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35 Years

3443 Innes Road

Noise Impact Assessment Report

Engineering excellence. Planning precision. Inspired landscapes.

3443 INNES ROAD
NOISE IMPACT ASSESSMENT REPORT

Prepared By:

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

December 2017

Novatech File No. 117077
Ref No.: R-2017-192

NOVATECH
Engineers, Planners & Landscape Architects

December 19, 2017

BY COURIER

Project 1 Studio
260 St. Patrick Street
Suite 300
Ottawa ON K1N 5K5

Attention: Ryan Koolwine, Principal

Dear Mr. Koolwine:

Reference: Noise Impact Assessment Report
3443 Innes Road
Our File No.: 117077

Enclosed please find the 'Noise Impact Assessment Report' for the proposed development of 3443 Innes Road in the City of Ottawa. The report will assess the impacts of noise from vehicular traffic on the proposed development using the MOE STAMSON software.

This report is submitted in support of a Zoning and Site Plan Control Application.

Please contact the undersigned, should you have any questions or require additional information.

Yours truly,

NOVATECH

Lisa Bowley, P.Eng.
Project Manager | Land Development Engineering

Encl.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Novatech has been retained to prepare this noise impact assessment report in support of the Zoning and Site Plan Control Application.

The report will assess the impacts of sound from vehicular traffic on the proposed development using the Ministry of the Environment (MOE) STAMSON 5.03 software and outline any necessary noise attenuation requirements for compliance with the City of Ottawa Environmental Noise Control Guidelines (ENCG) and the MOE Environmental Noise Guideline (MOE Publication NPC-300).

The subject site is located at 3443 Innes Road, west of Pagé Road, north of Innes Road, as shown on the Key Plan (**Figure 1**).

Figure 1: Key Plan

Project 1 Studio is proposing to redevelop the existing site (single dwelling) with a mixed use development, including; Six ground floor retail units and thirty-five residential units located above the retail units (floors 2-6). The residential units will have small balconies which do not meet the minimum area requirements specified in the ENCG to be considered as noise sensitive outdoor living areas. A shared outdoor amenity space is proposed on the rooftop terrace. The elevation and floor plans are included in **Appendix A**.

2.0 NOISE CONTROL GUIDELINES

2.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, railways and transitways as expressed in the City of Ottawa Official Plan (Policy 4.8.6). As per Section 2.2 of the ENCG, unless otherwise noted, noise mitigation recommendations should be consistent with NPC-300 to the extent that is both reasonable and practical.

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

These locations are defined as:

- **Outdoor Living Area (OLA):** The outdoor living areas provide for quiet enjoyment of the outdoor environment during the daytime period (i.e. backyards, terraces and decks). The rooftop OLA noise levels are analyzed at 3.0m from the edge of the rooftop terrace, 1.5m above grade.

- **Plane of Window (POW):** The plane of window is defined as the indoor living space where the sound levels will affect the living room area during daytime hours and bedrooms during night time hours. POW noise levels are analyzed inside the building, 1.5m above the finished floor of each floor.

The following table summarizes the ENCG sound level criteria pertinent to the subject site. Excerpts from the ENCG are included in **Appendix B** for reference.

Table 1: Sound Level Criteria

Type of Space	Time Period	Leq (dBA)
		Roadways
Outdoor Living Area (OLA)	7:00 - 23:00	55
Plane of Window (POW): Residential Living/Dining Areas	7:00 - 23:00	45
	23:00 - 7:00	45
Plane of Window (POW): Residential Sleeping quarters	7:00 - 23:00	45
	23:00 - 7:00	40
Plane of Window (POW): General Offices, reception areas, retail stores	7:00 - 23:00	50

2.2 Alternatives for Noise Attenuation Measures

When sound levels are predicted to exceed the sound level criteria, a combination of attenuation measures and warning clauses are recommended by the City of Ottawa and the MOE to modify the development environment.

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

- Distance setback with soft ground;
- Insertion of noise insensitive land uses between the source and sensitive receptor;
- Orientation of building to provide sheltered zones;
- Construction of sound or acoustic barriers;
- Installation of air conditioning and ventilation; and
- Enhanced construction techniques and construction quality.

2.2.1 Noise Barrier

When noise levels exceed 60 dBA in the Outdoor Living Area, control measures (barriers) are required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

The noise barriers are to be compliant with the City standard for noise barriers and have the following characteristics:

- Minimum height of 2.2m;
- Situated 0.30m inside the private property line;
- A surface mass density not less than 20kg/sq.m; and
- No holes or gaps.

2.2.2 Ventilation Requirements

A forced air heating system with provision for a central air conditioning system is required if the plane of window daytime noise levels are between 55 dBA and 65 dBA and/or the night time noise levels are between 50 dBA and 60 dBA.

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

2.2.3 Building Component Assessment

When plane of window noise levels exceed 65 dBA (daytime) or 60 dBA (night time) the exterior cladding system of the building envelope must be acoustically assessed to ensure 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.

2.2.4 Warning Clauses

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

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

Warning Clause Type A

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

Warning Clause Type B

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

Warning Clause Type C

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

Warning Clause Type D

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

2.2.5 Summary of Noise Attenuation Measure Requirements

Table 2 summarizes the required noise attenuation measure and warning clauses should sound criteria be exceeded. Excerpts from the MOE NPC-300 document are included in **Appendix B** for reference.

Table 2: 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
	More than 60	Barriers required	N/A	N/A	Required if resultant L_{eq} exceeds 55 dBA Type B
Plane of Living Room Window (POW)	Less than 55	N/A	None Required	None Required	None Required
	Between 55 and 65	N/A	Forced air heating with provision for central air conditioning	None Required	Required Type C
	More Than 65	N/A	Central Air Conditioning	Acoustical performance of the windows and walls should be specified	Required Type D
Plane of Bedroom Window (POW)	Less than 50	N/A	None Required	None Required	None Required
	Between 50 and 60	N/A	Forced air heating with provision for central air conditioning	None Required	Required Type C
	More than 60	N/A	Central Air Conditioning	Acoustical performance of the windows and walls should be specified	Required Type D

3.0 NOISE SOURCES

The City of Ottawa Official Plan (Policy 4.8.6) and Environmental Noise Control Guidelines (ENCG) stipulate that a noise impact assessment is required when a noise sensitive development is within proximity to a surface transportation (road or rail), stationary, and aircraft noise sources.

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

- Within 100m from the right-of-way of an existing arterial (Innes Road)
- Within 100m from the right-of-way of an existing collector (Pagé Road, south of Innes Road)

As per Table B1 of Appendix B of the ENCG, **Table 3** outlines the traffic parameters used to calculate the sound levels for the proposed residential units. Excerpts from the ENCG are included in **Appendix B** for reference.

Table 3: Traffic and Roadway Parameters

Parameters	Innes Road [1]	Pagé Road
Road Classification	Arterial (4 Lane)	Collector (2 Lane)
Annual Average Daily Traffic (AADT)	35,000	8,000
Day/Night Split (%)	92/8	92/8
Medium/Heavy Trucks (%)	7/5	7/5
Posted Speed	60 km/hr	40 km/hr

[1] Innes Road is classified as a transit priority corridor (with isolated measures), as per the City of Ottawa's Transportation Master Plan, Ultimate Network.

3.1 Modeling Results

The noise levels for the development were analyzed using version 5.03 of the MOE STAMSON computer noise modelling program. Representative receiver locations are shown on the Noise Control Plan **Figure 2**.

For a complete list of data modeling input, refer to the STAMSON noise modeling files in **Appendix C**. The STAMSON results for the representative receivers are summarized in **Table 4** and **Table 5**.

Table 4: Outdoor Living Area Noise Level Results

Receiver	Description	Unattenuated Daytime Noise level (dBA)
OLA	Roof Top Amenity Area	63.1

Table 5: Plane of Window Noise Level Results

Receiver[2]	Description	Unattenuated Daytime Noise level (dBA)	Unattenuated Nighttime Noise level (dBA)
POW1S	Retail Unit (South face of building)	69.8	NA[3]
POW1E	Retail Unit (East face of building)	64.7	NA[3]

POW1N	Retail Unit (North face of building)	49.4	NA[3]
POW1W	Retail Unit (West face of building)	66.5	NA[3]
POW6S	Residential Unit on Sixth Floor (South face of building)	69.8	62.2
POW6E	Residential Unit on Sixth Floor (South face of building)	64.7	57.1
POW6N	Residential Unit on Sixth Floor (North face of building)	54.0	46.4
POW6W	Residential Unit on Sixth Floor (West face of building)	66.6	59.0

[2] Receiver number 1 and 6 refer to the corresponding floor number within the building
[3] Nighttime sound levels are not analyzed for general offices, reception area and retail stores. Sound level criteria has only been assessed between 7:00 - 23:00 for the retail units.

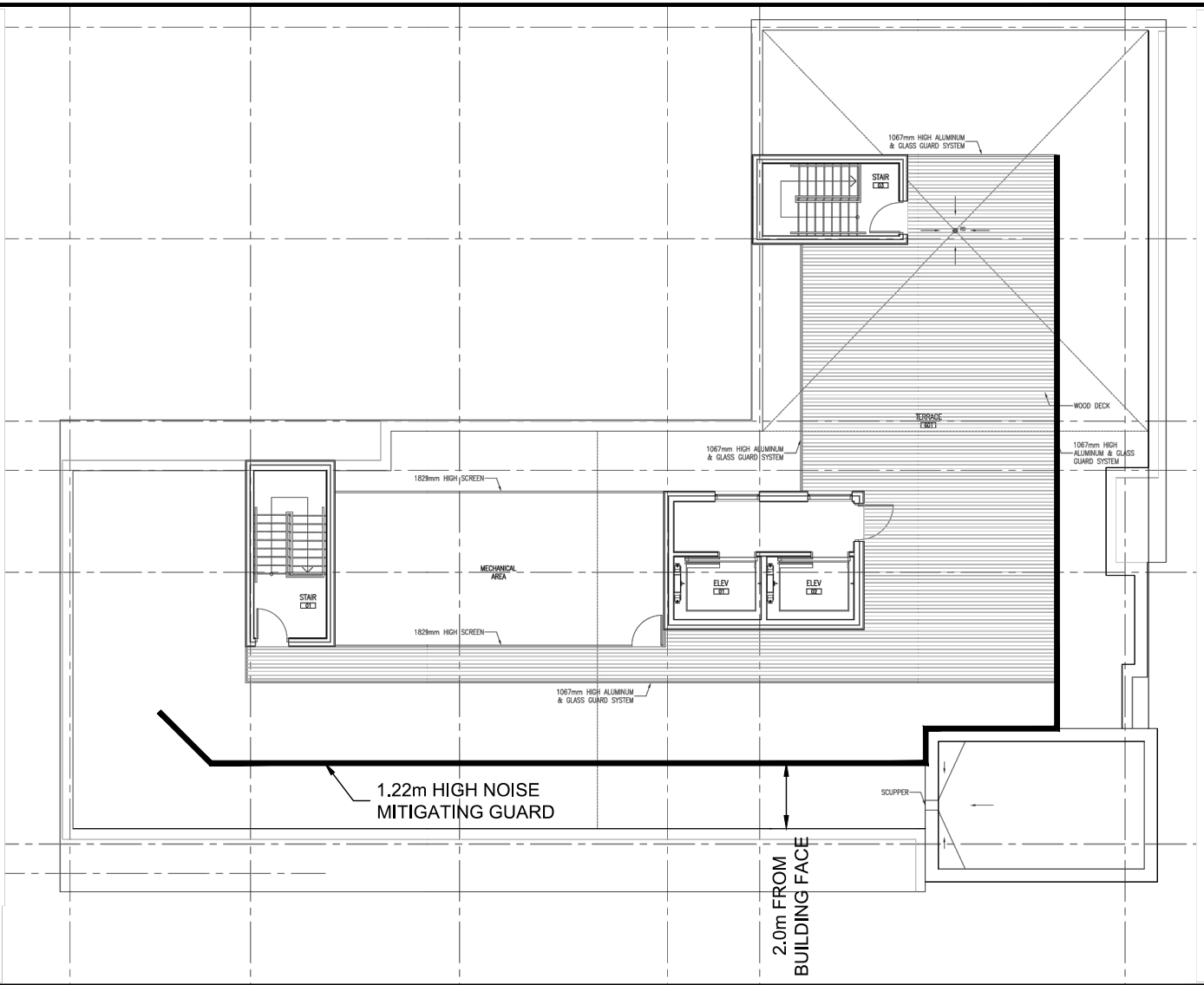
3.2 Proposed Attenuation Measures

3.2.1 Outdoor Control Measures

Comparing the noise level results in **Table 4** to the ENCG sound level criteria specified for the outdoor living area summarized in **Table 1** the noise levels exceed the minimum threshold of 55 dBA. As the unattenuated noise levels exceed 60 dBA on the rooftop terrace one alternative for noise attenuation includes a noise mitigating barrier. The barrier is required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

A 1.22m (4 ft) noise-mitigating guardrail on the south side of the rooftop terrace, situated 2.0m from the building face reduces the noise levels on the rooftop terrace to 59.8 dBA. Increasing the noise-mitigating rail to 1.83m (6ft) would reduce the noise levels to 58.2 dBA. Although the noise levels remain elevated, it is not feasible to reduce the noise levels below 55 dBA for the rooftop terrace without significantly impacting the intended use of the terrace therefore Novatech recommends a 1.22m noise-mitigating guardrail be installed. **Figure 3** indicates the proposed noise barrier location.

Warning clauses should 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 on the rooftop terrace.



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3443 INNES ROAD

NOISE BARRIER LOCATION ON ROOF TOP TERRACE

SCALE 1 : 200 (0 2 4 6 8)

DATE DEC 2017 | JOB 117077 | FIGURE FIGURE 3

SHT8X11.DWG - 216mmx279mm

M:\2017\117077\CAD\Design\Figures\Noise\117077-Noise Barrier Location.dwg, FIG 3, Dec 15, 2017 - 11:10am, alavallee

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

3.2.2 Indoor Control Measures

Comparing the noise level results in **Table 5** to the ENCG sound level criteria specified for the plane of window summarized in **Table 1,** the predicted noise levels exceed the minimum (residential nighttime) threshold of **40dBA** and exceeds the minimum threshold of **50dBA** for the retail spaces fronting onto Innes Road. Therefore, attenuation measures are required for the indoor living areas. These attenuation measures include; ventilation requirements, building component assessment and warning clauses.

Ventilation Requirements
Warning clauses are required on the purchase and lease/rental/sale agreements relating to the requirement for central air conditioning for the residential and retail units.

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

Building Component Assessment
To comply with the ENCG policies, the residential dwelling units will require a minimum acoustical insulation factor (AIF) rating to provide the indoor sound levels as shown in **Table 1**. The residential dwelling units (Floors 2-6) will require a minimum AIF rating of 31 to provide the appropriate indoor sound levels.

The acoustical insulation factor for a living room on the sixth floor (located on the south side of the building) is calculated as follows:

Three Building Components: AIF = 69.8 dBA – 45 dBA + $10\log_{10}(3)$ dBA + 2dBA = 31.4dBA

To comply with the ENCG policies, the retail units will require a minimum acoustical insulation factor (AIF) rating to provide the indoor sound levels as shown in **Table 1**. To comply with the City and MOE Guidelines, the main level of the building (retail space) will require a minimum AIF rating of 25 to provide the appropriate indoor sound levels.

Two Building Components: AIF = 69.8 dBA – 50 dBA + 10log10(2) dBA + 2dBA = 24.8dBA

Presented below are recommended building materials that provide the maximum (31) required AIF rating. These building materials are only suggestions and can be substituted by the builder with equivalent building materials that meet or exceed the AIF rating.

Wall Assemblies
A wall with type EW2 composition (refer to **Appendix D** for applicable worksheets) has an AIF of 31 with an exterior wall to interior floor area of 125%; this meets the minimum requirement for 3 components.

Window Assemblies
A standard dual pane residential window section has 4mm glazing x 20mm air space x 4mm glazing, which has an AIF of 31 if located in a room with a window to floor area ratio of 40%.

When the building floor plans and exterior facade have been finalized, the tables in **Appendix D** should be referenced by the builder to ensure that the selected building components exceed the minimum AIF rating for both the retail and residential units.

4.0 CONCLUSIONS AND RECOMMENDATIONS

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

Outdoor Control Measures
The predicted noise levels for the rooftop terrace are above the minimum threshold of 55 dBA. Novatech recommends a 1.22m noise-mitigating guardrail on the south side of the rooftop terrace, situated 2.0m from the building face to reduce the noise levels on the rooftop terrace.

Indoor Control Measures – Residential
The following minimum building requirements are recommended to reduce the residential indoor noise levels:

- Installation of air conditioning system.
- The installation of 'EW2' wall type assembly (or equivalent).
- The installation of window '4-20-4' type assemblies (or equivalent).

Indoor Control Measures – Retail
The following minimum building requirements are recommended to reduce the retail indoor noise levels:

- Installation of air conditioning system.
- The installation of 'EW1' wall type assembly (or equivalent).
- The installation of window '4-6-4' type assemblies (or equivalent).

When the building floor plans and exterior facade have been finalized, the AIF tables should be referenced by the builder to ensure that the selected building components exceed the minimum AIF rating for both the retail and residential units.

Warning Clause

The following warning clauses should be incorporated into the purchase and lease/rental/sale agreements:

For Outdoor Living Area (Rooftop)

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

For Indoor Living Area (Retail and Residential)

"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."

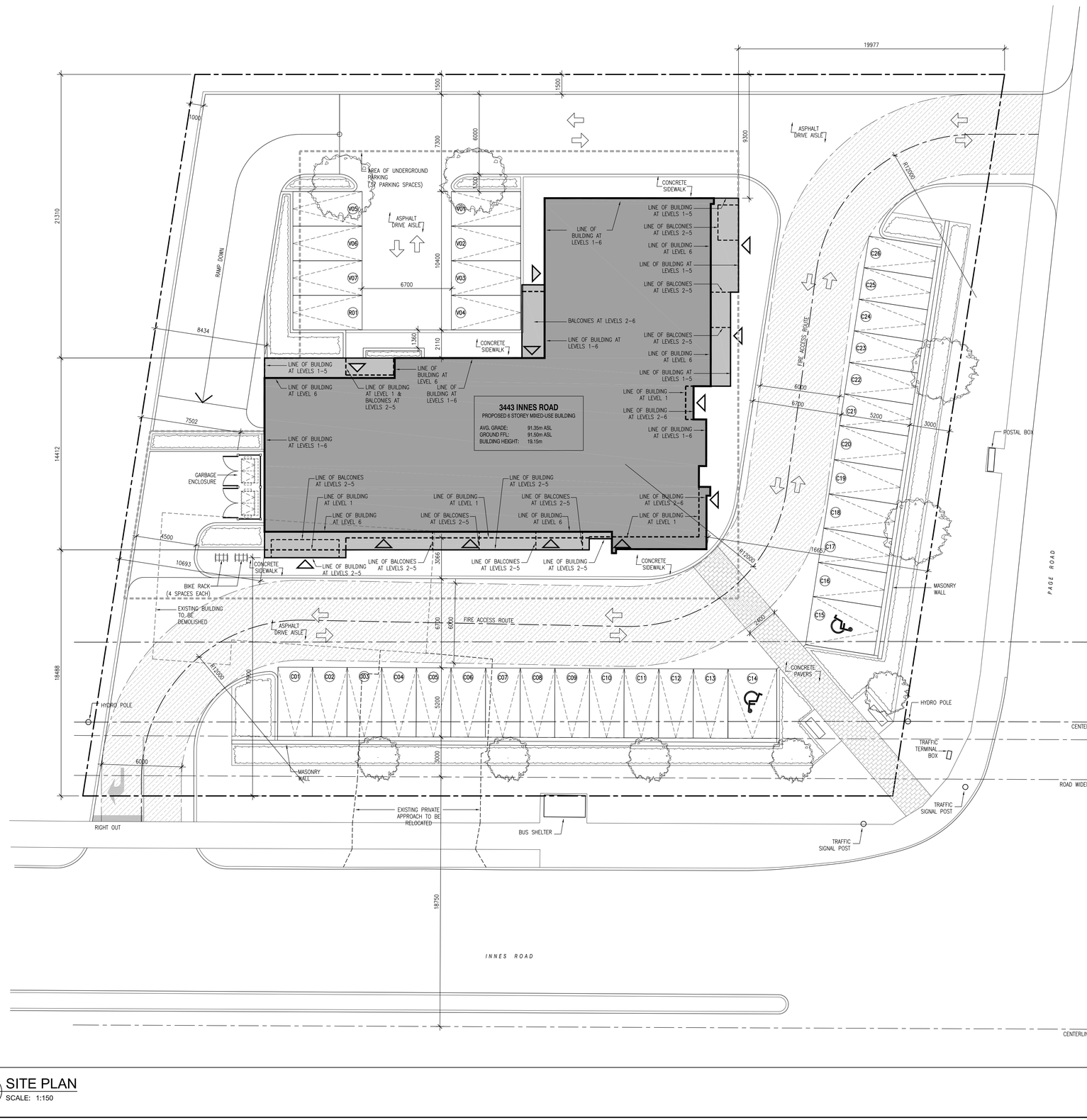
Prepared by:

NOVATECH

Lisa Bowley, P.Eng.
Project Manager
Land Development Engineering

APPENDIX A

Elevation and Floor Plans



2 SITE PLAN
SP-01 SCALE: 1:150

1 LOCATION PLAN
SP-01 SCALE: NTS

TOPOGRAPHIC PLAN OF SURVEY OF
PART OF LOT 6
CONCESSION 2 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2017

SURVEY INFO
SP-01 SCALE: NTS

SITE PLAN SYMBOLS LEGEND

- BUILDING ENTRANCE
- BUILDING EXIT
- FIRE HYDRANT
- NEW STREET LIGHT
- STREET LIGHT TO BE REMOVED
- BICYCLE PARKING

SYMBOLS LEGEND
SP-01 SCALE: NTS

SITE & PROJECT STATISTICS

GENERAL INFORMATION

Zoning:	----
Lot Area:	----

GROSS FLOOR AREA
As per Section 54

Ground Floor - Retail:	616 m2
Second Floor:	619 m2
Third Floor:	619 m2
Fourth Floor:	619 m2
Fifth Floor:	619 m2
Sixth Floor:	569 m2
Total GFA:	**3,661 m2**

PARKING CALCULATION
As per Table 101

Retail Use

Retail Area:	528 m2
Required Parking:	18 spaces
3.4sp/100m2	

Residential Use

Residential Units:	35
Required Parking:	35 spaces
1.0sp/unit	

Visitor Parking

Residential Units:	35
Required Parking:	7 spaces
0.2sp/unit	
Total Parking Required:	60 spaces
Under Section 101	
Total Parking Provided:	**71 spaces**

BICYCLE PARKING CALCULATION
As per Table 111A

Retail Area:	528 m2
Required Parking:	0 spaces
1sp/1500m2 [111A(i)]	
Residential Units:	35
Required Parking:	18 spaces
0.5sp/unit [111A(b)(i)]	
Total Required Parking:	18 spaces
Total Parking Provided:	**18 spaces**

AMENITY AREA CALCULATION
As per Table 137

Total Amenity Req'd:	210 m2
6m2/unit	
Communal Amenity Req'd:	105 m2
50% of Total Amenity Area Min.	
Total Amenity Provided:	331.9m2
Level 1:	*0m2*
Level 2:	*35.7m2*
Level 3:	*35.7m2*
Level 4:	*35.7m2*
Level 5:	*35.7m2*
Level 6:	*62.2m2*
Roof:	*126.9m2*
Communal Amenity Provided:	126.9m2
Roof:	*126.9m2*

STATISTICS
SP-01 SCALE: NTS

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REVISION RECORD

ISSUED FOR SITE PLAN CONTROL	2017-12-12
ISSUED FOR COORDINATION	2017-08-10
ISSUED FOR COORDINATION	2017-07-17

ISSUE RECORD

ONTARIO ASSOCIATION of ARCHITECTS
EVAN M. KOOLWINE
LICENCE
7319

project1 studio
Project1 Studio Incorporated
t 613.884.3939 | mail@project1studio.ca

3443 INNES ROAD

3443-3445 Innes Road
Ottawa, ON

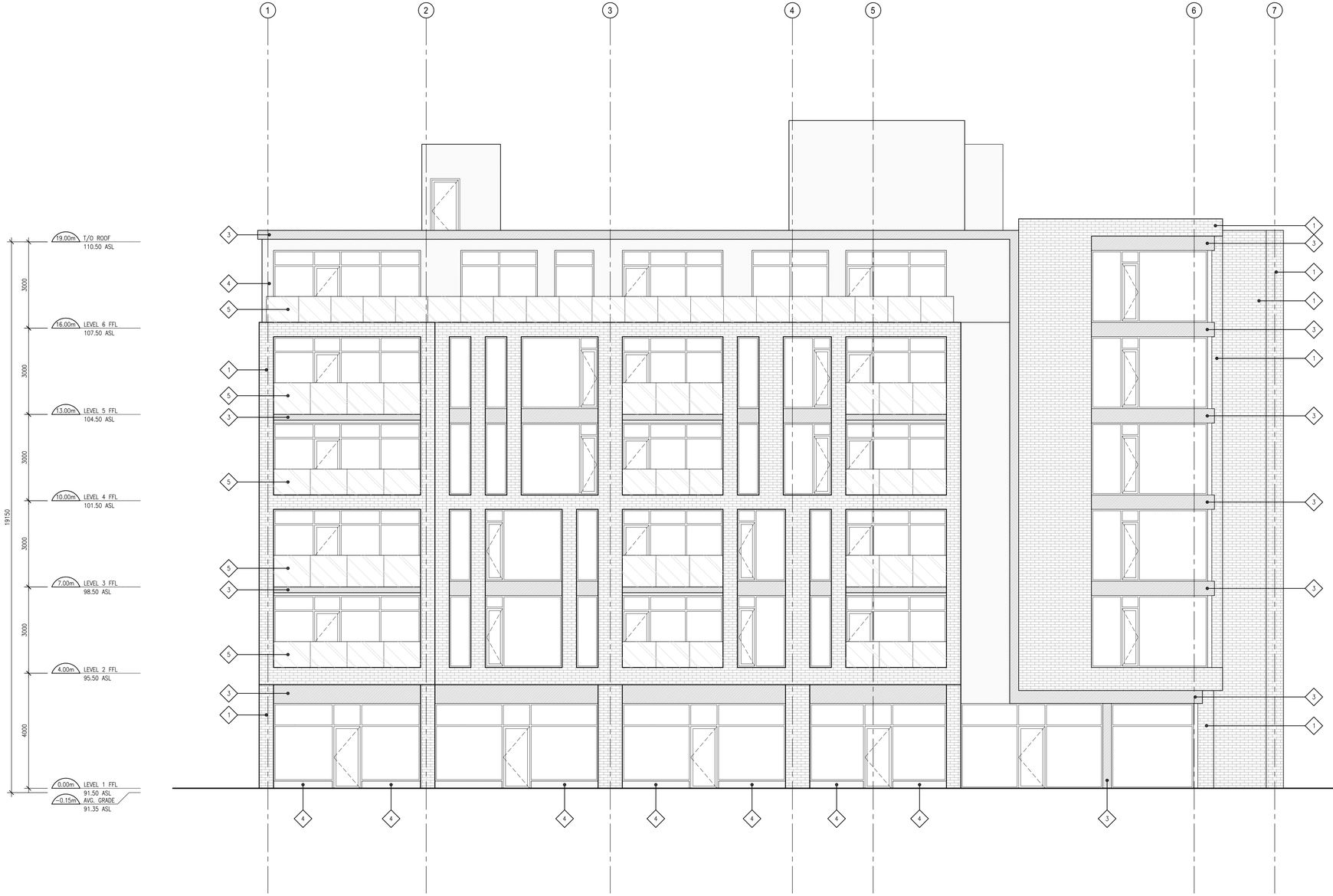
PROJ	SCALE	DRAWN	REVIEWED
1704	SP-01	LB	RMK

SITE PLAN & STATISTICS

SP-01

CLADDING LEGEND

1. BRICK
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
2. PRE-FINISHED SOLID WOOD SIDING
   SUPPLIER: MAIBEC
   PROFILE:
   FINISH:
3. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: DARK GREY
4. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
5. STEEL AND CLEAR GLASS GUARD
6. PRE-FINISHED ALUMINUM LOUVERS



1 / A201 SOUTH ELEVATION
SCALE: 1:75

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REVISION RECORD

ISSUE RECORD	
ISSUED FOR SITE PLAN CONTROL	2017-12-12
ISSUED FOR COORDINATION	2017-07-20

ONTARIO ASSOCIATION OF ARCHITECTS
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7570

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3443 INNES

3443-3445 Innes Road
Orleans, ON

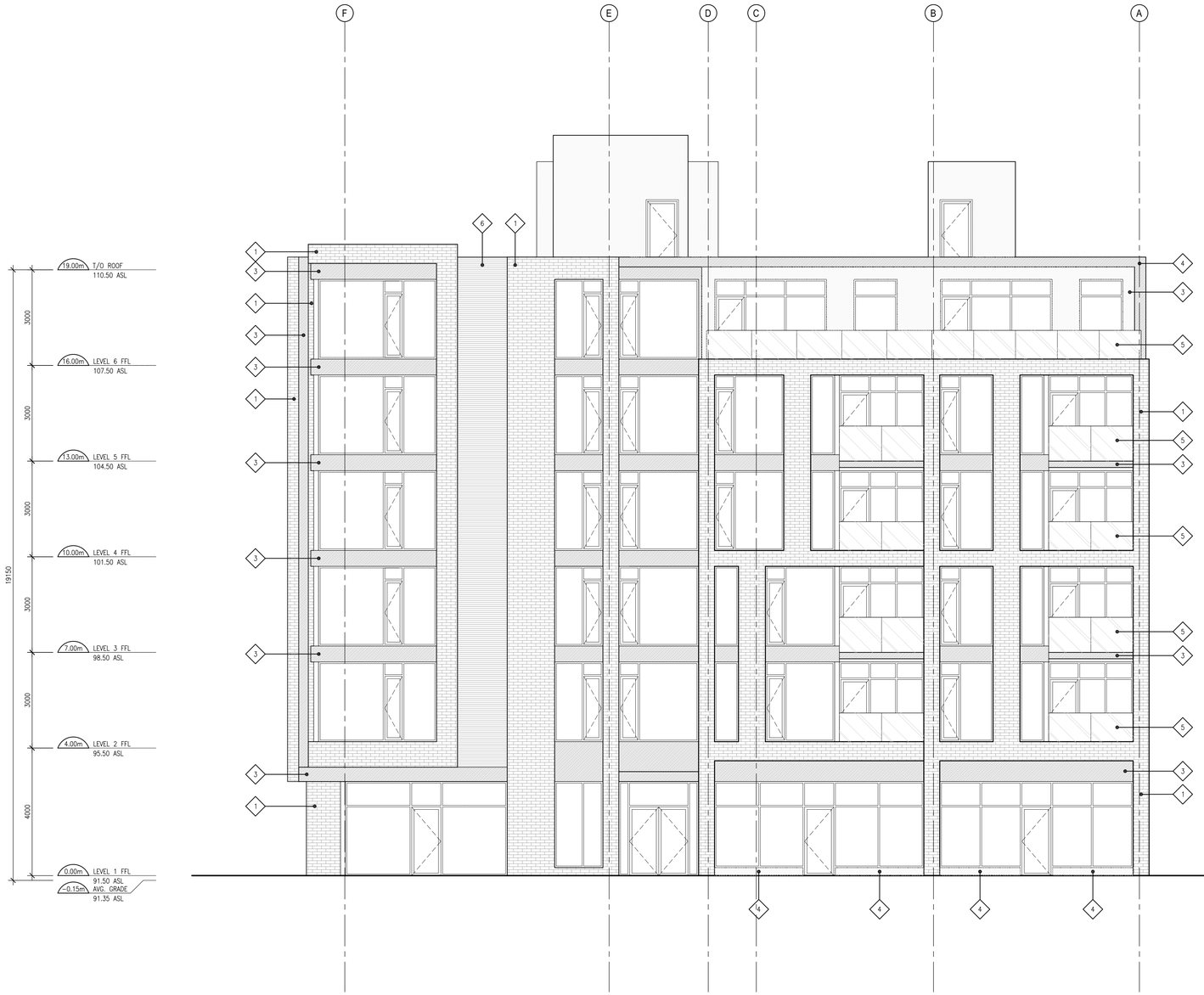
PROJ	SCALE	DRAWN	REVIEWED
1704	NOTED	LB	RMK

SOUTH ELEVATION

A201

CLADDING LEGEND

1. BRICK
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
2. PRE-FINISHED SOLID WOOD SIDING
   SUPPLIER: MAIBEC
   PROFILE:
   FINISH:
3. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: DARK GREY
4. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
5. STEEL AND CLEAR GLASS GUARD
6. PRE-FINISHED ALUMINUM LOUVERS



1 / A202 EAST ELEVATION
SCALE: 1:75

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REVISION RECORD

ISSUED FOR SITE PLAN CONTROL 2017-12-12

ISSUE RECORD

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3443 INNES

3443 Innes Road
Orleans, ON

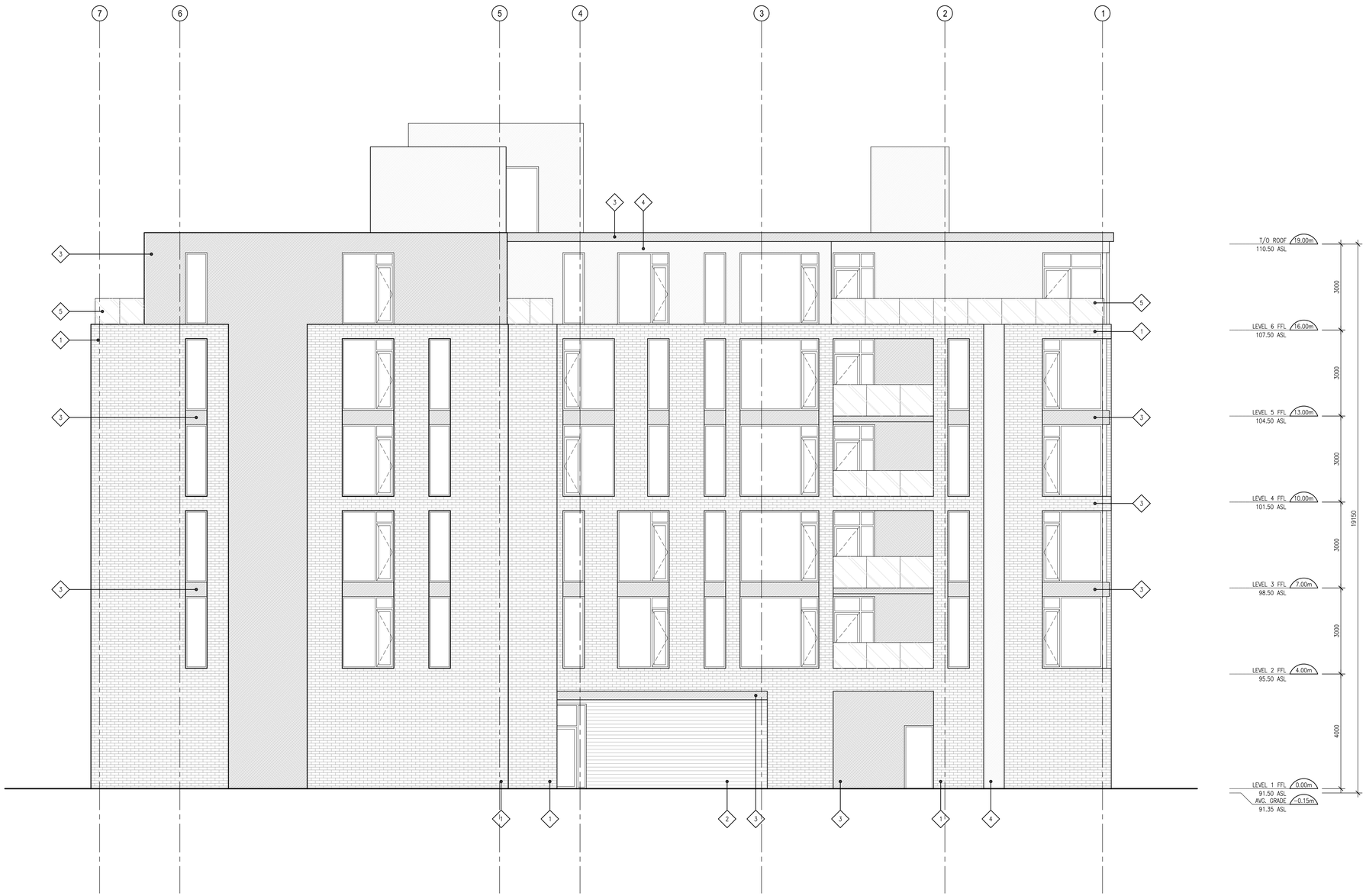
PROJ	SCALE	DRAWN	REVIEWED
1704	NOTED	JRKII	RMK

EAST ELEVATION

A202

CLADDING LEGEND

1. BRICK
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
2. PRE-FINISHED SOLID WOOD SIDING
   SUPPLIER: MAIBEC
   PROFILE:
   FINISH:
3. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: DARK GREY
4. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
5. STEEL AND CLEAR GLASS GUARD
6. PRE-FINISHED ALUMINUM LOUVERS



1 / A203 NORTH ELEVATION
SCALE: 1:75

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REVISION RECORD

ISSUED FOR SITE PLAN CONTROL	2017-12-12

ISSUE RECORD

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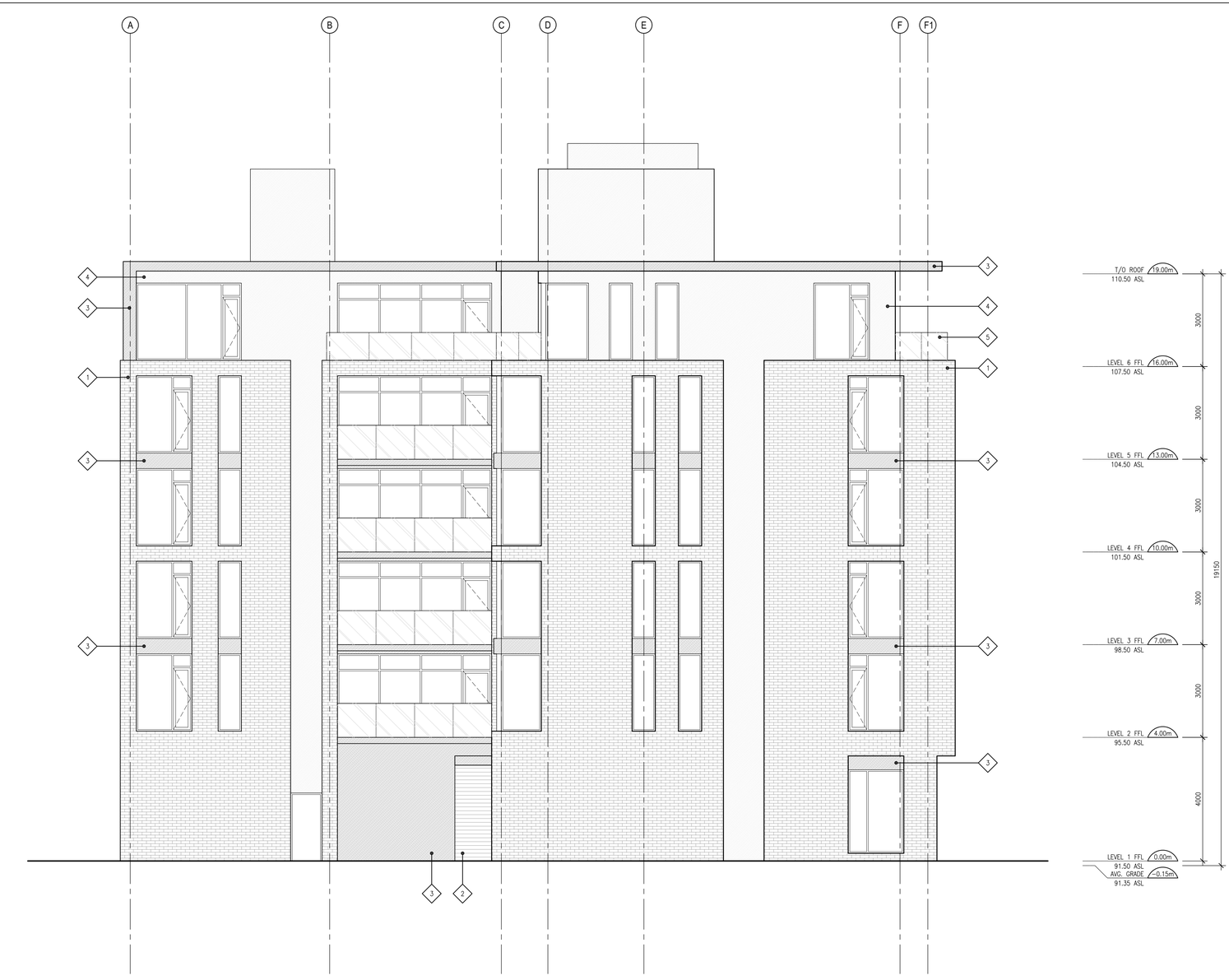
PROJ	SCALE	DRAWN	REVIEWED
1704	NOTED	JRKII	RMK

NORTH ELEVATION

A203

CLADDING LEGEND

1. BRICK
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
2. PRE-FINISHED SOLID WOOD SIDING
   SUPPLIER: MAIBEC
   PROFILE:
   FINISH:
3. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: DARK GREY
4. FIBRE CEMENT PANEL
   SUPPLIER:
   PROFILE:
   COLOUR: LIGHT GREY
5. STEEL AND CLEAR GLASS GUARD
6. PRE-FINISHED ALUMINUM LOUVERS



1 / A204 WEST ELEVATION
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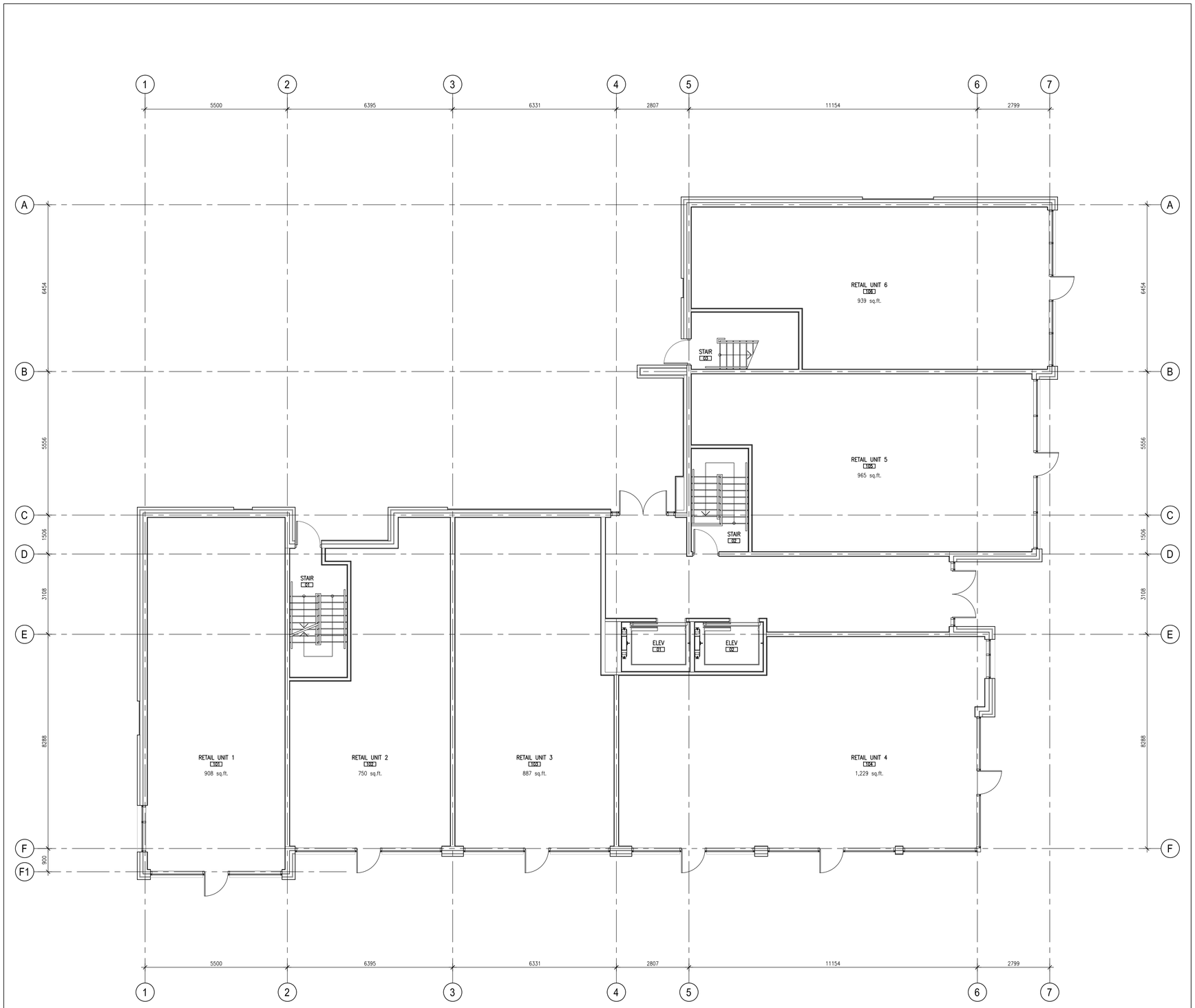
WEST ELEVATION

A204



1 / A101 LEVEL 01 FLOOR PLAN
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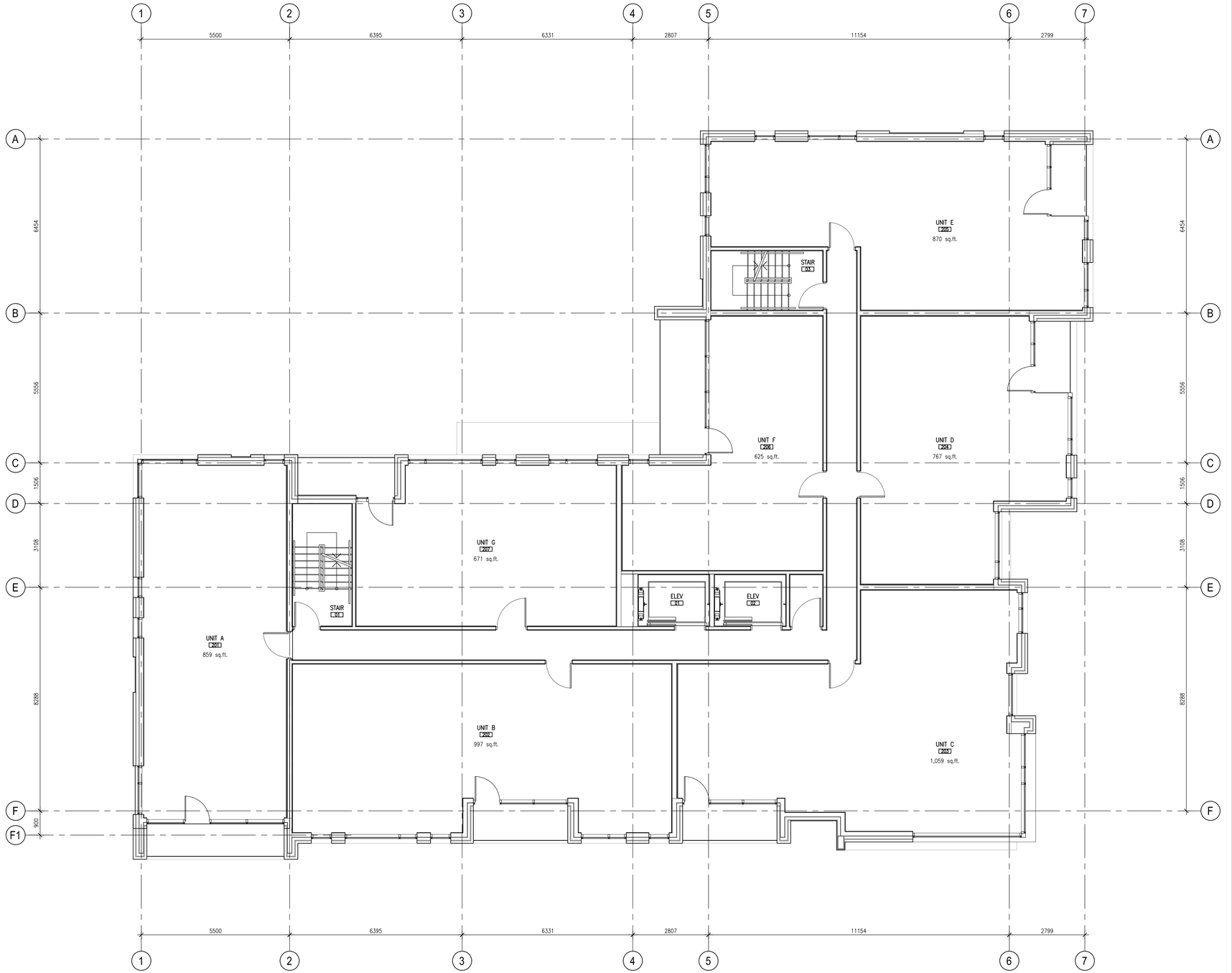
LEVEL 01 FLOOR PLAN

A101

NOTE:

INFORMATION ONLY



1 / A102 LEVEL 02 FLOOR PLAN

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LEVEL 02 FLOOR PLAN

A102

NOTE:

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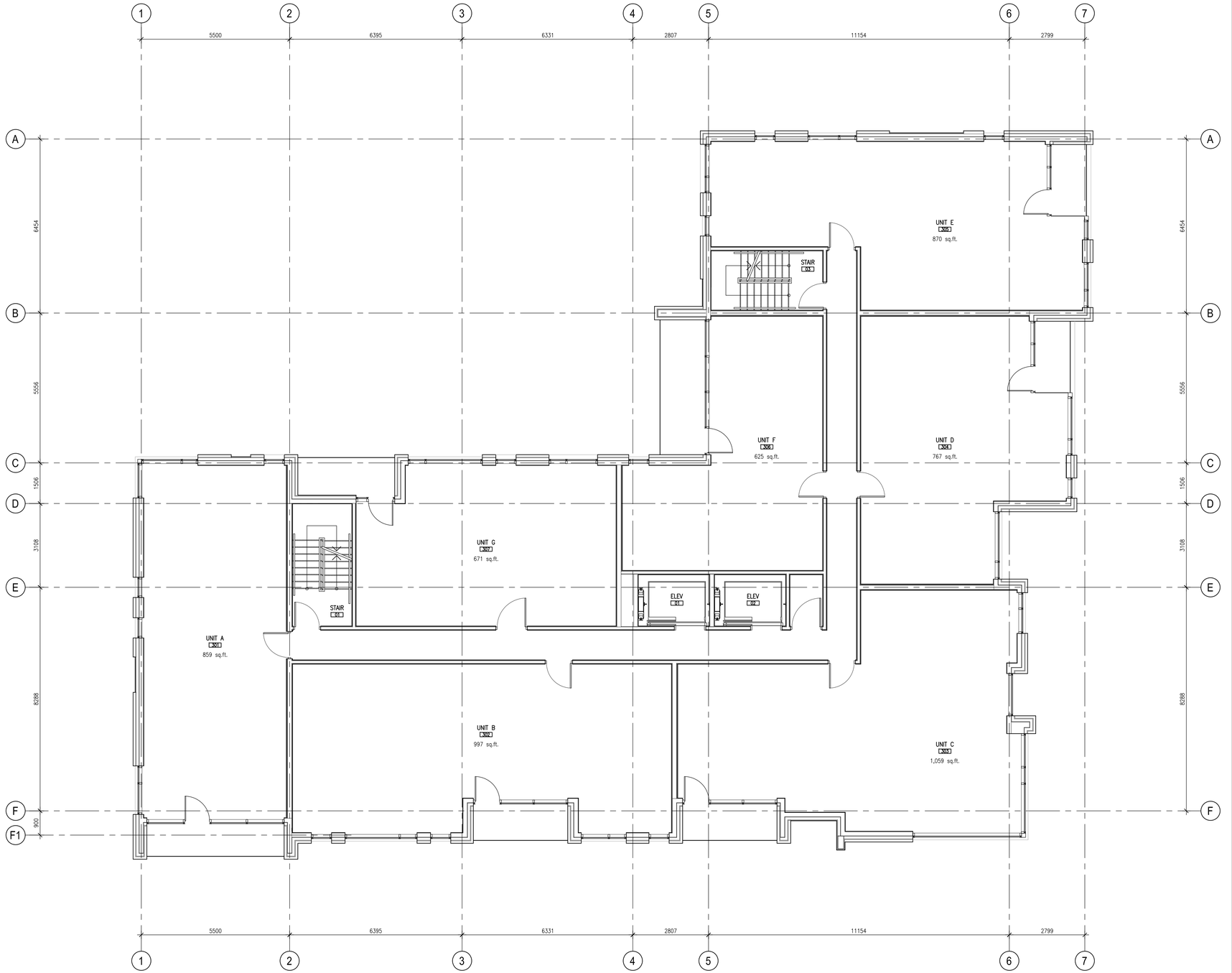

1 / A103 LEVEL 03 FLOOR PLAN

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LEVEL 03 FLOOR PLAN

A103

NOTE:

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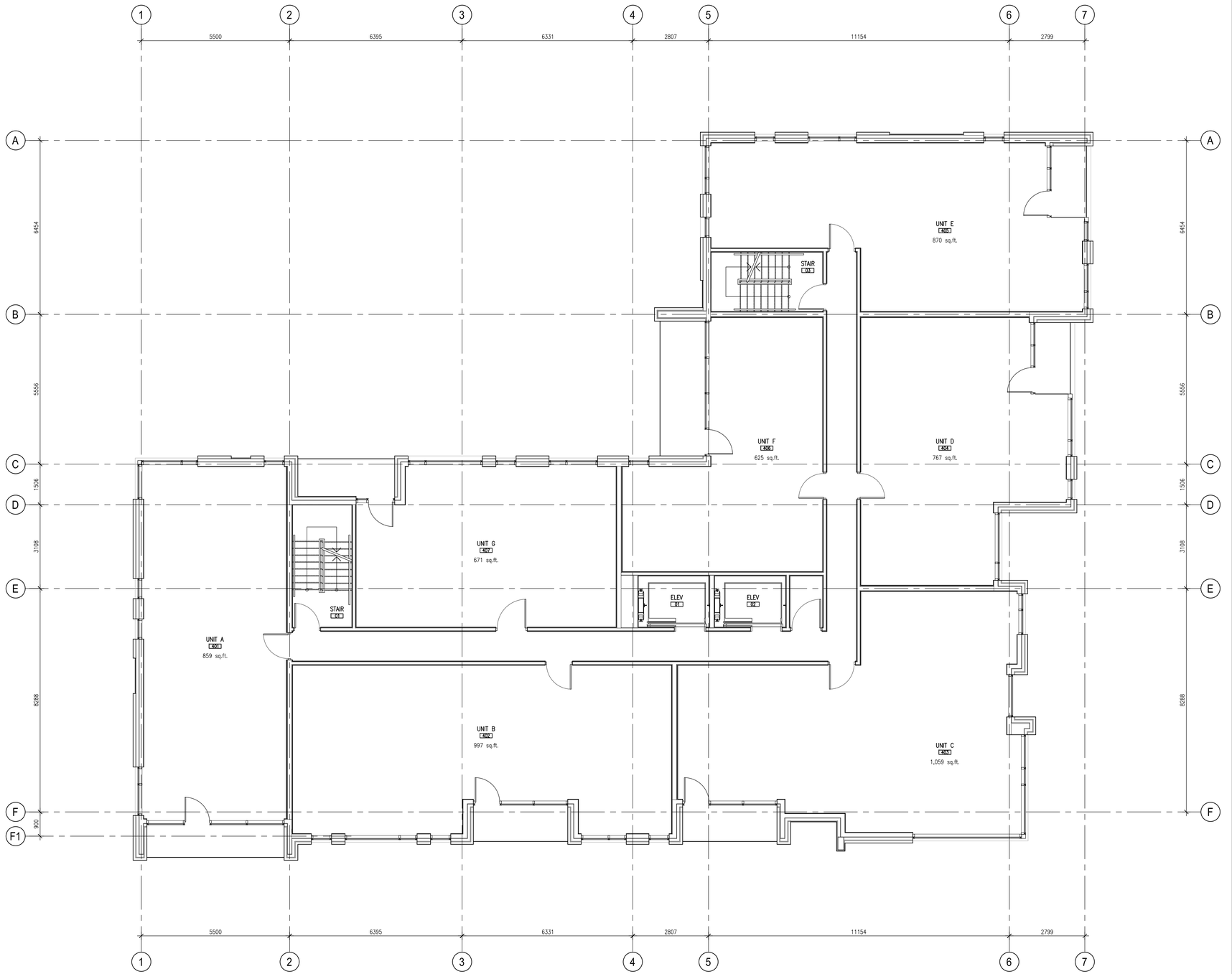

1 A104 LEVEL 04 FLOOR PLAN

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LEVEL 04 FLOOR PLAN

A104

NOTE:

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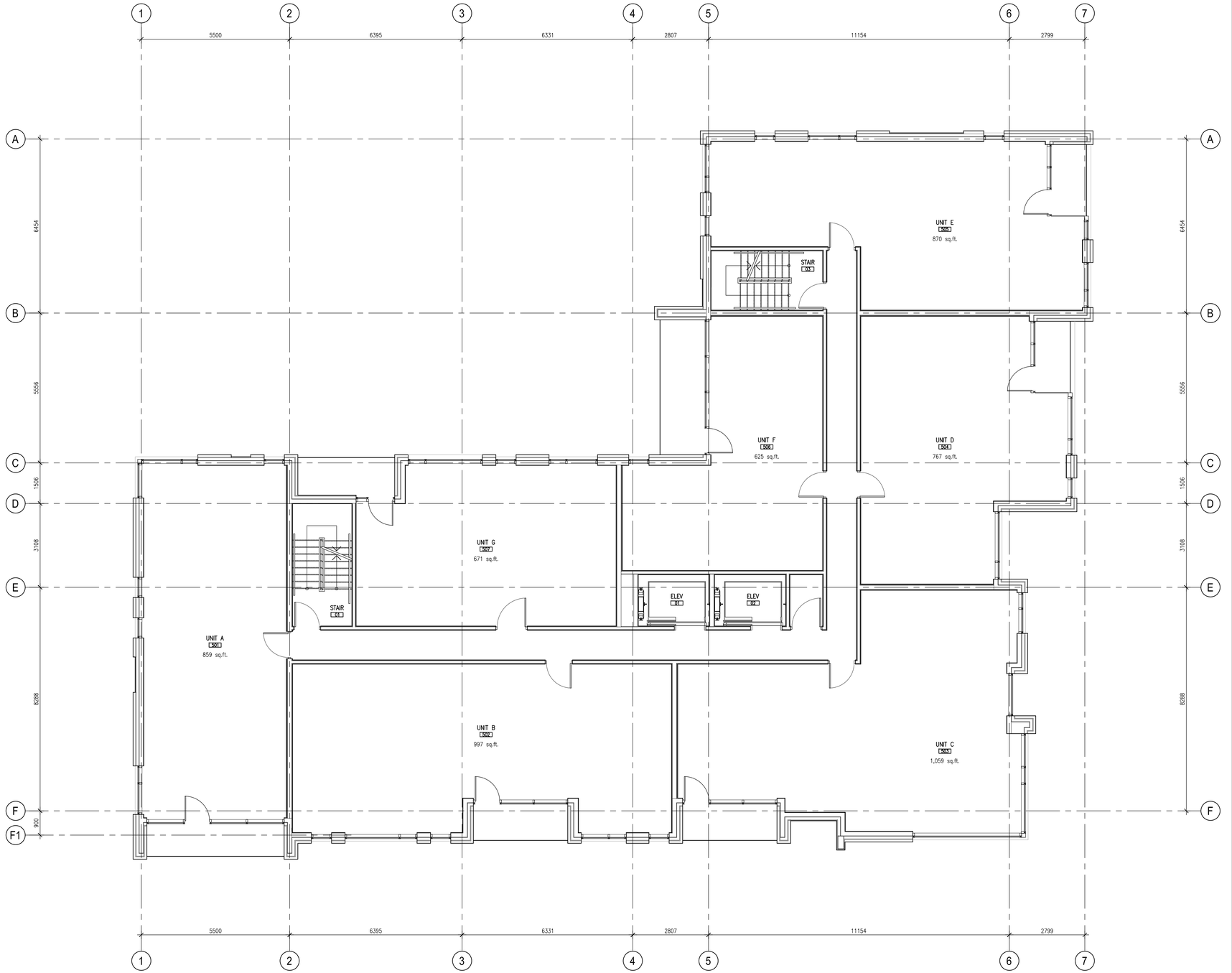

1 / A105 LEVEL 05 FLOOR PLAN

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LEVEL 05 FLOOR PLAN

A105

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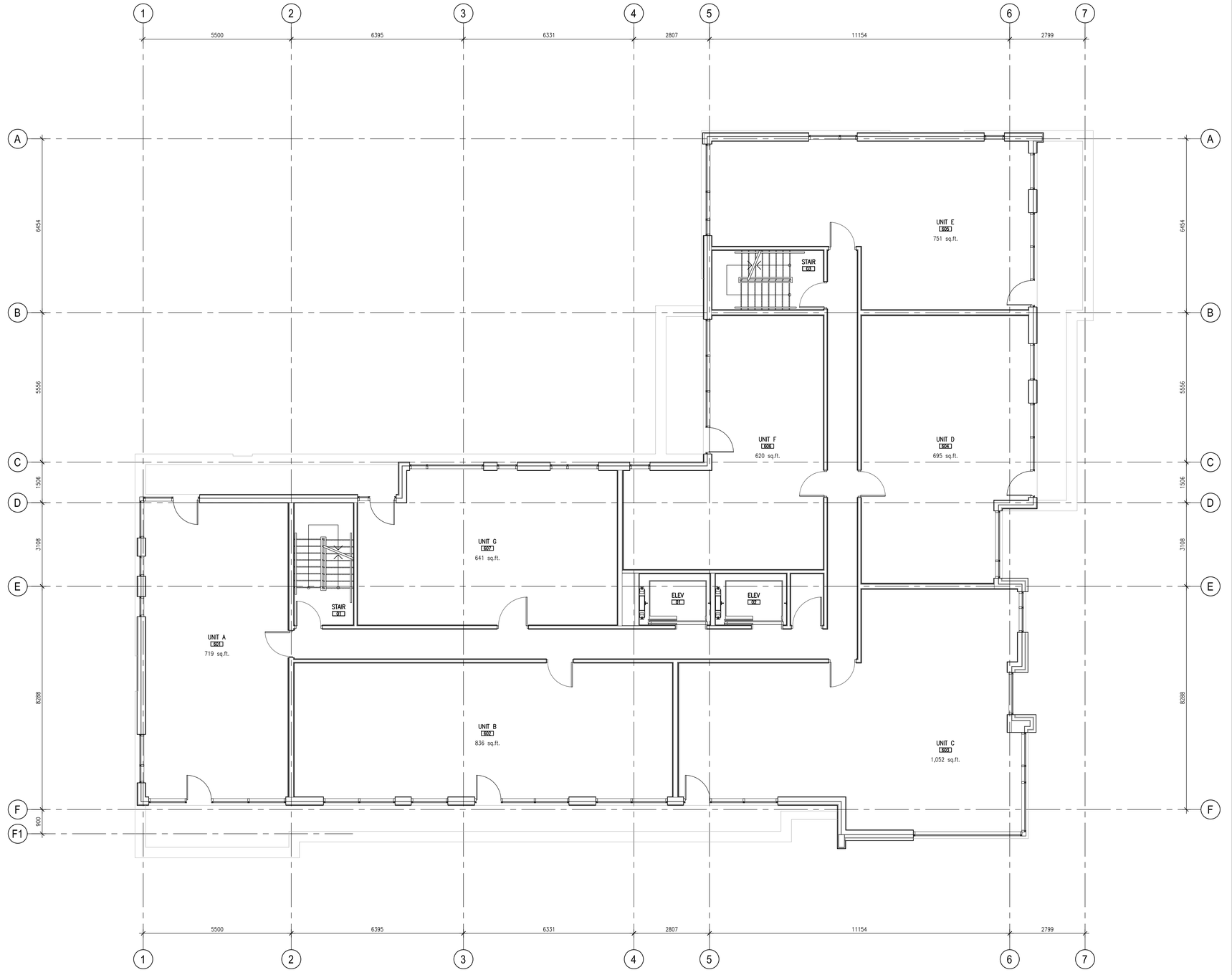

1 / A106 LEVEL 06 FLOOR PLAN

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LEVEL 06 FLOOR PLAN

A106

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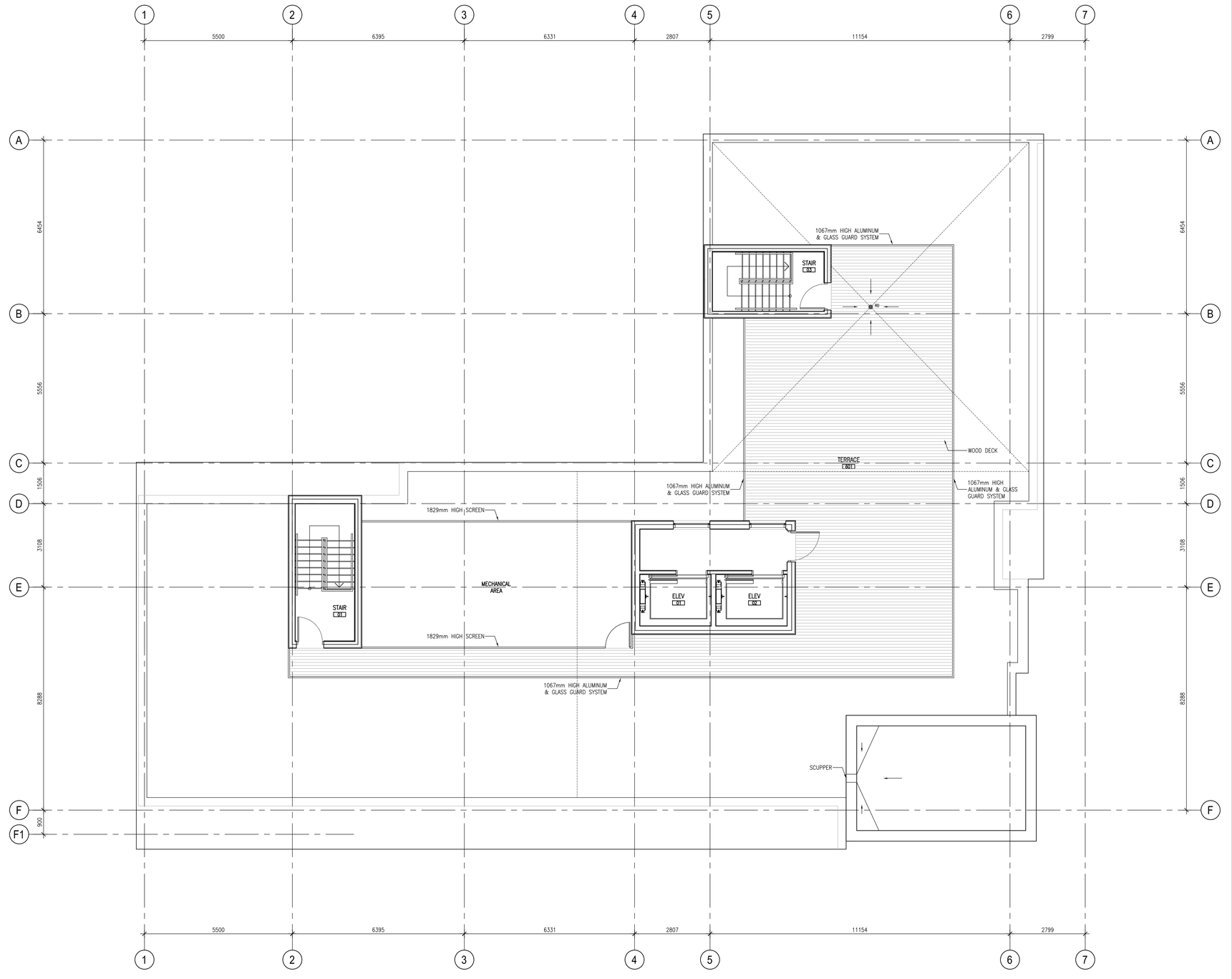

1 / A107 ROOF PLAN
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1704	NOTED	JRKII	RMK

ROOF PLAN

A107

NOTE:

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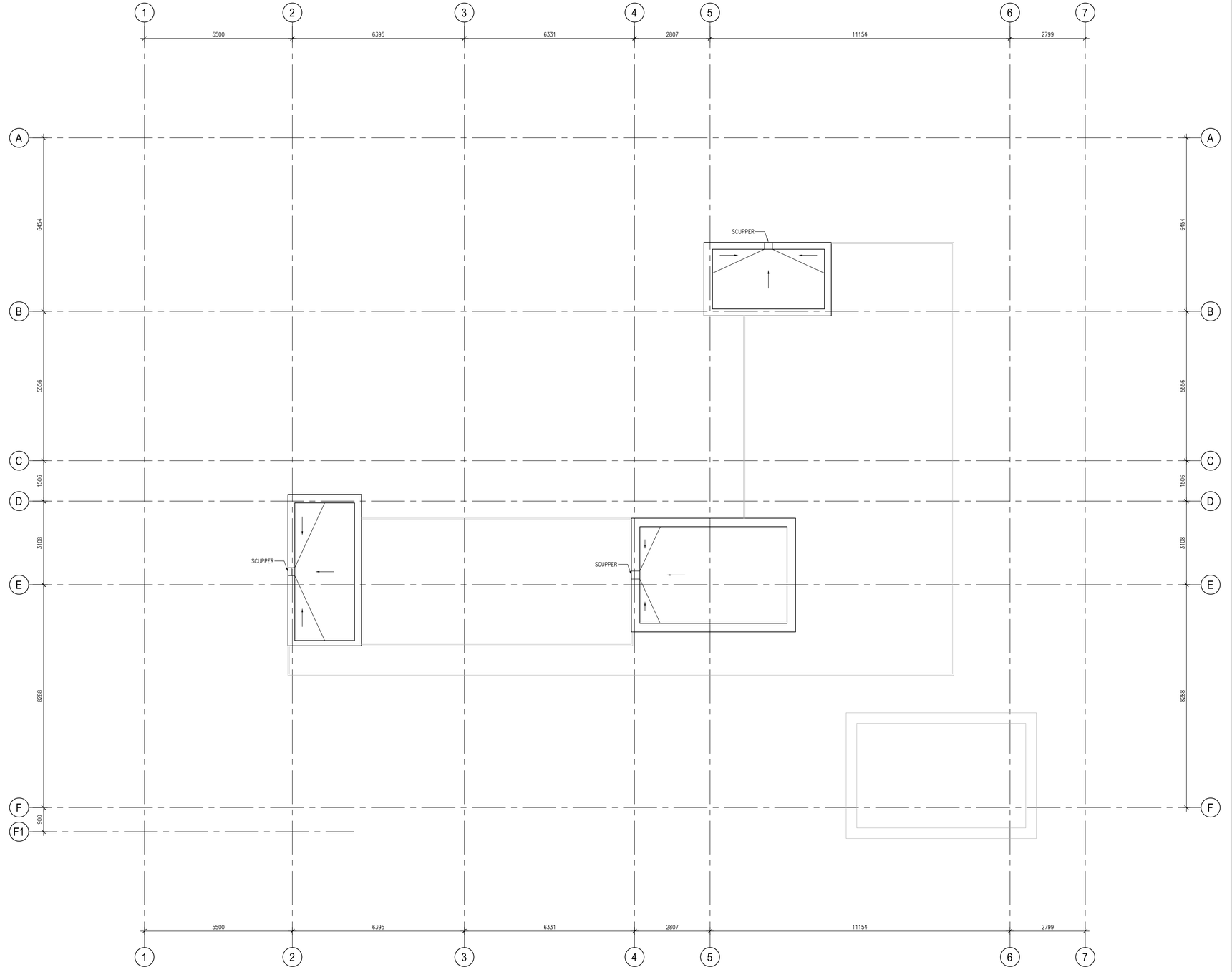

1 / A108 UPPER ROOF PLAN

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UPPER ROOF PLAN

A108

APPENDIX B

Environmental Noise Control Guidelines Excerpts

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 C

STAMSON Noise Modelling Program Results

STAMSON 5.0 NORMAL REPORT Date: 13-12-2017 13:29:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: olaun.te Time Period: Day/Night 16/8 hours
Description: OLA roof unattenuated

Road data, segment # 1: Innes Road (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 : 60 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 # 1: Innes Road (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 : 46.90 / 46.90 m
Receiver height : 1.50 / 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Elevation : 21.25 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 91.25 m
Receiver elevation : 112.50 m
Barrier elevation : 111.00 m
Reference angle : 0.00

```
Road data, segment # 2: Page Road (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     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 # 2: Page Road (day/night)
-------------------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  33.00 / 33.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : -60.00 deg
Barrier height            :   0.00 m
Elevation                 :  21.25 m
Barrier receiver distance :   6.00 / 6.00   m
Source elevation          :  91.25 m
Receiver elevation        : 112.50 m
Barrier elevation         : 111.00 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.63 !       110.37

ROAD (0.00 + 63.02 + 0.00) = 63.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
```

```
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -4.95   0.00   0.00   0.00  -5.70
63.02
-------------------------------------------------------------------------
---

Segment Leq : 63.02 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.86 !       110.14

ROAD (0.00 + 42.00 + 0.00) = 42.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  63.96   0.00  -3.42 -12.55   0.00   0.00  -5.98
42.00
-------------------------------------------------------------------------
---

Segment Leq : 42.00 dBA

Total Leq All Segments: 63.05 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.63 !       110.37

ROAD (0.00 + 55.43 + 0.00) = 55.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
```

```
-------------------------------------------------------------------------
---
   -90     90   0.00  66.08   0.00  -4.95   0.00   0.00   0.00  -5.70
55.43
-------------------------------------------------------------------------
---

Segment Leq : 55.43 dBA


Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.86 !       110.14

ROAD (0.00 + 34.40 + 0.00) = 34.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  56.36   0.00  -3.42 -12.55   0.00   0.00  -5.98
34.40
-------------------------------------------------------------------------
---

Segment Leq : 34.40 dBA

Total Leq All Segments: 55.46 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 63.05
(NIGHT): 55.46

STAMSON 5.0 NORMAL REPORT Date: 13-12-2017 13:32:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA122.te Time Period: Day/Night 16/8 hours
Description: OLA roof with 1.22m wall

Road data, segment # 1: Innes Road (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 : 60 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 # 1: Innes Road (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 : 46.90 / 46.90 m
Receiver height : 1.50 / 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 1.22 m
Elevation : 21.25 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 91.25 m
Receiver elevation : 112.50 m
Barrier elevation : 111.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)
-------------------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  33.00 / 33.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : -60.00 deg
Barrier height            :   1.22 m
Elevation                 :  21.25 m
Barrier receiver distance :   6.00 / 6.00   m
Source elevation          :  91.25 m
Receiver elevation        : 112.50 m
Barrier elevation         : 111.00 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.63 !       110.37

ROAD (0.00 + 59.76 + 0.00) = 59.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -4.95   0.00   0.00   0.00  -8.97
59.76
-------------------------------------------------------------------------
---

Segment Leq : 59.76 dBA
```

```
Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.86 !       110.14

ROAD (0.00 + 38.56 + 0.00) = 38.56 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  63.96   0.00  -3.42 -12.55   0.00   0.00  -9.42
38.56
-------------------------------------------------------------------------
---

Segment Leq : 38.56 dBA

Total Leq All Segments: 59.79 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.63 !       110.37

ROAD (0.00 + 52.16 + 0.00) = 52.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  66.08   0.00  -4.95   0.00   0.00   0.00  -8.97
52.16
-------------------------------------------------------------------------
---

Segment Leq : 52.16 dBA
```

Results segment # 2: Page Road (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	-0.86	110.14

ROAD (0.00 + 30.96 + 0.00) = 30.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.00	56.36	0.00	-3.42	-12.55	0.00	0.00	-9.42	30.96

Segment Leq : 30.96 dBA

Total Leq All Segments: 52.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.79
(NIGHT): 52.19

STAMSON 5.0 NORMAL REPORT Date: 13-12-2017 13:35:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA182.te Time Period: Day/Night 16/8 hours
Description: OLA roof with 1.83m wall

Road data, segment # 1: Innes Road (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 : 60 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 # 1: Innes Road (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 : 46.90 / 46.90 m
Receiver height : 1.50 / 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 1.83 m
Elevation : 21.25 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 91.25 m
Receiver elevation : 112.50 m
Barrier elevation : 111.00 m
Reference angle : 0.00

```
Road data, segment # 2: Page Road (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     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 # 2: Page Road (day/night)
-------------------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  33.00 / 33.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : -60.00 deg
Barrier height            :   1.83 m
Elevation                 :  21.25 m
Barrier receiver distance :   6.00 / 6.00   m
Source elevation          :  91.25 m
Receiver elevation        : 112.50 m
Barrier elevation         : 111.00 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.63 !       110.37

ROAD (0.00 + 58.20 + 0.00) = 58.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
```

```
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -4.95   0.00   0.00   0.00 -10.52
58.20
-------------------------------------------------------------------------
---

Segment Leq : 58.20 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.86 !       110.14

ROAD (0.00 + 36.72 + 0.00) = 36.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  63.96   0.00  -3.42 -12.55   0.00   0.00 -11.26
36.72
-------------------------------------------------------------------------
---

Segment Leq : 36.72 dBA

Total Leq All Segments: 58.23 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.63 !       110.37

ROAD (0.00 + 50.60 + 0.00) = 50.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
```

```
-------------------------------------------------------------------------
---
   -90     90   0.00  66.08   0.00  -4.95   0.00   0.00   0.00 -10.52
50.60
-------------------------------------------------------------------------
---

Segment Leq : 50.60 dBA


Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !       -0.86 !       110.14

ROAD (0.00 + 29.12 + 0.00) = 29.12 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  56.36   0.00  -3.42 -12.55   0.00   0.00 -11.26
29.12
-------------------------------------------------------------------------
---

Segment Leq : 29.12 dBA

Total Leq All Segments: 50.63 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 58.23
(NIGHT): 50.63

STAMSON 5.0 NORMAL REPORT Date: 13-12-2017 13:47:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POW1S.te Time Period: Day/Night 16/8 hours
Description: POW 1st floor south face

Road data, segment # 1: Innes Road (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 : 60 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 # 1: Innes Road (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 : 36.90 / 36.90 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 0.75 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)
-------------------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   0.75 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.77 + 0.00) = 69.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -3.91   0.00   0.00   0.00   0.00
69.77
-------------------------------------------------------------------------
---

Segment Leq : 69.77 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.39 + 0.00) = 48.39 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  63.96   0.00  -3.01 -12.55   0.00   0.00   0.00
48.39
-------------------------------------------------------------------------
---

Segment Leq : 48.39 dBA

Total Leq All Segments: 69.80 dBA
```

Results segment # 1: Innes Road (night)

Source height = 1.50 m

ROAD (0.00 + 62.17 + 0.00) = 62.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.08	0.00	-3.91	0.00	0.00	0.00	0.00	62.17

Segment Leq : 62.17 dBA

Results segment # 2: Page Road (night)

Source height = 1.50 m

ROAD (0.00 + 40.80 + 0.00) = 40.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.00	56.36	0.00	-3.01	-12.55	0.00	0.00	0.00	40.80

Segment Leq : 40.80 dBA

Total Leq All Segments: 62.20 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.80
(NIGHT): 62.20

STAMSON 5.0 NORMAL REPORT Date: 24-11-2017 15:15:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: RpowE1.te Time Period: Day/Night 16/8 hours
Description: Floor 1, East Face

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

Data for Segment # 1: Innes Road (day/night)

Angle1 Angle2 : 2.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 59.00 / 59.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)

Angle1 Angle2 : -76.00 deg -66.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 30.00 / 30.00 m

```
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.62 + 0.00) = 64.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
     2     90   0.00  73.68   0.00  -5.95  -3.11   0.00   0.00   0.00
64.62
-------------------------------------------------------------------------
---

Segment Leq : 64.62 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.39 + 0.00) = 48.39 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -76    -66   0.00  63.96   0.00  -3.01 -12.55   0.00   0.00   0.00
48.39
-------------------------------------------------------------------------
---

Segment Leq : 48.39 dBA

Total Leq All Segments: 64.72 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.02 + 0.00) = 57.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
```

```
     2     90   0.00  66.08   0.00  -5.95  -3.11   0.00   0.00   0.00
57.02
-------------------------------------------------------------------------
---

Segment Leq : 57.02 dBA


Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 40.80 + 0.00) = 40.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -76    -66   0.00  56.36   0.00  -3.01 -12.55   0.00   0.00   0.00
40.80
-------------------------------------------------------------------------
---

Segment Leq : 40.80 dBA

Total Leq All Segments: 57.12 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 64.72
(NIGHT): 57.12

STAMSON 5.0 NORMAL REPORT Date: 24-11-2017 15:21:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: powN1.te Time Period: Day/Night 16/8 hours
Description: Floor 1, North Face

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

Data for Segment # 1: Innes Road (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 : 47.00 / 47.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 19.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation : 91.25 m
Receiver elevation : 92.00 m
Barrier elevation : 92.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)
-----------------------------------------
Angle1   Angle2           : -63.00 deg   -53.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  43.00 / 43.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -63.00 deg   Angle2 : -53.00 deg
Barrier height            :  19.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :  91.25 m
Receiver elevation        :  92.00 m
Barrier elevation         :  92.00 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.48 !        93.48

ROAD (0.00 + 49.35 + 0.00) = 49.35 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -4.96   0.00   0.00   0.00 -19.36
49.35
-------------------------------------------------------------------------
---

Segment Leq : 49.35 dBA


Results segment # 2: Page Road (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
```

```
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.48 !        93.48

ROAD (0.00 + 26.83 + 0.00) = 26.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -63    -53   0.00  63.96   0.00  -4.57 -12.55   0.00   0.00 -20.00
26.83
-------------------------------------------------------------------------
---

Segment Leq : 26.83 dBA

Total Leq All Segments: 49.37 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.48 !        93.48

ROAD (0.00 + 41.75 + 0.00) = 41.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  66.08   0.00  -4.96   0.00   0.00   0.00 -19.36
41.75
-------------------------------------------------------------------------
---

Segment Leq : 41.75 dBA


Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
```

```
       1.50 !        1.50 !        1.48 !        93.48

ROAD (0.00 + 19.24 + 0.00) = 19.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -63    -53   0.00  56.36   0.00  -4.57 -12.55   0.00   0.00 -20.00
19.24
-------------------------------------------------------------------------
---

Segment Leq : 19.24 dBA

Total Leq All Segments: 41.77 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 49.37
(NIGHT): 41.77

STAMSON 5.0 NORMAL REPORT Date: 24-11-2017 15:40:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: powW1.te Time Period: Day/Night 16/8 hours
Description: Floor 1, West Face

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

Data for Segment # 1: Innes Road (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 : 41.00 / 41.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 3.00 deg Angle2 : 90.00 deg
Barrier height : 19.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation : 91.25 m
Receiver elevation : 92.00 m
Barrier elevation : 92.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)
------------------------------------------
Angle1   Angle2           : -47.00 deg   -41.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  61.70 / 61.70  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -47.00 deg   Angle2 : -41.00 deg
Barrier height            :  19.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :  91.25 m
Receiver elevation        :  92.00 m
Barrier elevation         :  92.00 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.48 !        93.48

ROAD (66.44 + 46.79 + 0.00) = 66.49 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      3   0.00  73.68   0.00  -4.37  -2.87   0.00   0.00   0.00
66.44
-------------------------------------------------------------------------
---
     3     90   0.00  73.68   0.00  -4.37  -3.16   0.00   0.00 -19.36
46.79
-------------------------------------------------------------------------
---

Segment Leq : 66.49 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m
```

```
Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.49 !        93.49

ROAD (0.00 + 23.04 + 0.00) = 23.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -47    -41   0.00  63.96   0.00  -6.14 -14.77   0.00   0.00 -20.00
23.04
-------------------------------------------------------------------------
---

Segment Leq : 23.04 dBA

Total Leq All Segments: 66.49 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.48 !        93.48

ROAD (58.84 + 39.20 + 0.00) = 58.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      3   0.00  66.08   0.00  -4.37  -2.87   0.00   0.00   0.00
58.84
-------------------------------------------------------------------------
---
     3     90   0.00  66.08   0.00  -4.37  -3.16   0.00   0.00 -19.36
39.20
-------------------------------------------------------------------------
---

Segment Leq : 58.89 dBA
```

```
Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.49 !        93.49

ROAD (0.00 + 15.45 + 0.00) = 15.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -47    -41   0.00  56.36   0.00  -6.14 -14.77   0.00   0.00 -20.00
15.45
-------------------------------------------------------------------------
---

Segment Leq : 15.45 dBA

Total Leq All Segments: 58.89 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 66.49
(NIGHT): 58.89

STAMSON 5.0 NORMAL REPORT Date: 13-12-2017 13:45:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POW6S.te Time Period: Day/Night 16/8 hours
Description: POW 6th floor south face

Road data, segment # 1: Innes Road (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 : 60 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 # 1: Innes Road (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 : 36.90 / 36.90 m
Receiver height : 1.50 / 1.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 18.25 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)
-------------------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :  18.25 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.77 + 0.00) = 69.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -3.91   0.00   0.00   0.00   0.00
69.77
-------------------------------------------------------------------------
---

Segment Leq : 69.77 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.39 + 0.00) = 48.39 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -70    -60   0.00  63.96   0.00  -3.01 -12.55   0.00   0.00   0.00
48.39
-------------------------------------------------------------------------
---

Segment Leq : 48.39 dBA

Total Leq All Segments: 69.80 dBA
```

Results segment # 1: Innes Road (night)

Source height = 1.50 m

ROAD (0.00 + 62.17 + 0.00) = 62.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.08	0.00	-3.91	0.00	0.00	0.00	0.00	62.17

Segment Leq : 62.17 dBA

Results segment # 2: Page Road (night)

Source height = 1.50 m

ROAD (0.00 + 40.80 + 0.00) = 40.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.00	56.36	0.00	-3.01	-12.55	0.00	0.00	0.00	40.80

Segment Leq : 40.80 dBA

Total Leq All Segments: 62.20 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.80
(NIGHT): 62.20

```
STAMSON 5.0        NORMAL REPORT        Date: 24-11-2017 15:07:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: RpowE6.te            Time Period: Day/Night 16/8 hours
```
Description: Floor 6, East Face

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

Data for Segment # 1: Innes Road (day/night)
--------------------------------------------
Angle1   Angle2           :   2.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  59.00 / 59.00  m
Receiver height           :  17.50 / 17.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: Page Road (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     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 # 2: Page Road (day/night)
-------------------------------------------
Angle1   Angle2           : -76.00 deg   -66.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  30.00 / 30.00  m
```

```
Receiver height           :  17.50 / 17.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.62 + 0.00) = 64.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
     2     90   0.00  73.68   0.00  -5.95  -3.11   0.00   0.00   0.00
64.62
-------------------------------------------------------------------------
---

Segment Leq : 64.62 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.39 + 0.00) = 48.39 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -76    -66   0.00  63.96   0.00  -3.01 -12.55   0.00   0.00   0.00
48.39
-------------------------------------------------------------------------
---

Segment Leq : 48.39 dBA

Total Leq All Segments: 64.72 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 57.02 + 0.00) = 57.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
```

```
     2     90   0.00  66.08   0.00  -5.95  -3.11   0.00   0.00   0.00
57.02
-------------------------------------------------------------------------
---

Segment Leq : 57.02 dBA


Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

ROAD (0.00 + 40.80 + 0.00) = 40.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -76    -66   0.00  56.36   0.00  -3.01 -12.55   0.00   0.00   0.00
40.80
-------------------------------------------------------------------------
---

Segment Leq : 40.80 dBA

Total Leq All Segments: 57.12 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 64.72
(NIGHT): 57.12

STAMSON 5.0 NORMAL REPORT Date: 24-11-2017 15:33:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: powN6.te Time Period: Day/Night 16/8 hours
Description: Floor 6, North Face

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

Data for Segment # 1: Innes Road (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 : 47.00 / 47.00 m
Receiver height : 17.50 / 17.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 19.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation : 91.25 m
Receiver elevation : 92.00 m
Barrier elevation : 92.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)
------------------------------------------
Angle1   Angle2           : -63.00 deg   -53.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  43.00 / 43.00  m
Receiver height           :  17.50 / 17.50  m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -63.00 deg   Angle2 : -53.00 deg
Barrier height            :  19.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :  91.25 m
Receiver elevation        :  92.00 m
Barrier elevation         :  92.00 m
Reference angle           :   0.00


Results segment # 1: Innes Road (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.14 !       109.14

ROAD (0.00 + 53.98 + 0.00) = 53.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  73.68   0.00  -4.96   0.00   0.00   0.00 -14.73
53.98
-------------------------------------------------------------------------
---

Segment Leq : 53.98 dBA


Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
```

```
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.11 !       109.11

ROAD (0.00 + 30.37 + 0.00) = 30.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -63    -53   0.00  63.96   0.00  -4.57 -12.55   0.00   0.00 -16.46
30.37
-------------------------------------------------------------------------
---

Segment Leq : 30.37 dBA

Total Leq All Segments: 54.00 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.14 !       109.14

ROAD (0.00 + 46.38 + 0.00) = 46.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.00  66.08   0.00  -4.96   0.00   0.00   0.00 -14.73
46.38
-------------------------------------------------------------------------
---

Segment Leq : 46.38 dBA


Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
```

```
       1.50 !       17.50 !       17.11 !       109.11

ROAD (0.00 + 22.78 + 0.00) = 22.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -63    -53   0.00  56.36   0.00  -4.57 -12.55   0.00   0.00 -16.46
22.78
-------------------------------------------------------------------------
---

Segment Leq : 22.78 dBA

Total Leq All Segments: 46.40 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 54.00
(NIGHT): 46.40

STAMSON 5.0 NORMAL REPORT Date: 24-11-2017 15:42:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: powW6.te Time Period: Day/Night 16/8 hours
Description: Floor 6, West Face

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

Data for Segment # 1: Innes Road (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 : 41.00 / 41.00 m
Receiver height : 17.50 / 17.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 3.00 deg Angle2 : 90.00 deg
Barrier height : 19.00 m
Barrier receiver distance : 1.00 / 1.00 m
Source elevation : 91.25 m
Receiver elevation : 92.00 m
Barrier elevation : 92.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 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 # 2: Page Road (day/night)

```
-----------------------------------------
Angle1   Angle2           : -47.00 deg   -41.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  61.70 / 61.70  m
Receiver height           :  17.50 / 17.50  m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -47.00 deg   Angle2 : -41.00 deg
Barrier height            :  19.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :  91.25 m
Receiver elevation        :  92.00 m
Barrier elevation         :  92.00 m
Reference angle           :   0.00

Results segment # 1: Innes Road (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.09 !       109.09

ROAD (66.44 + 51.39 + 0.00) = 66.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      3   0.00  73.68   0.00  -4.37  -2.87   0.00   0.00   0.00
66.44
-------------------------------------------------------------------------
---
     3     90   0.00  73.68   0.00  -4.37  -3.16   0.00   0.00 -14.76
51.39
-------------------------------------------------------------------------
---

Segment Leq : 66.57 dBA
```

```
Results segment # 2: Page Road (day)
------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.23 !       109.23

ROAD (0.00 + 25.86 + 0.00) = 25.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -47    -41   0.00  63.96   0.00  -6.14 -14.77   0.00   0.00 -17.18
25.86
-------------------------------------------------------------------------
---

Segment Leq : 25.86 dBA

Total Leq All Segments: 66.57 dBA


Results segment # 1: Innes Road (night)
---------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.09 !       109.09

ROAD (58.84 + 43.79 + 0.00) = 58.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      3   0.00  66.08   0.00  -4.37  -2.87   0.00   0.00   0.00
58.84
-------------------------------------------------------------------------
---
     3     90   0.00  66.08   0.00  -4.37  -3.16   0.00   0.00 -14.76
43.79
-------------------------------------------------------------------------

Segment Leq : 58.98 dBA
```

```
Results segment # 2: Page Road (night)
--------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       17.50 !       17.23 !       109.23

ROAD (0.00 + 18.27 + 0.00) = 18.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -47    -41   0.00  56.36   0.00  -6.14 -14.77   0.00   0.00 -17.18
18.27
-------------------------------------------------------------------------
---

Segment Leq : 18.27 dBA

Total Leq All Segments: 58.98 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 66.57
(NIGHT): 58.98

APPENDIX D

AIF Tables

ISSN 0701-5232

BUILDING RESEARCH NOTE

ACOUSTIC INSULATION FACTOR: A RATING FOR THE INSULATION OF BUILDINGS AGAINST OUTDOOR NOISE

by

J.D. Quirt

Division of Building Research, National Research Council of Canada

Ottawa, June 1979
Revised June 1980

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.

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.