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39 Years

200 Elgin Street, Ottawa

Noise Impact Feasibility Report

Engineering excellence. Planning progress. Liveable landscapes.

200 Elgin Street

City of Ottawa

Noise Impact Feasibility Report

Prepared By:

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

Novatech File: 123101

Submitted: January 4, 2024
Revised: May 30th, 2024

May 30, 2024

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

Attention: **Adrian van Wyk, Planner**
Development Review Central

Reference: **200 Elgin Street**
Noise Impact Feasibility Report
Our File No.: 123101

Please find enclosed the 'Noise Impact Feasibility Report' for the above-noted development located at 200 Elgin Street in the City of Ottawa. This report is being submitted in support of a site plan application to convert the 2nd to 11th floors of the existing building from office space to residential units.

This report evaluates the environmental impact of noise from traffic and assesses the feasibility of mitigation measures to attenuate noise to acceptable levels.

Please contact the undersigned should you have any questions or comments on this report.

Yours truly,

NOVATECH

Greg MacDonald, P. Eng.
Director, Land Development and Public Sector Infrastructure

cc: Kevin Fagan, JBPA Developments
Mike Morin, District Realty

Table of Contents

1.0 INTRODUCTION

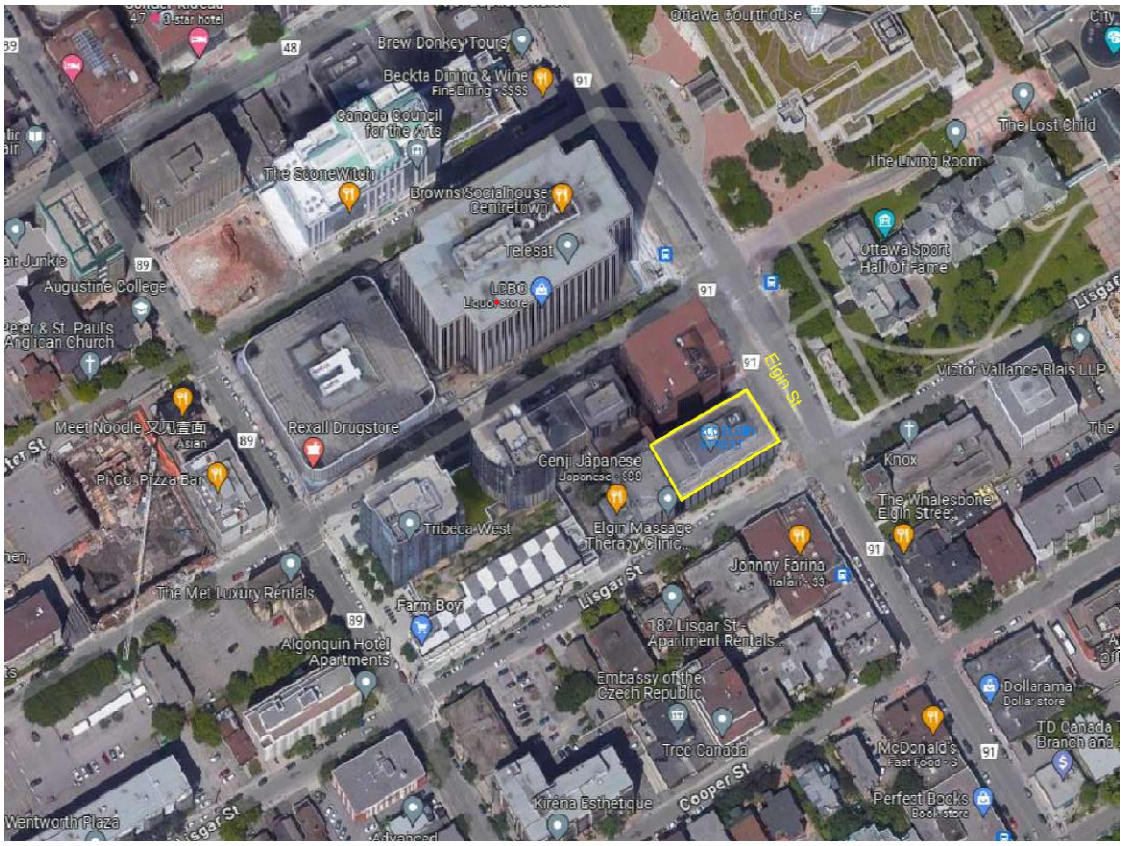
Novatech has been retained to prepare a Noise Impact Feasibility Report on behalf of District Realty to assess the impact of noise from traffic on the existing building located at 200 Elgin Street. The report is in support of a site plan application for the conversion of offices to residential units on floors 2 to 11. The ground floor will remain commercial. **Figure 1 - Key Plan** shows the site location.

The subject site is surrounded the following roads:

- Elgin Street to the east,
- Lisgar Street to the south,
- Nepean Street to the north, and
- Metcalfe Street to the west

An aerial of the subject site is provided in **Figure 1 – Key Plan – 200 Elgin Street.**

Figure 1: Key Plan – 200 Elgin Street



The subject site is an existing eleven (11) storey office building with underground parking. The building will be renovated to convert office space to residential units on the upper floors. The ground floor will remain commercial. The locations of all nodes used to confirm the noise levels at the building are included in **Figure 2 – Receiver Location Plan**.

This report follows recommendations of the City of Ottawa's Environmental Nosie Control Guidelines (ENCG) and MOEE NPC-300 Environmental Noise Guideline.

NEPEAN STREET (L)

ELGIN STREET (A)

POW 1

200 ELGIN STREET

POW 2

LISGAR STREET (L)

LEGEND

POW 1 — POW NODE LOCATION WITH NODE NUMBER

(A) — ARTERIAL ROAD CLASSIFICATION

(L) — LOCAL ROAD CLASSIFICATION

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

CITY OF OTTAWA
200 ELGIN STREET

NODE LOCATION PLAN

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

DATE DEC 2023 | JOB 123101 | FIGURE FIGURE 2

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2.0 NOISE CRITERIA, NOISE SOURCES AND NOISE ATTENATION METHODS

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

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

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

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

The noise level criteria are summarized in **Table 1:**

Table 1: Noise Level Criteria

Time Period	Receiver Location	Noise Level Criteria (Leq)
Daytime (07:00 – 23:00)	Outdoor Living Area (OLA)	55 dBA
Daytime (07:00 – 23:00)	Plane of Window (POW) at Living/Dining Rooms	45 dBA
Nighttime (23:00 – 07:00)	Plane of Window (POW) at Bedrooms/Sleeping Quarter	40 dBA

2.1 Noise Sources

The City of Ottawa Official Plan stipulates that a noise study shall be prepared when a new development is proposed within 100 metres of an arterial, major collector or collector roadway, or a rapid-transit corridor. There are no railway, airport, or stationary noise sources that affect this site. Elgin Street is the only noise source which needs to be considered. Elgin Street is classified as an urban arterial roadway in the City of Ottawa Transportation Master Plan and Official Plan, and it is separated into 2 segments. The section north of Lisgar Street is a 40m ROW, and south of it is a 23m ROW. Refer to **Appendix A** for the excerpt from the TMP. **Table 2** confirms the road noise sources for the site.

Table 2: Traffic and Roadway Parameters

	Elgin ST. N	Elgin ST. S
Roadway Classification	4-Lane Urban Arterial Undivided	2-Lane Urban Arterial Undivided
Annual Average Daily Traffic (AADT)	35,000 vehicles/day	15,000 vehicles/day
Day/Night Split (%)	92/8	92/8
Medium Trucks (%)	7	7
Heavy Trucks (%)	5	5
Posted Speed	40 km/hr	30 km/hr

2.2 Methods for Noise Attenuation

When OLA or POW sound levels are predicted to be approximately equal to or less than the maximum suggested levels in ENCG attenuation measures are not required. If the predicted noise levels are found to exceed the limits, noise mitigation and /or warning clauses are required. Warning clauses are discussed in section 2.5. The City of Ottawa's preferred noise mitigation methods are:

- Increasing the amount of soft ground between the noise sources and noise receptor,
- Inserting noise insensitive land between the noise source and the noise receptor,
- Orientating the building to provide shelter to noise sensitive areas,
- Installing acoustic (noise) barriers,
- Installing air conditioning and forced air ventilation, and
- Enhancing construction techniques and construction quality.

2.3 Noise Barrier Requirements

Acoustic (noise) barriers are typically the most effective noise mitigation measure listed in Section 2.1. However, acoustic barriers are also typically visually unappealing, expensive to install and maintain, and reduce outdoor living space. Acoustic barriers are typically only considered when all other noise mitigation techniques listed in Section 2.1 are not available or sufficient to reduce predicted noise levels below the maximum allowable. Only noise mitigation measures that are economically and administratively feasible will be considered.

Acoustic barriers, if required, must conform to Part 3 of the City of Ottawa's Environmental Noise Control Guidelines (2016), and include the following characteristics:

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

2.4 Ventilation Requirements

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

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

2.5 Warning Clauses

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

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

It is recommended that the following noise clauses be registered on title and incorporated into the agreement of purchase and sales, as deemed necessary. Results can be found in **Table 4** from Section 3.0 of this report:

Type A

> "Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."
>
> "To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation include:
>
> - An acoustic barrier"
>
> "To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features."
>
> "The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original."

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

Type B

> "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment by up to 5 dBA."
>
> "To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- An acoustic barrier"

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

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

Type C

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

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

- Multi-pane glass
- Double brick veneer"

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

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

Type D

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

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

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

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

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

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

2.6 Building Component Assessment

When plane of window noise levels exceeds 65 dBA (daytime) or 60 dBA (nighttime) the exterior cladding system of the building envelope must be acoustically assessed to ensure indoor sound criteria are achieved. This includes analysis of the exterior wall, door, and/or glazing system specifications as appropriate.

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

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

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

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

L = Sound Level expressed on a common decibel scale.

2.7 Summary of Attenuation Requirements

Table 3 summarizes the required noise attenuation measures and warning clauses should sound criteria be exceeded. Excerpts from the MOE NPC-300 and City of Ottawa ENCG documents are included in **Appendix A** for reference.

Table 3: Noise Attenuation Measure Requirements

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

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

3.0 PREDICTED NOISE LEVELS

Noise levels were analyzed using Version 5.03 of the STAMSON computer program. AS there are no outdoor amenity areas, this analysis was not required. For POW, the 2 worst scenarios are selected for noise analysis. POW1 is the worst scenario for daytime living room, and POW2 is for a bedroom. The predicted noise levels are listed in **Table 4** bellow.

Table 4: Simulation Results – Plane of Window

Receiver Location *	Predicted Noise Level 7:00-23:00 (dBa)	Predicted Noise Level 23:00-7:00 (dBa)	Mitigation Method
	Un-attenuated	Un-attenuated	
POW1	70.01	62.42	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis
POW2	69.62	62.03	• Installation of Air Conditioning • Warning Clauses as per Section 3.6 – Type D • Building Façade Analysis

*Locations found on **Figure 2 – Receiver Location Plan**

Based on the results above, we recommend Central Air Conditioning and the inclusion of Noise Clause Type D be registered as a notice on title and incorporated into the lease/rental/sale agreements of all units. Refer to **Figure 3 – Noise Attenuation Measures Plan** for all proposed noise mitigation measures. Refer to **Appendix B** for noise calculation.

4.0 BUILDING FAÇADE ANALYSIS

The City of Ottawa ENCG requires that wall & window construction be reviewed when noise levels exceed minimum requirements outlined in **Table 3.** The acoustical insulation factor (AIF) method recognized by the City of Ottawa is used to assess the wall and window requirements.

The Acoustic Insulation Factor (AIF) is used as a measure of the reduction of outdoor noise provided by the elements of the outer surface of a building. The difference between the indoor noise criterion and the outdoor noise level establishes the acoustical insulation requirement for the exterior shell. The exterior shell is comprised of primarily two components; windows and walls (patio doors are treated as windows).

Mathematically, this Acoustical Insulation Factor can be expressed as:

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

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

The AIF and building façade analysis are summarized bellow:

POW1

- $\text{AIF}_{\text{Residential(day)}} = 70.01\text{ dBA} - 45\text{ dBA} + 10\log(2)\text{ dBA} + 2\text{dBA} = 30\text{ dBA}$
- $\text{AIF}_{\text{Residential(night)}} = 62.42\text{ dBA} - 40\text{ dBA} + 10\log(2)\text{ dBA} + 2\text{dBA} = 27\text{ dBA}$

POW2

- $\text{AIF}_{\text{Residential(day)}} = 69.62\text{ dBA} - 45\text{ dBA} + 10\log(2)\text{ dBA} + 2\text{dBA} = 29\text{ dBA}$
- $\text{AIF}_{\text{Residential(night)}} = 62.03\text{ dBA} - 40\text{ dBA} + 10\log(2)\text{ dBA} + 2\text{dBA} = 27\text{ dBA}$

NEPEAN STREET (L)

ELGIN STREET (A)

200 ELGIN STREET

LISGAR STREET (L)

LEGEND

	WARNING CLAUSE TYPE 4 REQUIRED
(A)	ARTERIAL ROAD CLASSIFICATION
(L)	LOCAL ROAD CLASSIFICATION

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
200 ELGIN STREET

NOISE ATTENUATION MEASURES PLAN

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

DATE DEC 2023 | JOB 123101 | FIGURE FIGURE 3

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

To assess the façade against the required AIF respective L_{eq} values, the number of components in a wall, the calculated required AIF, percentage of window to room areas and exterior wall to room areas are required. Exterior facade analysis data is presented in **Tables 5 & 6.**

Table 5: Exterior Façade Analysis Data – POW1

Description	Residential Bedroom
Number and Type of Components Forming Building Envelope.	2 – Windows and Exterior Walls
Percentage of Window Area to Total Floor Area of Room.	**14%**
Percentage of Wall Area to Total Floor Area of Room.	**125%**

Table 6: Exterior Façade Analysis Data – POW2

Description	Residential Bedroom
Number and Type of Components Forming Building Envelope.	2 – Windows and Exterior Walls
Percentage of Window Area to Total Floor Area of Room.	**16%**
Percentage of Wall Area to Total Floor Area of Room.	**63%**

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

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

Table 7 bellow lists the results of the analysis requiring assemblies to mitigate the indoor noise levels.

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

Description	AIF	Double Pane Window Assembly Options	Minimum Typical Wall Assembly
POW1	30	▪ 2 mm – 6 mm – 2 mm	EW1
POW2	29	▪ 2 mm – 6 mm – 2 mm	EW1

Notes:

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

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

Table 11 and 12 in **Appendix C** were used to convert the AIF values to Sound Transmission Class (STC) values. The largest STC results for selected analyzed units are summarized in **Table 11** bellow. The bellow STC values should be reviewed by the architect in relation to the proposed wall design. If required, the proposed structure should be modified to ensure that the required STC values will be accommodated.

Table 8: Equivalent Sound Transmission Class, STC Values

		Windows			Walls	
	AIF	Conversion	STC	AIF	Conversion	STC
POW1	30	STC+2 = AIF	28	30	STC-8 = AIF	38
POW2	29	STC+2 = AIF	27	29	STC-5 = AIF	34

5.0 CONCLUSION

This report recommends:

- The inclusion of Central Air Conditioning and Warning Clause Type D to be registered as a notice on title and incorporated into the lease/rental/sale agreements for all units in the proposed development.

- The construction of minimum required exterior wall EW1 for all units to meet a minimum sound transmission class rating, STC of 38.

- The construction of double pane window (2mm – 6mm – 2mm) for all units, to meet a minimum sound transmission class rating, STC of 28.

NOVATECH ENGINEERING CONSULTANTS LTD.

Report By:

Ming Fang, C.E.T., B.Eng
Design Technologist

Reviewed By:

Greg MacDonald, P. Eng.
Director - Land Development and
Public Sector Infrastructure

APPENDIX A:

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

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

ENVIRONMENTAL NOISE CONTROL GUIDELINES: Introduction and Glossary

January 2016

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

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

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

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

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

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

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

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

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

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

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

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

Environmental Noise Guideline

Stationary and Transportation Sources – Approval and Planning

Publication NPC-300

Ontario

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

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

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

C7 Noise Control Measures

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

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

C7.1 Road Noise Control Measures

C7.1.1 Outdoor Living Areas

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

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

C7.1.2 Plane of a Window – Ventilation Requirements

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

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

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

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

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

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

C7.1.3 Indoor Living Areas – Building Components

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

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

C7.2 Rail Noise Control Measures

C7.2.1 Outdoor Living Areas

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

C7.2.2 Plane of a Window – Ventilation Requirements

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

C7.2.3 Indoor Living Areas – Building Components

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

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

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

C7.3 Combination of Road and Rail Noise

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

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

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

C7.9 Verification of Noise Control Measures

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

C8 Warning Clauses

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

C8.1 Transportation Sources

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

TYPE A: (see Section C7.1.1)

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

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

> "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

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

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

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

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

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

C8.2 Stationary Sources

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

TYPE E: (see Section C7.6)

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

C8.3 Class 4 Area Notification

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

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

Appendix A: Warning Clauses

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

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

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

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

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

Surface Transportation Warning Clauses

Table A1 Surface Transportation Warning Clauses

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

Table A1 Surface Transportation Warning Clauses

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

Table A1 Surface Transportation Warning Clauses

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

Stationary Source Warning Clauses

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

Note:
1) This schedule forms part of the Transportation Master Plan of the City of Ottawa and must be read in conjunction with the text.
2) This schedule is intended as a framework for planning and design;consequently alignments of proposed roads are approximate and subject to detailed study.
3) This schedule includes some lands adjacent to the Central Area that are designated General Urban Area.

Note:
1) La présente annexe fait partie du Plan directeur de transports de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) La présente annexe doit servir de guide en matière de planification et de conception;il s'ensuit que le tracé des routes proposées n'est qu'approximatif et donnera lieu à une étude plus approfondie.
3) Cette annexe englobe des terrains contigus à l'aire centrale qui portent la désignation Aire urbaine générale.

7

City of / Ville de GATINEAU

Rivière des Outaouais / Ottawa River

Site

Rideau Canal

Canal Rideau

Rivière Rideau River

Ottawa

0 0.1 0.2 0.3 km

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2013
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, 2013

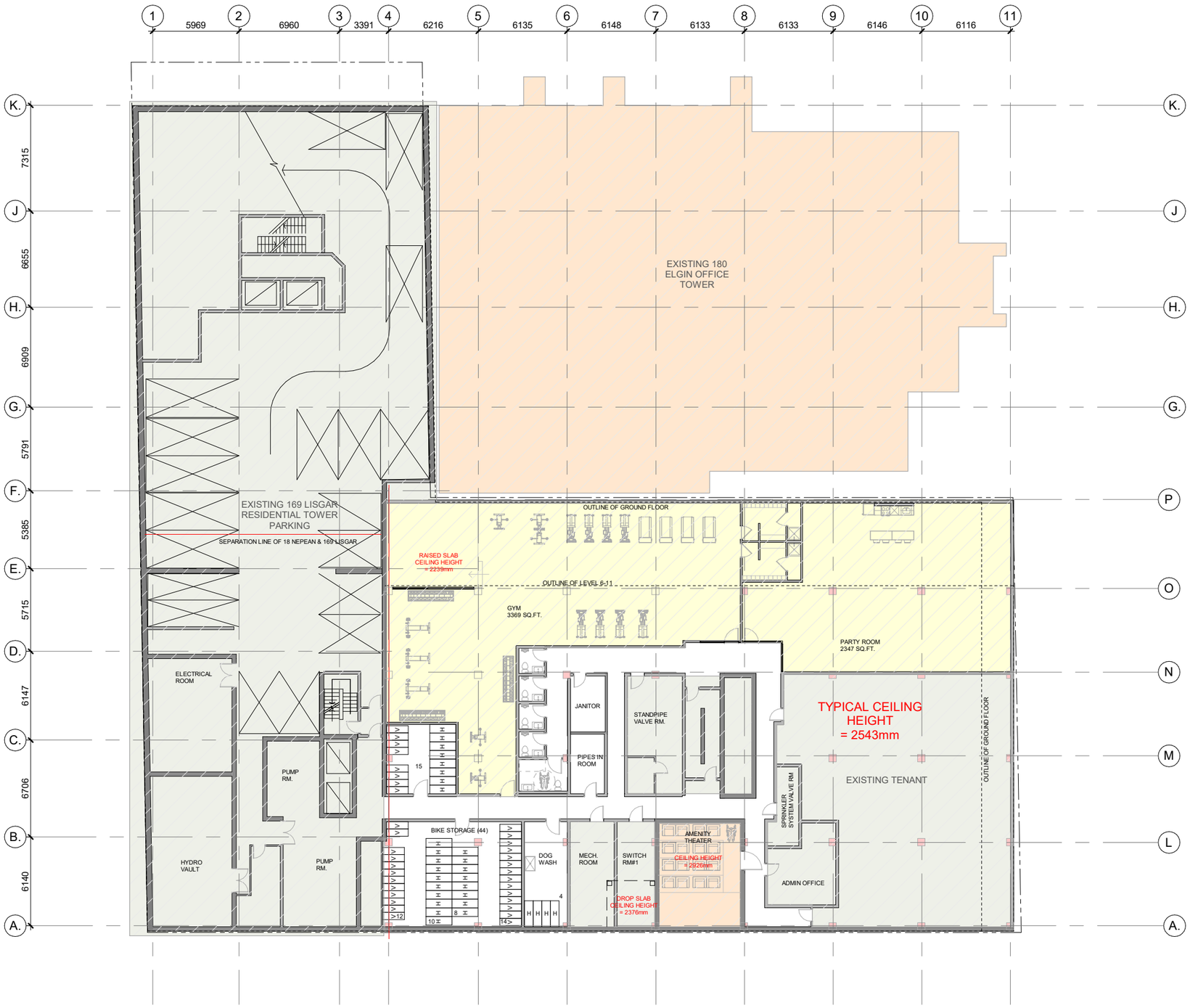
Provincial Highway	Route provinciale
Federally Owned Road	Chemins de propriété fédéral
Arterial - Existing	Artère - Établie
Arterial - Proposed (alignment defined)	Artère - Proposé (alignement déterminée)
Major Collector - Existing	Grande collectrice - Établie
Collector - Existing	Collectrice - Établie

TRANSPORTATION MASTER PLAN - Map 7
ROAD NETWORK - CENTRAL AREA / INNER CITY

PLAN DIRECTEUR DES TRANSPORTS - Carte 7
AIRE CENTRALE / RÉSEAU ROUTIER DE L'HYPERCENTRE

Road	From	To	ROW to be Protected	Classification	Sector
Edgar Brault	St. Joseph	100m south of St. Joseph	20	local	urban
Elgin	Wellington	Queen	40 Note: Maximum land requirement from property abutting existing ROW (2.4 m).	arterial	urban
Elgin	Plaza Bridge	Queen	40 Note: Maximum land requirement from property abutting existing ROW (2.4 m).	arterial	urban
Elgin	Queen	Laurier	40 Note: Maximum land requirement from property abutting existing ROW (2.4 m).	arterial	urban
Elgin	Laurier	Lisgar	40	arterial	urban
Elgin	Lisgar	Isabella	23	arterial	urban
Elm	Main	Main	24	collector	urban
Fallowfield	Eagleson	Moodie	34	arterial	rural
Fallowfield	Strandherd	Cedarview	44.5 Note: An additional 5.0 m on the rural side may be required to construct a rural cross-section.	arterial	urban
Fallowfield	Woodroffe	Prince of Wales	G	arterial	urban
Fallowfield	Highway 416	Strandherd	44.5	arterial	urban
Fallowfield	Cedarview	Woodroffe	44.5 Note: Subject to unequal widening: north side 44.5 m, measured from south ROW limit.	arterial	urban
Family Brown	Merivale	Grant Carmen	24	collector	urban
Farlane	Walford	Baseline	24	collector	urban
Farrow	Grandeur	Ahearn	12	local	urban
Fernbank	Stittsville Urban Area western limit	Stittsville Main	24	collector	urban
Fernbank	Stittsville Main Street South	Terry Fox	37.5	arterial	urban
Fernbank	Terry Fox	Eagleson	30	arterial	urban
Fieldrow	Aldercrest	Perry	24	collector	urban

https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/official-plan/volume-1-official-plan/section-7-annexes/annex-1-road-classification-and-rights-way



LEGEND

- EXISTING PARKING GARAGE OF 169 LISGAR & 18 NEPEAN (NOT INCLUDED IN SCOPE OF WORK)
- EXISTING OFFICE BUILDING - 180 ELGIN (NOT INCLUDED IN SCOPE OF WORK)
- EXISTING AREA OF 200 ELGIN - AREA OF PROPOSED WORK

rla/architecture

P1 FLOOR PLAN

SCALE 1 : 300

2023-10-11

200 ELGIN ST.

OTTAWA ON

DISTRICT REALTY

SHEET # D101

PROJ# 0001

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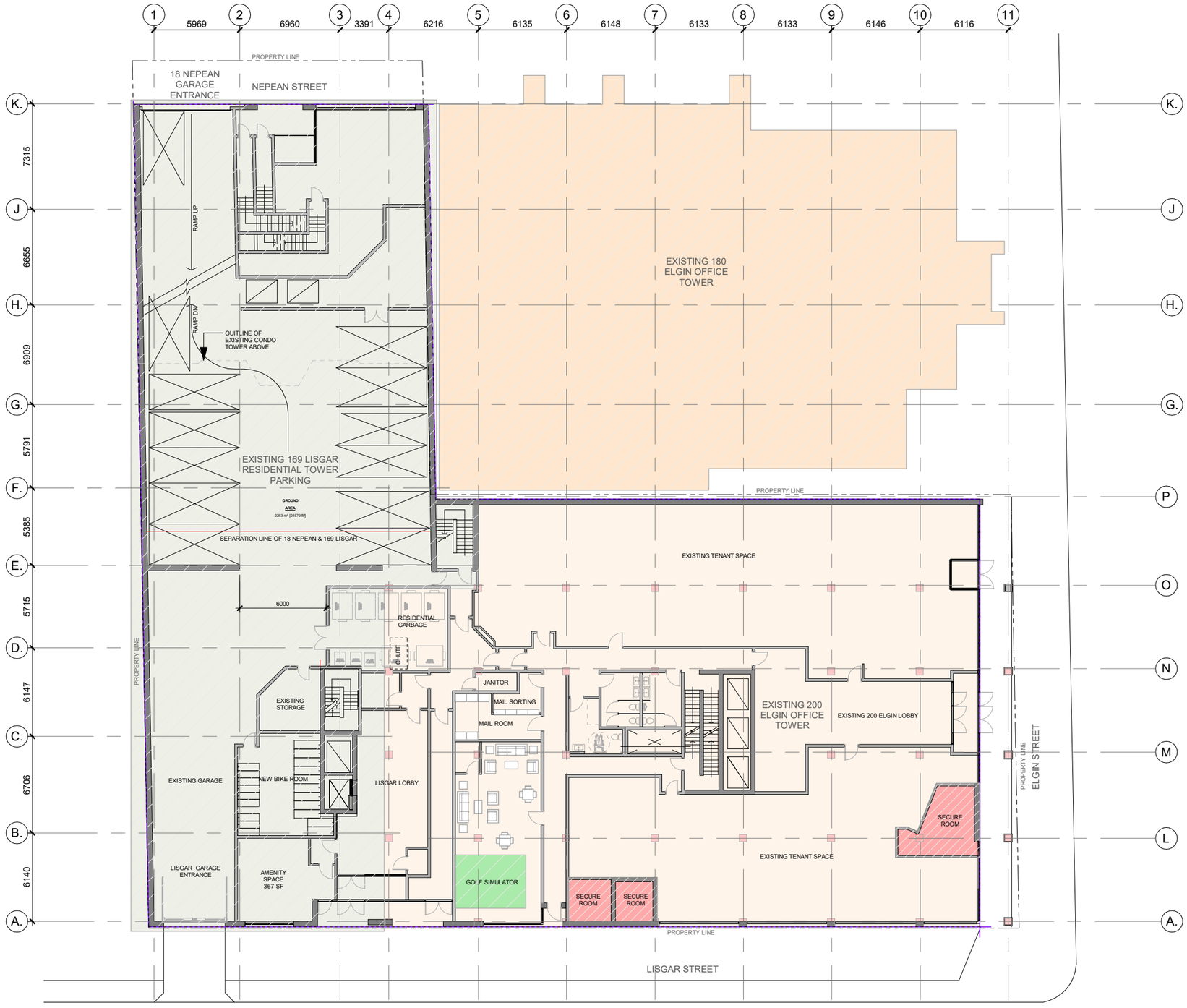

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- EXISTING OFFICE BUILDING - 180 ELGIN (NOT INCLUDED IN SCOPE OF WORK)
- EXISTING AREA OF 200 ELGIN - AREA OF PROPOSED WORK

rla / architecture

GROUND FLOOR PLAN

SCALE 1 : 300

2023-10-11

200 ELGIN ST.

OTTAWA ON

DISTRICT REALTY

SHEET # D102

PROJ# 0001

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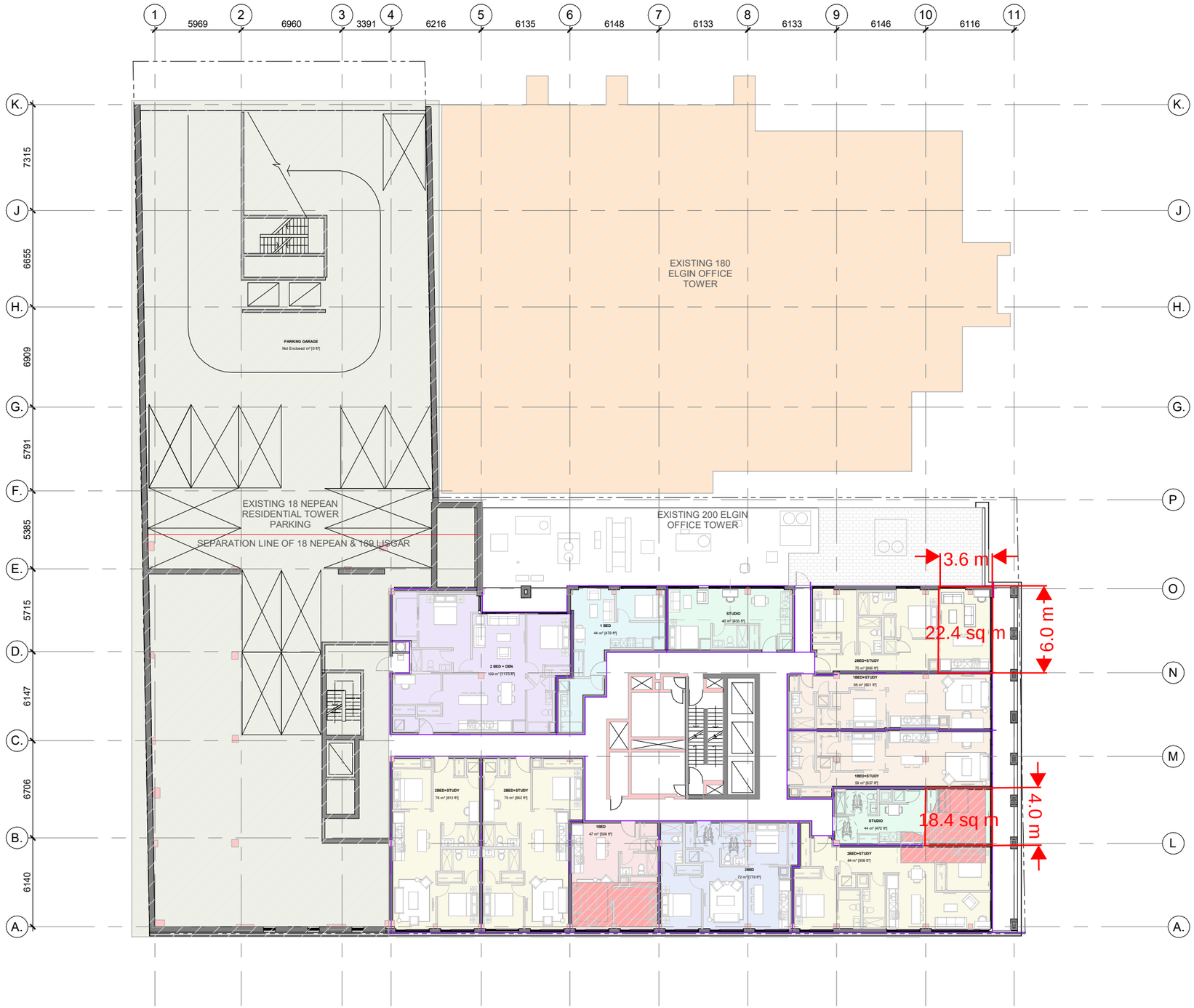

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- EXISTING OFFICE BUILDING - 180 ELGIN (NOT INCLUDED IN SCOPE OF WORK)
- EXISTING AREA OF 200 ELGIN - AREA OF PROPOSED WORK

rla / architecture

LEVEL2
SCALE 1 : 300
2023-10-11

200 ELGIN ST.
OTTAWA ON

DISTRICT REALTY

SHEET # D103
PROJ# 0001

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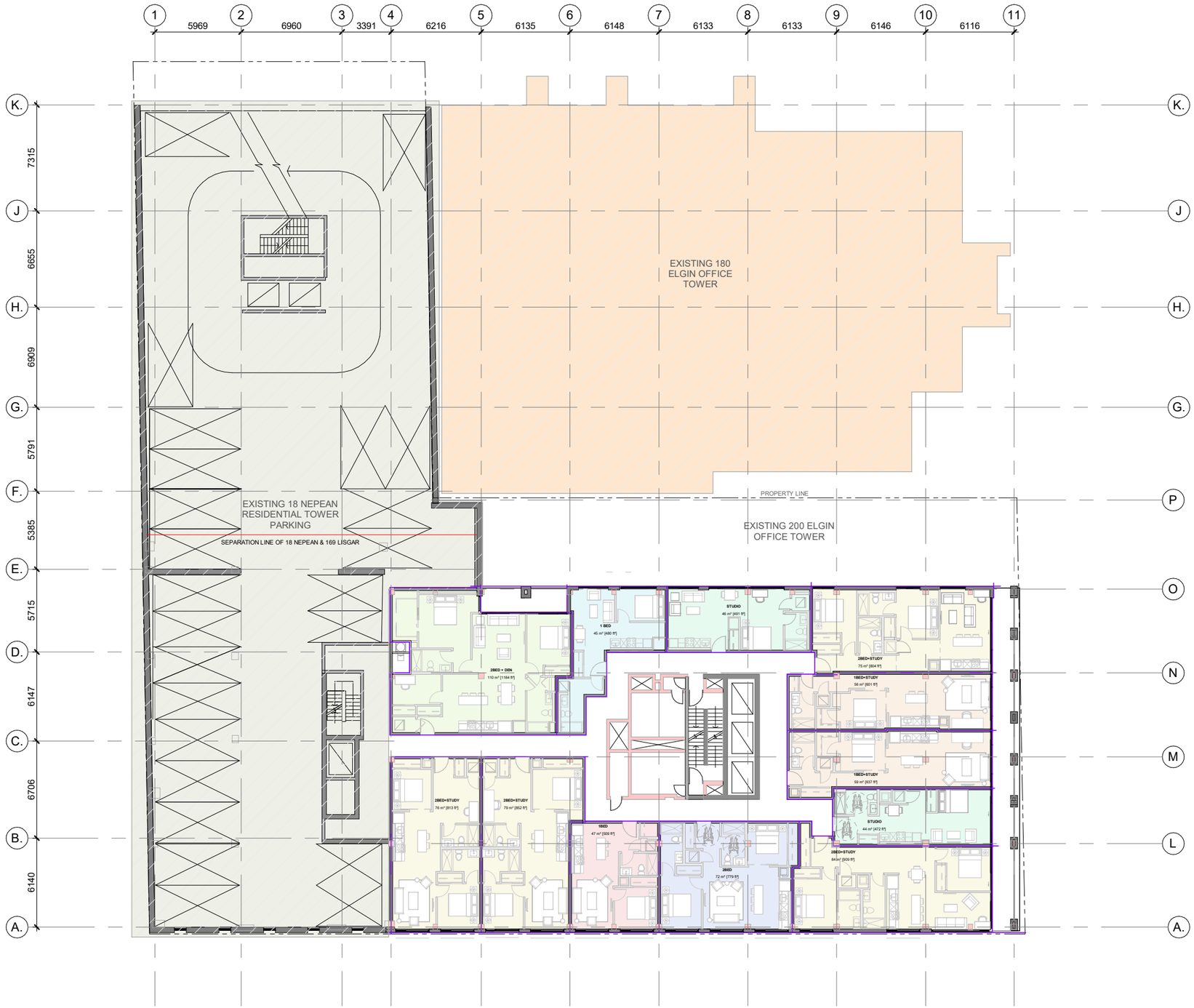

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- EXISTING OFFICE BUILDING - 180 ELGIN (NOT INCLUDED IN SCOPE OF WORK)
- EXISTING AREA OF 200 ELGIN - AREA OF PROPOSED WORK

rla / architecture

LEVEL3-4
SCALE 1 : 300
2023-10-11

200 ELGIN ST.
OTTAWA ON

DISTRICT REALTY

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PROJ# 0001

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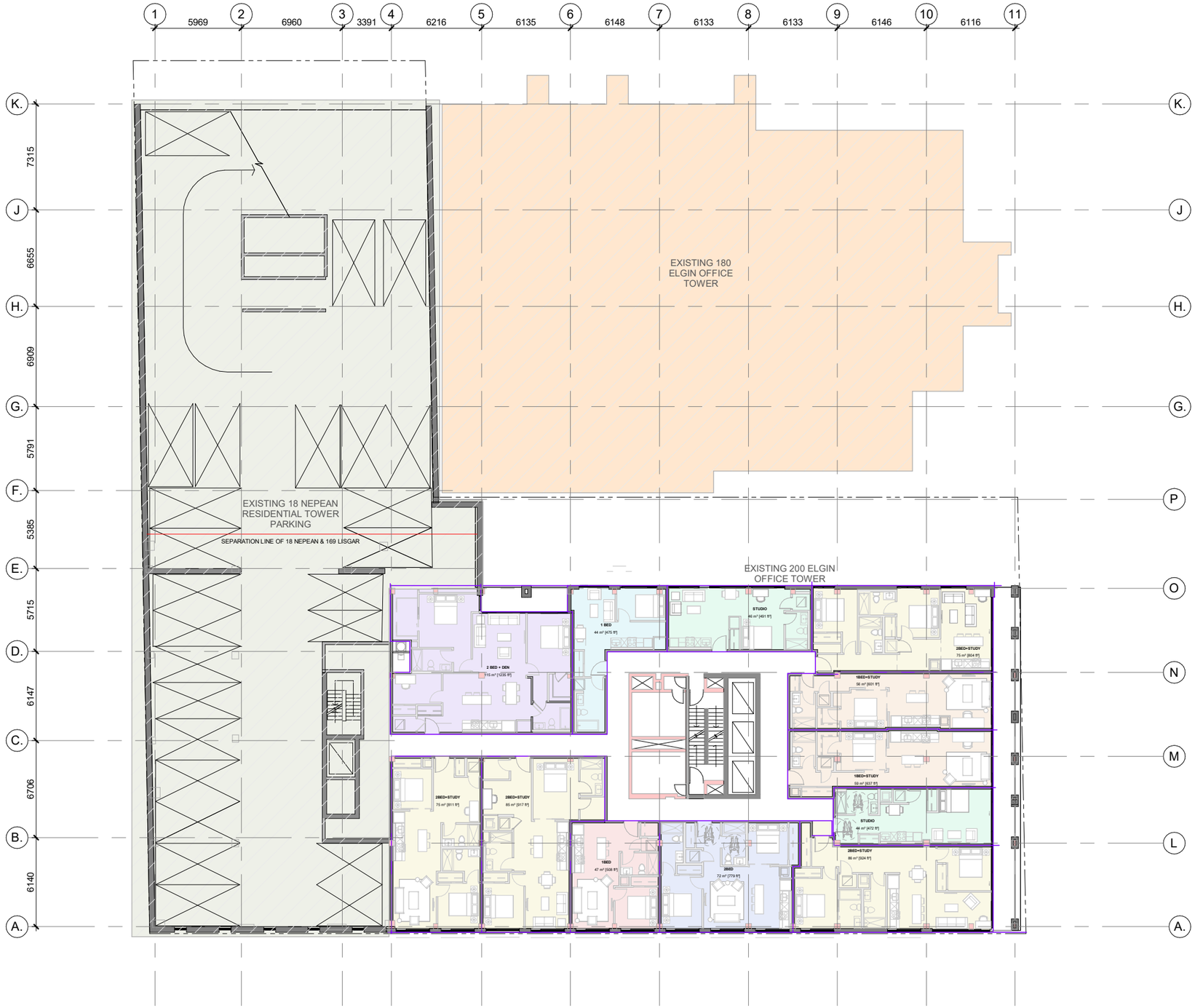

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- EXISTING OFFICE BUILDING - 180 ELGIN (NOT INCLUDED IN SCOPE OF WORK)
- EXISTING AREA OF 200 ELGIN - AREA OF PROPOSED WORK

rla / architecture

LEVEL5
SCALE 1 : 300
2023-10-11

200 ELGIN ST.
OTTAWA ON

DISTRICT REALTY

SHEET # D105
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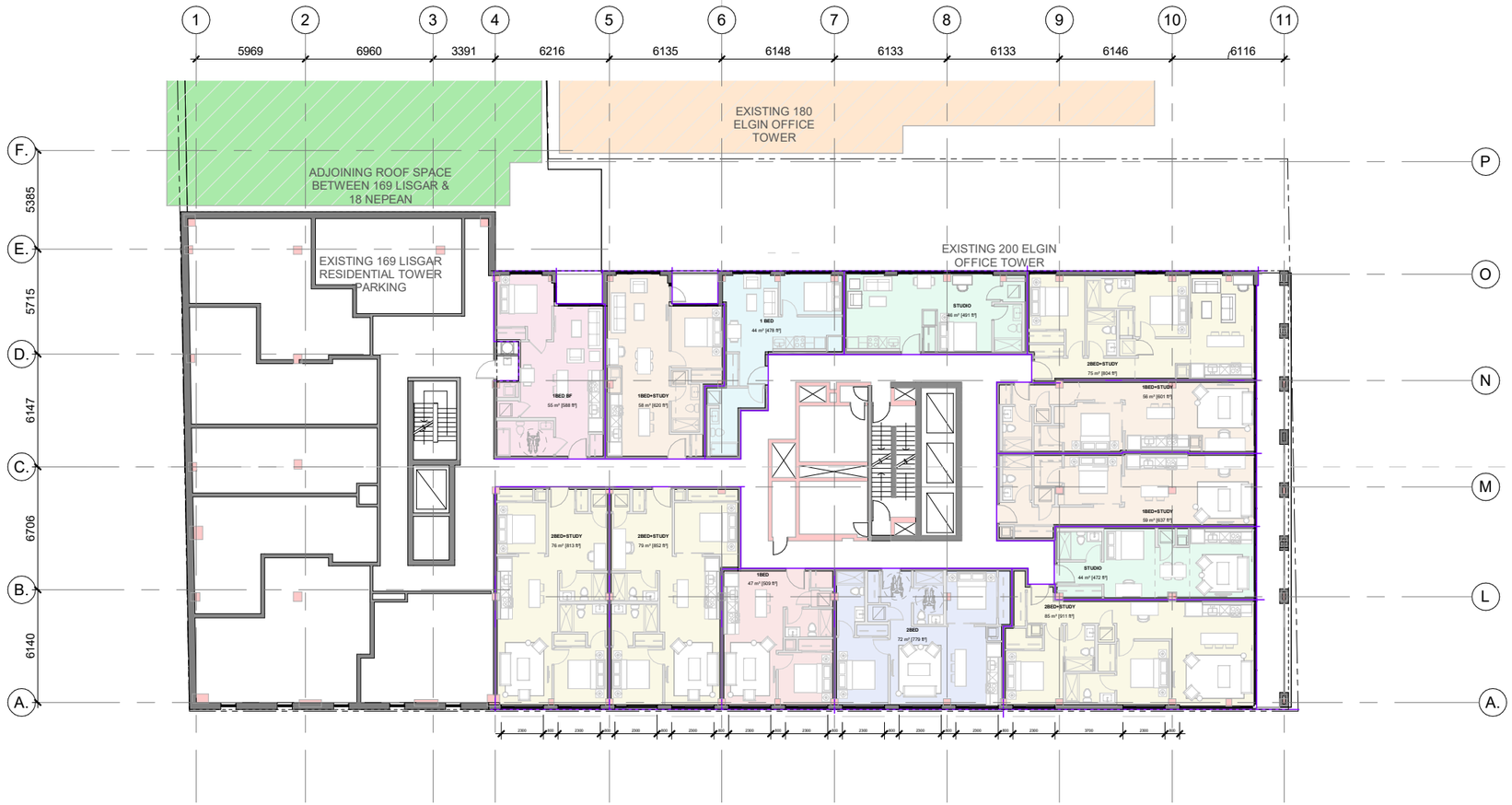

LEGEND

EXISTING PARKING GARAGE OF 169 LISGAR & 18 NEPEAN (NOT INCLUDED IN SCOPE OF WORK)
EXISTING ROOF SPACE ADJOINING 169 LISGAR & 18 NEPEAN (NOT INCLUDED IN SCOPE OF WORK)
EXISTING OFFICE BUILDING - 180 ELGIN (NOT INCLUDED IN SCOPE OF WORK)
EXISTING AREA OF 200 ELGIN - AREA OF PROPOSED WORK

rla / architecture

LEVEL6-11
SCALE 1 : 300
2023-10-11

200 ELGIN ST.
OTTAWA ON

DISTRICT REALTY

SHEET # D106.
PROJ# 0001

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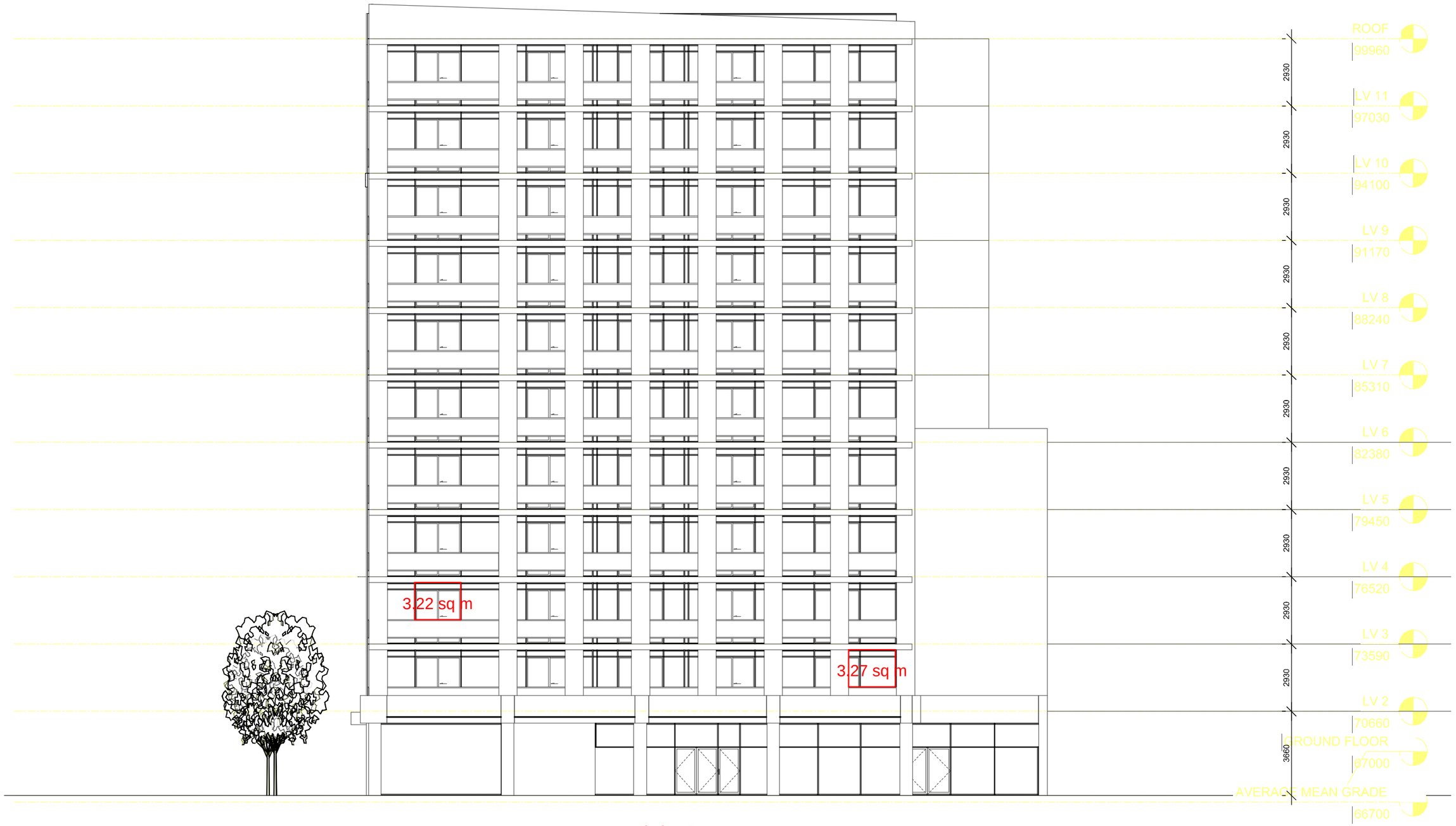
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LV 11
97030
LV 10
94100
LV 9
91170
LV 8
88240
LV 7
85310
LV 6
82380
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LV 4
76520
LV 3
73590
LV 2
70660
GROUND FLOOR
67000
AVERAGE MEAN GRADE
66700
2930
2930
2930
2930
2930
2930
2930
3660
3.22 sq m
3.27 sq m
Elgin Street

APPENDIX B

Sound Level Calculations

STAMSON 5.0 SUMMARY REPORT Date: 13-12-2023 10:14:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow1.te Time Period: Day/Night 16/8 hours
Description: POW - Second Floor

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

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

Angle1 Angle2 : -90.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.25 / 15.25 m
Receiver height : 6.00 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 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): 15000
Percentage of Annual Growth : 0.00

```
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: ELGIN S (day/night)
------------------------------------------
Angle1   Angle2           :  70.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.25 / 15.25  m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.ELGIN N	1.50	69.78	69.78
2.ELGIN S	1.50	57.07	57.07
Total			70.01 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.ELGIN N	1.50	62.19	62.19
2.ELGIN S	1.50	49.47	49.47
Total			62.42 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 70.01
                       (NIGHT): 62.42
```

STAMSON 5.0 SUMMARY REPORT Date: 20-12-2023 09:01:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow2.te Time Period: Day/Night 16/8 hours
Description: Second Floor -POW2

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

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

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.25 / 15.25 m
Receiver height : 6.00 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 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): 15000
Percentage of Annual Growth : 0.00

```
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: ELGIN S (day/night)
------------------------------------------
Angle1   Angle2           :  45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.25 / 15.25  m
Receiver height           :   6.00 / 6.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.ELGIN N	1.50	69.04	69.04
2.ELGIN S	1.50	60.59	60.59
Total			69.62 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.ELGIN N	1.50	61.45	61.45
2.ELGIN S	1.50	53.00	53.00
Total			62.03 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 69.62
                           (NIGHT): 62.03
```

NEPEAN STREET (L)

ELGIN (N)

90d

ELGIN STREET (A)

POW1

200 ELGIN
STREET

70d
ELGIN (N)

70d
ELGIN (S)

90d
ELGIN (S)

LISGAR STREET (L)

LEGEND

POW

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
200 ELGIN STREET

POW1 ANGLES AND DISTANCE

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

DATE DEC 2023

JOB 123101

FIGURE

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SHT11X17.DWG - 279mmX432mm

NEPEAN STREET (L)

ELGIN (N) -90d

ELGIN STREET (A)

200 ELGIN STREET

POW2

45d ELGIN (N)

45d ELGIN (S)

90d ELGIN (S)

LISGAR STREET (L)

LEGEND

POW

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CITY OF OTTAWA
200 ELGIN STREET

POW1 ANGLES AND DISTANCE

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

DATE DEC 2023

JOB 123101

FIGURE

SHT11X17.DWG - 279mmX432mm

APPENDIX C

Acoustic Insulation Factor Tables

POW 1.

TABLE 5: Acoustic Insulation Factor for Various Types of Windows

Window area as a percentage of total floor area of room[1]														Single glazing	Double glazing of indicated glass thickness				Triple Glazing	
4	5	6	8	10	13	16	20	25	32	40	50	63	80		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
Acoustic Insulation Factor (AIF)[2]														Thickness	Interpane spacing in mm[3]					Interpane spacings in mm[5]	
35	34	33	32	31	30	29	28	27	26	25	24	23	22	2mm	6						
36	35	34	33	32	31	30	29	28	27	26	25	24	23		13						
37	36	35	34	33	32	31	30	29	28	27	26	25	24	3mm	15	6					
38	37	36	35	34	33	32	31	30	29	28	27	26	25	4mm, 6mm	19	13	6				
39	38	37	36	35	34	33	32	31	30	29	28	27	26		22	16	13	8	6	6,6	
40	39	38	37	36	35	34	33	32	31	30	29	28	27	9mm[4]	28	20	16	13	13	6,10	6,6
41	40	39	38	37	36	35	34	33	32	31	30	29	28		35	25	20	16	16	6,15	6,10
42	41	40	39	38	37	36	35	34	33	32	31	30	29	12mm[4]	42	32	25	20	20	6,20	6,15
43	42	41	40	39	38	37	36	35	34	33	32	31	30		50	40	32	25	24	6,30	6,20
44	43	42	41	40	39	38	37	36	35	34	33	32	31		63	50	40	32	30	6,40	6,30
45	44	43	42	41	40	39	38	37	36	35	34	33	32		80	63	50	40	37	6,50	6,40
46	45	44	43	42	41	40	39	38	37	36	35	34	33		100	80	63	53	50	6,65	6,50
47	46	45	44	43	42	41	40	39	38	37	36	35	34		125	100	80	75	70	6,80	6,65
48	47	46	45	44	43	42	41	40	39	38	37	36	35		150	125	100	95	90	6,100	6,80
49	48	47	46	45	44	43	42	41	40	39	38	37	36			150	125	110	100		6,100
50	49	48	47	46	45	44	43	42	41	40	39	38	37				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.

POW!

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

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

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

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

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

STC = AIF - 2 = 30 - 2 = 28

POW 1

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

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

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

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

STC = AIF + 8 = 30 + 8 = 38

POW1

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.

POW 2

TABLE 5: Acoustic Insulation Factor for Various Types of Windows

Window area as a percentage of total floor area of room (1)														Single glazing	Double glazing of indicated glass thickness					Triple Glazing	
4	5	6	8	10	13	16	20	25	32	40	50	63	80		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
Acoustic Insulation Factor (AIF) (2)														Thickness	Interpane spacing in mm (3)					Interpane spacings in mm (5)	
35	34	33	32	31	30	29	28	27	26	25	24	23	22	2mm	6						
36	35	34	33	32	31	30	29	28	27	26	25	24	23		13						
37	36	35	34	33	32	31	30	29	28	27	26	25	24	3mm	15	6					
38	37	36	35	34	33	32	31	30	29	28	27	26	25	4mm, 6mm	19	13	6				
39	38	37	36	35	34	33	32	31	30	29	28	27	26		22	16	13	6	6	6,6	
40	39	38	37	36	35	34	33	32	31	30	29	28	27	9mm (4)	28	20	16	13	13	6,10	6,6
41	40	39	38	37	36	35	34	33	32	31	30	29	28		35	25	20	16	16	6,15	6,10
42	41	40	39	38	37	36	35	34	33	32	31	30	29	12mm (4)	42	32	25	20	20	6,20	6,15
43	42	41	40	39	38	37	36	35	34	33	32	31	30		50	40	32	25	24	6,30	6,20
44	43	42	41	40	39	38	37	36	35	34	33	32	31		63	50	40	32	30	6,40	6,30
45	44	43	42	41	40	39	38	37	36	35	34	33	32		80	63	50	40	37	6,50	6,40
46	45	44	43	42	41	40	39	38	37	36	35	34	33		100	80	63	55	50	6,65	6,50
47	46	45	44	43	42	41	40	39	38	37	36	35	34		125	100	80	75	70	6,80	6,65
48	47	46	45	44	43	42	41	40	39	38	37	36	35		150	125	100	95	90	6,100	6,80
49	48	47	46	45	44	43	42	41	40	39	38	37	36			150	125	110	100		6,100
50	49	48	47	46	45	44	43	42	41	40	39	38	37				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.

POW 2

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

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

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

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

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

STC = AIF - 2 = 29 - 2 = 27

POW 2

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

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

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

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

STC = AIF + 5 = 29 + 5 = 34

POW 2

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.