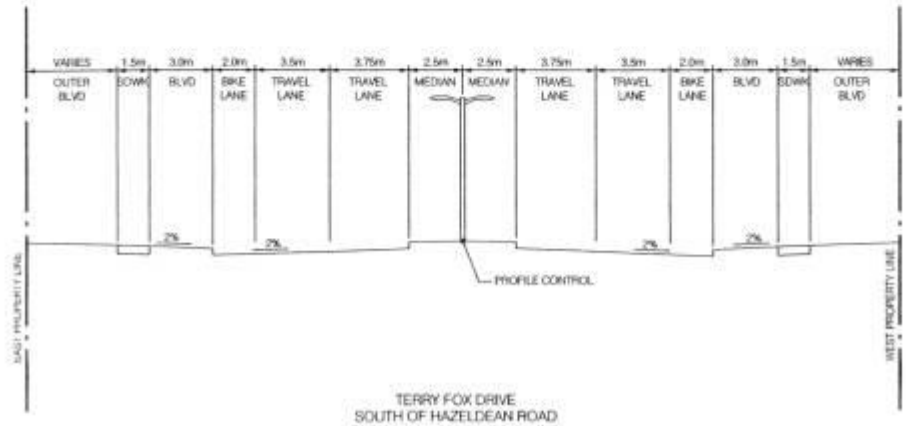
- Terry Fox Drive Ultimate Condition Typical Cross Section
- Grading Plans – 121011-GR1-2



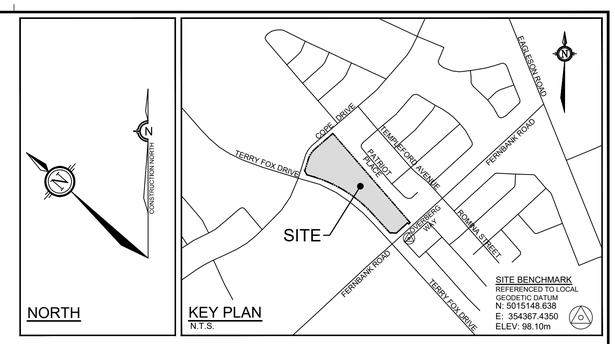
MAPLE GROVE ROAD TO
PALLADIUM DRIVE / KATIMAVIK ROAD



HAZELDEAN ROAD TO
MAPLE GROVE ROAD



TERRY FOX DRIVE
SOUTH OF HAZELDEAN ROAD



LEGEND

- PROPOSED ELEVATION / EXISTING ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED SWALE ELEVATION
- PROPOSED TOP OF GRATE ELEVATION
- PROPOSED CENTERLINE OF DITCH ELEVATION
- PROPOSED RETAINING WALL
- FF= FINISHED FLOOR ELEVATION
- T/F= TOP OF FOUNDATION ELEVATION
- USF= UNDERSIDE OF FOOTING ELEVATION
- MUSF= MINIMUM UNDERSIDE OF FOOTING ELEVATION
- 97.70 PROPOSED TERRACE ELEVATION
- MAXIMUM 3:1 SIDESLOPE
- PROPOSED CENTRELINE SWALE
- 2.0% PROPOSED GRADE AND DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- HYD PROPOSED HYDRANT LOCATION
- T/F=127.55 PROPOSED TOP OF BOTTOM FLANGE
- V&VB PROPOSED VALVE AND VALVE BOX
- CS PROPOSED CURB STOP
- DMA PROPOSED DISTRICT METERING CHAMBER
- 101 PROPOSED SANITARY MANHOLE
- 100 PROPOSED STORM MANHOLE
- CB 1 PROPOSED ROAD CATCHBASIN
- CBMH 1 PROPOSED CATCHBASIN MANHOLE
- RYE 1 PROPOSED REAR YARD ELBOW
- RYT 1 PROPOSED REAR YARD TEE
- M PROPOSED WATER METER LOCATION
- R PROPOSED REMOTE WATER METER LOCATION
- STATIC PONDING LIMITS AND ELEVATION
- 98.00 / 97.50 / 97.00 EXISTING CONTOUR LINE AND ELEVATION
- EXISTING FIRE HYDRANT
- EX.SANMH EXISTING SANITARY MANHOLE
- EX.STMMH EXISTING STORMMANHOLE
- EXISTING VALVE
- HP EXISTING HYDRO POLE
- EX.CB EXISTING CATCH BASIN

MATCHLINE: REFER TO 121011-GR2 FOR CONTINUATION

PAVEMENT STRUCTURE DETAILS

*REFER TO GEOTECHNICAL REPORT FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.

ACCESS LANES AND HEAVY DUTY TRUCK PARKING

- 40mm SUPERPAVE 12.5
- 50mm SUPERPAVE 19.0
- 150mm GRANULAR 'A'
- 400mm GRANULAR 'B' TYPE II
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

LIGHT DUTY PARKING

- 50mm HL3 OR SUPERPAVE 12.5
- 150mm GRANULAR 'A'
- 300mm GRANULAR 'B' TYPE II
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

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.

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	JUN 2/21	DDB

SCALE 1:400 (1:400, 0 4 8 12 16)

DESIGN DDB | CHECKED MSP | DRAWN ATE | CHECKED DDB | APPROVED MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — D. D. BLAIR — 100122737 — June 2 2021 — PROVINCE OF ONTARIO

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
5331 FERNBANK ROAD
FERNBANK ZENS

DRAWING NAME
GRADING PLAN

PROJECT No. 121011-00
REV REV # 1
DRAWING No. 121011-GR1

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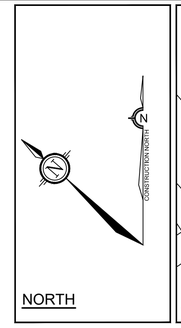

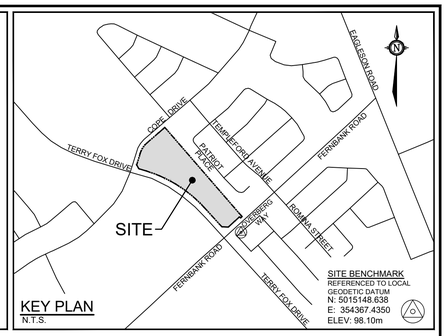

LEGEND

- PROPOSED ELEVATION / EXISTING ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED SWALE ELEVATION
- PROPOSED TOP OF GRATE ELEVATION
- PROPOSED CENTERLINE OF DITCH ELEVATION
- PROPOSED RETAINING WALL
- FF= FINISHED FLOOR ELEVATION
- T/F= TOP OF FOUNDATION ELEVATION
- USF= UNDERSIDE OF FOOTING ELEVATION
- MUSF= MINIMUM UNDERSIDE OF FOOTING ELEVATION
- PROPOSED TERRACE ELEVATION
- MAXIMUM 3:1 SIDESLOPE
- PROPOSED CENTRELINE SWALE
- PROPOSED GRADE AND DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- HYD PROPOSED HYDRANT LOCATION
- T/F=127.55 PROPOSED TOP OF BOTTOM FLANGE
- PROPOSED VALVE AND VALVE BOX
- CS PROPOSED CURB STOP
- DMA PROPOSED DISTRICT METERING CHAMBER
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- CB 1 PROPOSED ROAD CATCHBASIN
- CBMH 3 PROPOSED CATCHBASIN MANHOLE
- RYE 1 PROPOSED REAR YARD ELBOW
- RYT 1 PROPOSED REAR YARD TEE
- (M) PROPOSED WATER METER LOCATION
- (R) PROPOSED REMOTE WATER METER LOCATION
- 97.55 STATIC PONDING LIMITS AND ELEVATION
- 98.00 / 97.50 / 97.00 EXISTING CONTOUR LINE AND ELEVATION
- EXISTING FIRE HYDRANT
- EX.SANMH EXISTING SANITARY MANHOLE
- EX.STMMH EXISTING STORMMANHOLE
- EXISTING VALVE
- HP EXISTING HYDRO POLE
- EX.CB EXISTING CATCH BASIN

PAVEMENT STRUCTURE DETAILS

*REFER TO GEOTECHNICAL REPORT FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.

ACCESS LANES AND HEAVY DUTY TRUCK PARKING

- 40mm SUPERPAVE 12.5
- 50mm SUPERPAVE 19.0
- 150mm GRANULAR 'A'
- 400mm GRANULAR 'B' TYPE II
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

LIGHT DUTY PARKING

- 50mm HL3 OR SUPERPAVE 12.5
- 150mm GRANULAR 'A'
- 300mm GRANULAR 'B' TYPE II
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

MATCHLINE: REFER TO 121011-GR1 FOR CONTINUATION

TERRY FOX DRIVE

FERNBANK ROAD

PROPERTY LINE

BLDG E FF=99.61 FF (LOWER)=96.40 TF=99.13 USF = 95.75

BLDG F FF=99.76 FF (LOWER)=96.55 TF=99.28 USF = 95.90

BLDG G FF=99.86 FF (LOWER)=96.65 TF=99.38 USF = 96.00

BLDG H FF=99.91 FF (LOWER)=96.70 TF=99.43 USF = 96.05

BLDG J FF=100.01 FF (LOWER)=96.80 TF=99.53 USF = 96.15

BLDG K FF=100.01 FF (LOWER)=96.80 TF=99.53 USF = 96.15

BLDG L FF=99.71 FF (LOWER)=96.50 TF=99.23 USF = 95.85

20m-750mmØ CSP CULVERT @ 0.5%
INV.NW=96.65
INV.SE=96.55

EX.600mmØ CSP CULVERT T/P=96.43 INV=95.83

EX.600mmØ CSP CULVERT T/P=96.48 INV=95.93

EX.DICB T/G=96.20

EX.CB T/G=96.36

EX.CB T/G=96.36

EX.STMMH T/G=97.41

EX.STMMH T/G=97.55

EX.STMMH T/G=97.67

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.

PRELIMINARY
NOT FOR
CONSTRUCTION

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	JUN 2/21	DDB

SCALE
1:400
1:400
0 4 8 12 16

DESIGN DDB
CHECKED MSP
DRAWN ATE
CHECKED DDB
APPROVED MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
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100122737
June 8 2021
PROVINCE OF ONTARIO

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CITY OF OTTAWA
5331 FERNBANK ROAD
FERNBANK ZENS

DRAWING NAME
GRADING PLAN

PROJECT No. 121011-00
REV REV # 1
DRAWING No. 121011-GR2

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