Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

Prepared by:

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SLR Project No:

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1.0 Introduction

SLR Consulting (Canada) Ltd., was retained by Studio Limina Inc. to conduct an Environmental Noise Assessment for the proposed development at 1 Columbia Street West, in Waterloo, Ontario (herein referred to as "the site"). This report is in support of the Site Plan Application (SPA) for the proposed development. A copy of the Declaration Statements is included in Appendix A.

1.1 Focus of Report

In keeping with the Regional Municipality of Waterloo (RMOW) and Ministry of Environment, Conservation and Parks (MECP) requirements, this report examines the potential for:

- Impacts of the environment on the proposed development;
- Impacts of the proposed development on the environment; and
- Impacts of the proposed development on itself.

Mechanical systems associated with the development (e.g., cooling and ventilation equipment) have not been sufficiently designed at this stage and should be assessed at a future date. A general discussion has been included in this report to address impacts of the proposed development on the environment and on itself.

1.2 Nature of the Subject Lands

The proposed development is located on the southwest corner of the intersection of Columbia Street West and King Street North, in Waterloo, Ontario. The site is currently occupied by a high-rise residential building as well as two single-family homes. The two single-family homes will be demolished as part of the redevelopment.

The proposed development will be a seven (7) storey residential building.

Indoor amenity spaces for condominium occupants are planned on floor 1. Floors 2 through 7 will contain residential condominium units. An outdoor seating area will be located at grade between the two buildings on the property.

A copy of the development drawings is included for reference in Appendix B.

1.3 Nature of the Surroundings

The proposed development site is bounded by the following:

- Columbia Street West and a convenience store, low/high-rise residential buildings beyond to the north;
- King Street north and commercial land uses beyond to the east;
- A mixture of low-rise and high-rise residential buildings to the south; and
- Low-rise residential buildings and spruce street beyond to the west.

The closest rail line is a spur line of the Guelph Subdivision rail line operated by Waterloo Central Railway. As this line is approximately 1.4 km from the site, assessments of railway noise and vibration impacts is not required.

A context plan is shown in Figure 1.

PART 1: IMPACTS OF THE ENVIRONMENT ON THE DEVELOPMENT

In evaluating potential impacts of the environment on the proposed development, the focus of this report is to assess the potential for:

- Transportation noise impacts from surrounding roadways; and
- Stationary noise impacts from the surrounding industries on the development.

There are no airports or railway lines in the immediate vicinity of the proposed development; therefore, an assessment of aircraft and railway noise impacts is not required.

2.0 Transportation Noise Impacts

2.1 Transportation Noise Sources

Transportation sources with the potential to produce road traffic noise at the proposed development include:

- Columbia Street (East and West); and
- King Street North.

Sound exposure levels at the proposed development have been predicted, and this information has been used to identify façade, ventilation, and warning clause requirements.

2.2 Surface Transportation Noise Criteria

2.2.1 Ministry of the Environment Publication NPC-300

Noise-Sensitive Developments

Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-300 provides sound level criteria for noise sensitive developments. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A – Background. Tables 1 to 4 summarize the applicable surface transportation (road and rail) criteria limits.

Location-Specific Criteria

Table 1 summarizes criteria in terms of energy equivalent sound exposure (L_{eq}) levels for specific noise-sensitive locations. Both outdoor and indoor locations are identified, with the focus of outdoor areas being amenity spaces. Indoor criteria vary with sensitivity of the space. As a result, Sleeping Quarters have more stringent criteria than Living/Dining Room spaces.

Table 1: MECP Publication NPC-300 Sound Level Criteria for Road and Rail Noise

Type of Space	Time Period	Energy Equivalent Sound Exposure Level L_{eq} [5] (dBA)		Assessment Location
		Road	Rail [1]	
Outdoor Amenity Area	Daytime (0700-2300h)	55	55	Outdoors [2]
Living/Dining Room [3]	Daytime (0700-2300h)	45	40	Indoors [4]
	Night-time (2300-0700h)	45	40	Indoors [4]
Sleeping Quarters	Daytime (0700-2300h)	45	40	Indoors [4]
	Night-time (2300-0700h)	40	35	Indoors [4]

Notes:
[1] Whistle noise is excluded for OLA noise assessments and included for Living/Dining Room and Sleeping Quarters assessments, where applicable.
[2] Road and Rail noise impacts are to be combined for assessment of OLA impacts.
[3] Residence area Dens, Hospitals, Nursing Homes, Schools, Daycares are also included. During the night-time period, Schools and Daycares are excluded.
[4] An assessment of indoor noise levels is required only if the criteria in **Table 3** are exceeded.
[5] L_{eq} – the energy equivalent sound exposure level, integrated over the time period shown.

Outdoor Living Areas

Table 2 summarizes the noise mitigation requirements for communal outdoor amenity areas ("Outdoor Living Areas" or "OLAs").

For the assessment of outdoor sound levels, the surface transportation noise impact is determined by combining road and rail traffic sound levels. Whistle noise from trains is not included in the determination of outdoor sound levels.

Table 2: MECP Publication NPC-300 Outdoor Living Area Mitigation Requirements

Time Period	OLA Energy Equivalent Sound Level L_{eq} (dBA)	Mitigation/Warning Clause Requirements
Daytime (0700-2300h)	≤ 55	• None
	56 to 60 inc.	• Noise barrier **OR** Warning Clause A
	> 60	• Noise barrier to reduce noise to 55 dBA **OR** • Noise barrier to reduce noise to 60 dBA and Warning Clause B

Ventilation and Warning Clauses

Table 3 summarizes requirements for ventilation where windows would potentially have to remain closed as a means of noise control. Despite implementation of ventilation measures where required, if sound exposure levels exceed the guideline limits in **Table 1**, warning clauses advising future occupants of the potential excesses are required. Warning clauses also apply to OLAs.

Table 3: MECP Publication NPC-300 Ventilation & Warning Clause Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level - L_{eq} (dBA)		Ventilation and Warning Clause Requirements [2]
		Road	Rail [1]	
Outdoor Amenity Area	Daytime (0700-2300h)	56 to 60 incl.		Type A Warning Clause
Plane of Window	Daytime (0700-2300h)	≤ 55		None
		56 to 65 incl.		Forced Air Heating with provision to add air conditioning + Type C Warning Clause
		> 65		Central Air Conditioning + Type D Warning Clause
	Night-time (2300-0700h)	51 to 60 incl.		Forced Air Heating with provision to add air conditioning + Type C Warning Clause
		> 60		Central Air Conditioning + Type D Warning Clause

Notes: [1] Whistle noise is excluded.
[2] Road and Rail noise is combined for determining Ventilation and Warning Clause requirements.

Building Component Requirements

Table 4 provides sound level thresholds which, if exceeded, trigger a requirement for the building shell components (i.e., wall, windows) to be designed accordingly to meet the applicable indoor sound criteria.

Table 4: MECP Publication NPC-300 Building Component Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level - L_{eq} (dBA)		Component Requirements
		Road	Rail [1]	
Plane of Window	Daytime (0700-2300h)	> 65	> 60	Designed/ Selected to Meet Indoor Requirements [2]
	Night-time (2300-0700h)	> 60	> 55	

Notes: [1] Whistle noise is included in the assessment.
[2] Building component requirements are assessed separately for Road and Rail and combined for a resultant sound isolation parameter.

2.3 Traffic Data and Future Projections

2.3.1 Roadway Traffic Data

Future (2032) average annual daily traffic (AADT) volumes and vehicle percentages for Columbia Street West and King Street North were provided by the RMOW's Transportation department. Commercial vehicle percentages, speed limit, and the day/night split were also provided.

Copies of all traffic data, correspondence and related calculations are provided for reference in Appendix C. Table 5 summarizes the road traffic volumes and associated details used in the analysis.

Table 5: Summary of Road Traffic Data Used in the Transportation Analysis

Roadway Link	Future Volume (AADT)[1]	Day / Night Volume Split		Commercial Traffic Breakdown [2]		Vehicle Speed (km/h)
		Daytime	Night-time	% Medium Trucks	% Heavy Trucks	
Columbia Street	25,300	90	10	1.0	1.1	50
King Street North	18,400	90	10	1.3	1.5	50

Notes: [1] Year 2032 traffic volume projections, vehicle breakdowns, and day/night splits, and vehicle speeds were obtained from the RMOW.

2.4 Predicted Sound Levels

Future road traffic sound levels at the proposed development were predicted using Cadna/A, a commercially available noise propagation modelling software. Roadways were modelled as line sources of sound, with sound emission rates calculated using ORNAMENT algorithms, the road traffic noise model of the MECP.

These predictions were validated and are equivalent to those made using the MECP's ORNAMENT or STAMSON v5.04 road traffic noise models. Validation files are included in Appendix D.

Sound levels were predicted along the façades of the proposed development using the "building evaluation" feature of Cadna/A. This feature allows for noise levels to be predicted across the entire façade of a structure.

Topographic contours and surrounding buildings from the City of Waterloo Open Data Portal were included in the analysis. Ground absorption for the surrounding area was considered reflective.

2.4.1 Façade Sound Levels

Predicted worst-case façade sound levels are presented in Table 6. The transportation façade sound levels of the development, showing the ranges of predicted daytime and night-time sound levels, are shown in Figure 2 and Figure 3 respectively.

Table 6: Summary of Predicted Transportation Façade Sound Levels

Building Façade[1]	Predicted Road Traffic Sound Levels[2]	
	L_{eq} Day (dBA)	L_{eq} Night (dBA)
North	62	56
East	65	59
South	61	55
West	54	48

Notes: [1] Façade locations are shown in **Figure 2** (daytime) and **Figure 3** (night-time).
[2] The sound levels presented are the highest value predicted for the entire façade.

The façade sound levels are predicted to be at or below 65 dBA and 60 dBA during the daytime and night-time periods, respectively (i.e., the thresholds described in Table 4). Therefore, an assessment of building components is not required.

2.4.2 Outdoor Living Areas

Landscaped areas at grade are considered to be publicly accessible and have not been included as OLAs in this assessment.

Private terraces and balconies are expected to be less than 4 m in depth, and do not meet the minimum requirements for inclusion under the definitions in NPC-300. Therefore, they have not been considered in this assessment.

Given the above, no assessment of OLA noise impacts is required.

2.5 Ventilation and Warning Clause Requirements

The triggers for requiring warning clauses are summarized in Table 3. Where required, the warning clauses should be included in agreements registered on Title for the residential units and included in all agreements of purchase and sale or lease, and all rental agreements. Warning clauses for the proposed development are summarized in Appendix E.

Based on the predicted façade noise levels, forced air heating with provisions for future installation of central air conditioning, and an MECP Type C warning clause, is recommended for all affected units with façade sound levels from road traffic between 56 and 65 dBA (inclusive) during the daytime, or between 51 and 60 dBA during night-time hours. This includes units on the **north, east and south façades of the building**.

Façade sound levels for **all units not listed above** of the building are below 56 dBA during the daytime and 51 dBA during the night-time; therefore, there are no ventilation or warning clause requirements.

3.0 Stationary Source Noise Impacts

3.1.1 Guidelines

3.1.1.1 MECP Publication NPC-300 Guidelines for Stationary Noise

The applicable MECP noise guidelines for new sensitive land uses adjacent to existing industrial commercial uses are provided in MECP Publication NPC-300. NPC-300 revokes and replaces the previous noise assessment guideline, Publication LU-131 and Publication NPC-205, which was previously used for assessing noise impacts as part of Certificates of Approval / Environmental Compliance Approvals granted by the MECP for industries.

The new guideline sets out noise limits for two main types of noise sources:

- Non-impulsive, "continuous" noise sources such as ventilation fans, mechanical equipment, and vehicles while moving within the property boundary of an industry. Continuous noise is measured using 1-hour average sound exposures (L_{eq} (1-hr) values), in dBA; and
- Impulsive noise, which is a "banging" type noise characterized by rapid rise time and decay. Impulsive noise is measured using a logarithmic mean (average) level (L_{LM}) of the impulses in a one-hour period, in dBAI.

Furthermore, the guideline requires an assessment at, and provides separate guideline limits for:

- Outdoor points of reception (e.g., back yards, communal outdoor amenity areas); and
- Façade points of reception such as the plane of windows on the outdoor façade which connect onto noise sensitive spaces, such as living rooms, dens, eat-in kitchens, dining rooms and bedrooms.

The applicable noise limits at a point of reception are the higher of:

- The existing ambient sound level due to road traffic, or
- The exclusion limits set out in the guideline.

The following tables set out the exclusion limits from the guideline.

Table 7: NPC-300 Class 1 Exclusion Limits for Non-Impulsive Sounds (L_{eq} (1-hr), dBA)

Time of Day	Class 1 Area	
	Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception
7 am to 7 pm	50	50
7 pm to 11 pm	50	50
11 pm to 7 am	45	n/a

Table 8: NPC-300 Class 1 Exclusion Limits for Impulsive Sounds (L_{LLM}, dBAI)

Time of Day	No. of Impulses in a 1-hour Period	Class 1 Area	
		Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception
7 am to 11 pm	9 or more	50	50
	7 to 8	55	55
	5 to 6	60	60
	4	65	65
	3	70	70
	2	75	75
	1	80	80
11 pm to 7 am	9 or more	45	n/a
	7 to 8	50	n/a
	5 to 6	55	n/a
	4	60	n/a
	3	65	n/a
	2	70	n/a
	1	75	n/a

Notes:
n/a Not Applicable. Outdoor points of reception are not considered to be noise sensitive during the overnight period.
- Area classifications are: Class 1 - Urban

The applicable guideline limits for infrequent events such as emergency generator set testing are +5 dB higher than the values above.

3.1.2 Application of the NPC-300 Guidelines

The stationary noise guidelines apply only to residential land uses and to noise-sensitive commercial and institutional uses, as defined in NPC-300 (e.g., schools, daycares, hotels). For the site, the stationary noise guidelines only apply to the residential portions of the development, including:

- Individual residences;
- Communal indoor amenity areas; and
- Communal outdoor amenity areas.

All of the above have been considered as noise-sensitive points of reception in the analysis.

3.1.2.1 Guideline Summary and Interpretation

The following presents a summary of the guidelines and settlements presented above.

- The applicable Ministry of the Environment noise guideline for assessing new residential development applications is Publication NPC-300.
- The Class 1 limits have been considered in this study as a conservative assessment.

3.1.3 Site Visit and Observations

A site visit was conducted in the area on October 4, 2022. SLR personnel conducted a site visit to the area to identify to identify sources of noise around the subject site.

In general, noise from nearby facilities was not audible at or around the site. The general ambient environment surrounding the development lands is dominated by roadway noise.

3.1.4 Sources of Interest

Based on the information obtained from site visit and aerial photography, the significant sources of noise in the area of the site have been identified. Noise emission rates for the equipment/ activities were determined based on information from SLR's in-house database. Modelled noise sources include:

354 King Street North – Commercial building with rooftop mechanical equipment that is assumed to operate during all times of the day, with reduced operations during nighttime hours.

- HVAC units.

Figure 4 shows the location of all modelled noise sources. Noise emission data used in the assessment can be found in Appendix F.

Other Institutional/Commercial Lands

Multiple institutional/ commercial land uses exist within 300 m, north and east of the subject site. Given the separation distances and high ambient roadway noise levels created by King Street and Columbia Street, stationary noise from these sources is not anticipated to be of concern. This is consistent with the site observations by SLR acoustics personnel, in which activity from surrounding industries was inaudible at and around the site. Additionally, noise impacts from these facilities are expected to meet NPC-300 guidelines at closer intervening noise sensitive receptors. Therefore, a detailed assessment of these facilities is not considered necessary and was not completed.

3.1.5 Noise Modelling and Results

Worst-case scenario noise levels from the surrounding commercial/ industrial operations were modelled using Cadna/A, a computerized version of the internationally recognized ISO 9613-2 noise propagation algorithms. This is the preferred noise modelling methodology of the MECP. The ISO 9613 equations account for:

- Source to receiver geometry;
- Distance attenuation;
- Atmospheric absorption;
- Reflections off of the ground and ground absorption;

- Reflections off of vertical walls; and
- Screening effects of buildings, terrain, and purpose-built noise barriers (noise walls, berms, etc.).

The following additional parameters were used in the modelling, which are consistent with providing a conservative (worst-case assessment of noise levels):

- Temperature: 10°C;
- Relative Humidity: 70%;
- Ground Absorption G: G = 0.2 default global parameter;
- Reflection: An order of reflection of 1 was used (accounts for noise reflecting from walls);
- Wall Absorption Coefficients: Set to 0.37 (37 % of energy is absorbed, 63% reflected); and
- Terrain: Ground contours have been used in the modelling to account for hills and changes in grade in the area.

Predicted façade sound levels for stationary noise are shown in Figure 5 and Figure 6 for daytime and nighttime, respectively. Overall predicted sound levels are provided in the following tables:

Table 9: Summary of Predicted Stationary Source Façade Sound Levels

Façade[1]	Stationary Source Sound Levels[2]			Applicable Sound Level Limits		
	L_{eq} Day (dBA)	L_{eq} Evening (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Evening (dBA)	L_{eq} Night (dBA)
North	47	47	44	50	50	45
East	48	48	45			
South	38	35	35			
West	24	24	21			

Notes: [1] Façade locations are identified on **Figures 5** and **Figure 6.**
[2] Sound levels presented are the highest predicted for the identified façade.

Sound levels due to stationary sources are predicted to be below applicable guideline limits at all façade locations in the proposed development. Therefore, no additional noise control measures are required.

As there are no applicable noise sensitive OLAs in the development, an assessment of OLAs was not completed.

3.1.6 Mitigation Measures and Warning Clauses

As shown in the previous section, the applicable Class 1 noise guideline limits from worst-case predicted operations in the surrounding industrial and commercial uses are met. Based on the current study, additional physical noise mitigation measures are not required.

A Type E noise warning clause is recommended for all units. See Appendix E for warning clause details. The warning clauses should be included in documents registered on Title and included in all agreements of purchase and sale or lease and all rental agreements.

PART 2: IMPACTS OF THE DEVELOPMENT ON ITSELF

4.0 Stationary Source Noise Impacts of the Development on Itself

At the time of this assessment, the proposed development's mechanical systems have not been sufficiently designed to complete a detailed assessment of stationary source impacts on the development itself.

For common mechanical systems that will be implemented as part of the proposed development, the impacts from all noise-generating equipment should comply with the guideline limits in MECP Publication NPC-300. The potential noise impacts of mechanical equipment to be included with proposed development (such as make-up air units, cooling towers, parking garage exhaust fans, emergency generators) should be assessed as part of the final building design. The criteria can be met at all on-site receptors through appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers) into the design. This can be confirmed either later in the site plan approval process, or at the building permit approval stages.

It is recommended that the mechanical systems be reviewed by an acoustical consultant prior to final equipment selection.

If individual air conditioning systems are to be implemented for each residential unit for the proposed site, the sound levels from each unit should meet MECP Publication NPC-216.

PART 3: IMPACTS OF THE DEVELOPMENT ON THE SURROUNDING AREA

5.0 Stationary Source Noise Impacts on the Surrounding Area

With respect to the acoustic environment of the area, it is expected that the proposed development will have a negligible effect on neighbouring noise-sensitive properties.

The traffic related to the proposed development will be small relative to the existing traffic volumes within the area and is not of concern with respect to potential noise impacts.

Other noise sources associated with the development with possible adverse impacts on the surrounding neighbourhood are mechanical equipment (e.g., make up air units, cooling units, and parking garage exhaust fans). Sound levels due to operation of these sources are required to meet MECP Publication NPC-300 requirements at all off-site noise sensitive receptors.

Regardless, potential impacts should be assessed as part of the final building design to ensure compliance. The criteria can be met at all surrounding and on-site receptors though the use of routine mitigation measures, including the appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers, barriers) into the design.

It is recommended that the mechanical systems be reviewed by an accredited acoustical consultant prior to final selection of equipment.

6.0 Conclusions and Recommendations

The potential for noise impacts on and from the proposed development have been assessed. Impacts of the environment on the development, the development on itself, and the development on the surrounding area have been considered. Based on the results of this assessment, the following conclusions have been reached:

Transportation Noise

- An assessment of transportation noise impacts from surrounding roadways has been completed.
- Based on transportation façade sound levels upgraded glazing is not required within the development, as outlined in outlined in Section 2.4.1.
- Ventilation and warning clause requirements are outlined in Section 2.5, and summarized as follows:
    - Provision for Air Conditioning and a Type C Warning clause are required for residential units on the north, east and south façades of the building.
    - The warning clauses should be included in agreements registered on Title for the residential units and included in agreements of purchase and sale/rental agreements. Warning clause requirements are summarized in Appendix E.

Stationary Source Noise

- "Stationary" noise from the surrounding commercial and industrial facilities were assessed on the proposed development, as outlined in Section 3.
- Stationary noise impacts from the surrounding commercial noise are predicted to meet NPC-300 Class 1 guideline limits on all façades.
- A Type E noise warning clause is recommended, as outlined in Section 3.1.6, due to the general noise from the surrounding industries and commercial properties. Warning clauses are included in Appendix E.

Overall Assessment

- Impacts of the environment on the proposed development can be adequately controlled without upgrades to the building construction, without the inclusion of mitigation measures for surrounding stationary sources, and the inclusion of ventilation and warning clause requirements, detailed in Part 1 of this report.
- Impacts of the proposed development on itself are not anticipated and can be adequately controlled by following the design guidance outlined in Part 2 of this report.
- Impacts of the proposed development on the surroundings are expected to meet the applicable guideline limits, and can be adequately controlled by following the design guidance outlined Part 3 of this report.
- As the mechanical systems for the proposed development have not been designed at the time of this assessment, the acoustical design should be reviewed by an acoustical consultant later in the approvals process or as part of the final building design.

Sincerely,

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7.0 References

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8.0 Statement of Limitations

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Fora Studio Limina Inc., hereafter referred to as the "Client". It is intended for the sole and exclusive use of the Client. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and by the Region of Waterloo in their role as land use planning approval authority, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

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Figures

Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

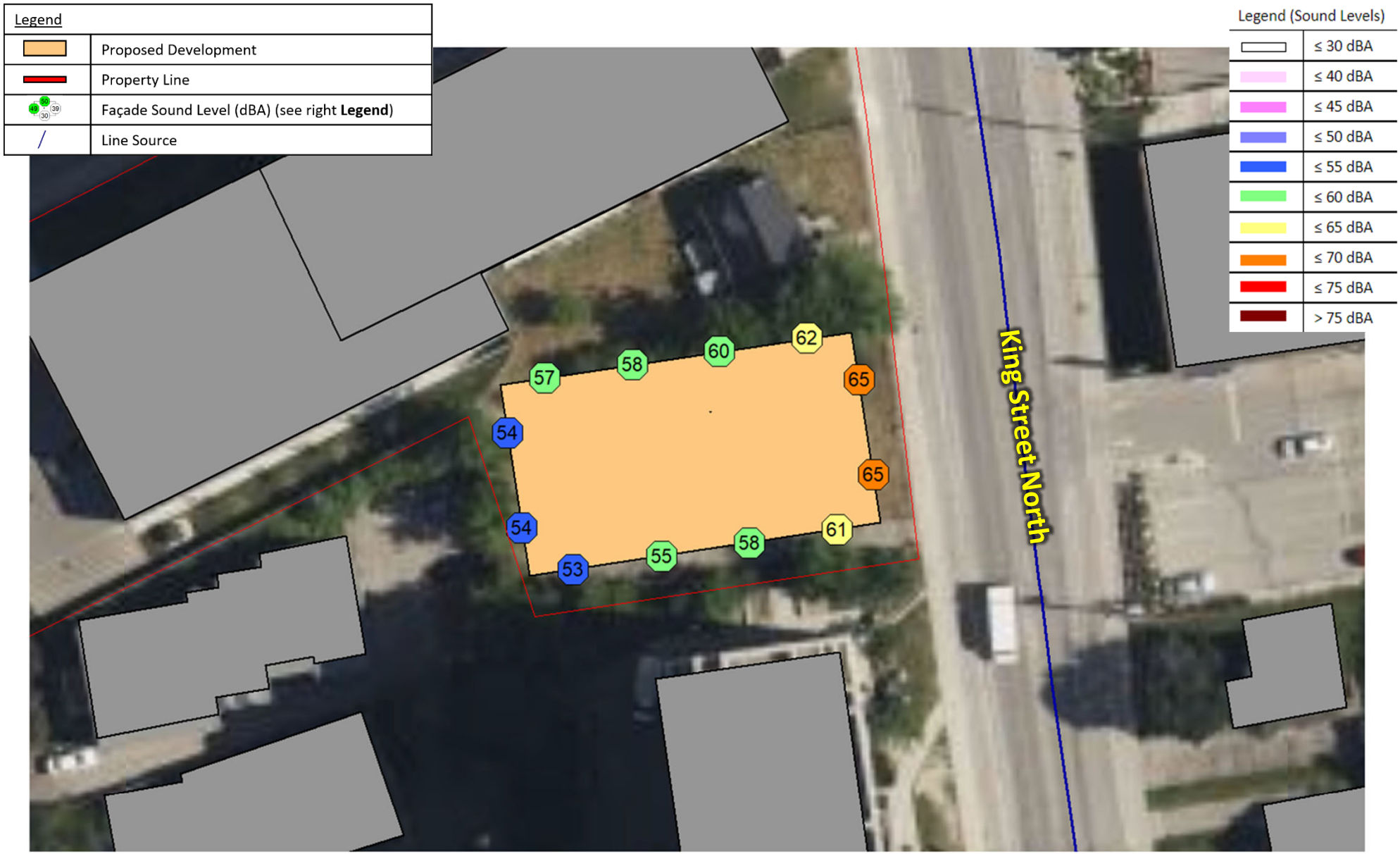
Studio Limina Inc.

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November 18, 2022

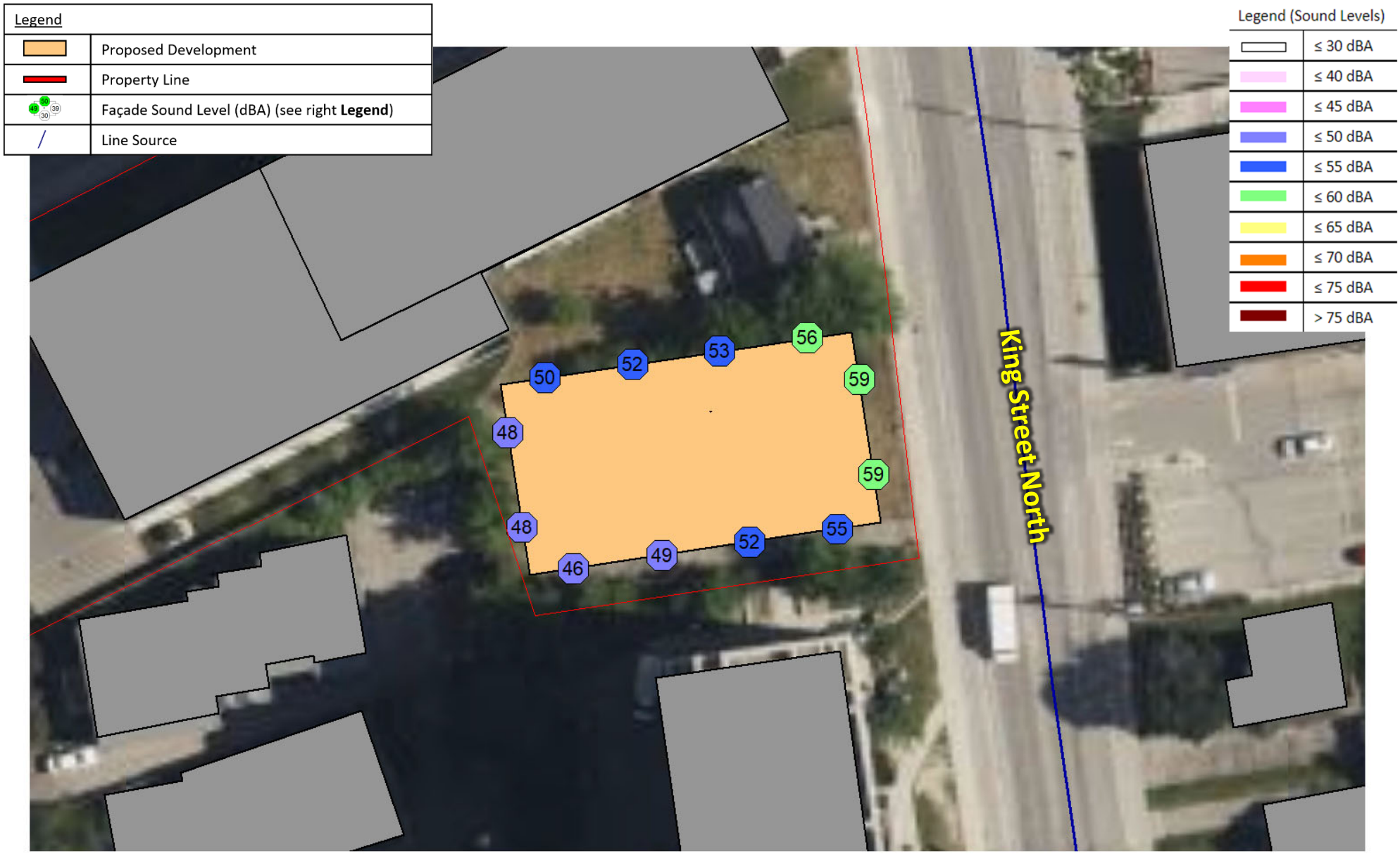


STUDIO LIMINA INC.	True North	Scale: 1:5000	METRES	SLR global environmental solutions
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. 1	
CONTEXT PLAN		Project No. 241.30640.00000		



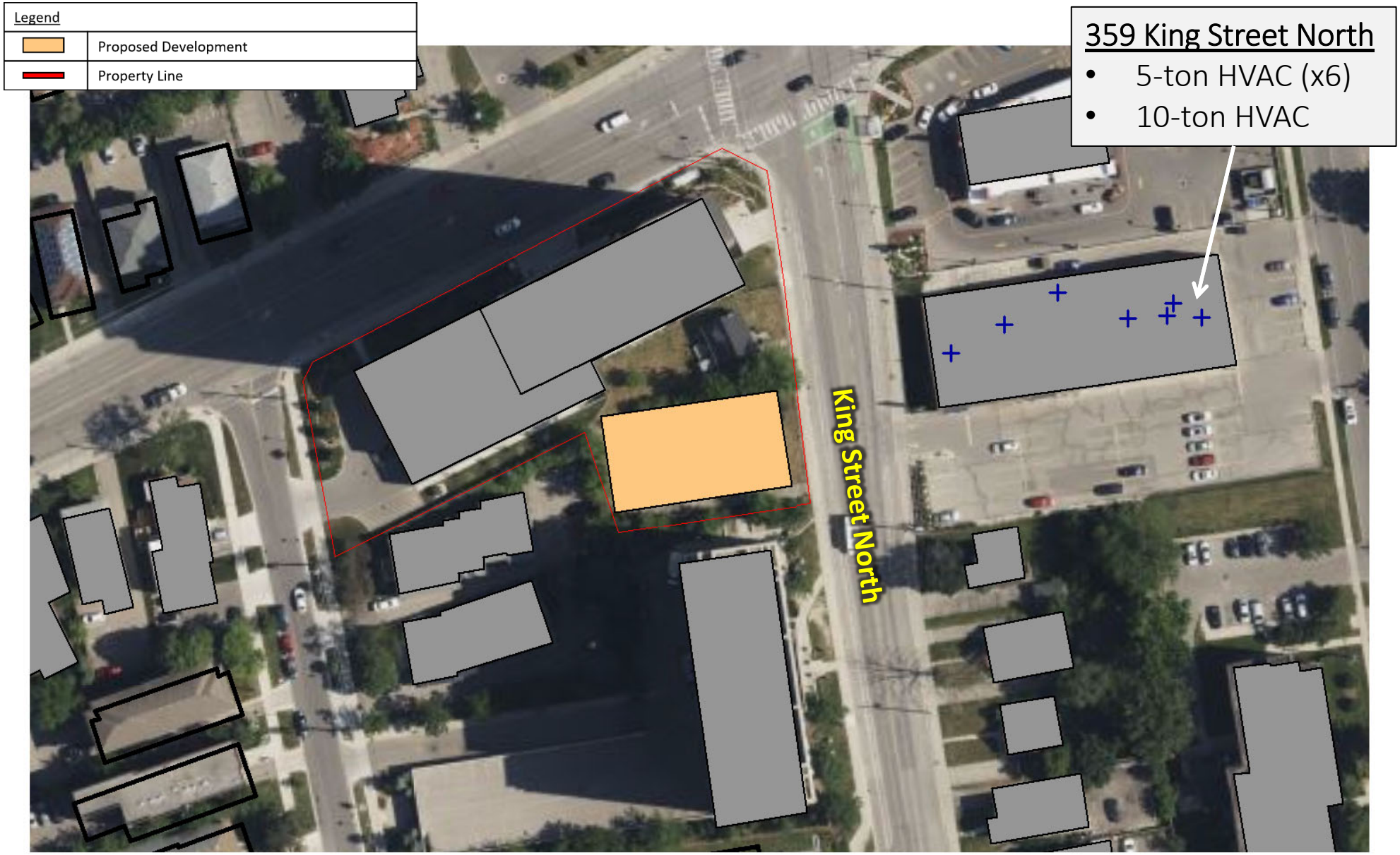
STUDIO LIMINA INC.	True North	Scale: 1:500	METRES
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. **2**
PREDICTED FAÇADE SOUND LEVELS – ROAD – DAYTIME		Project No. 241.30640.00000	

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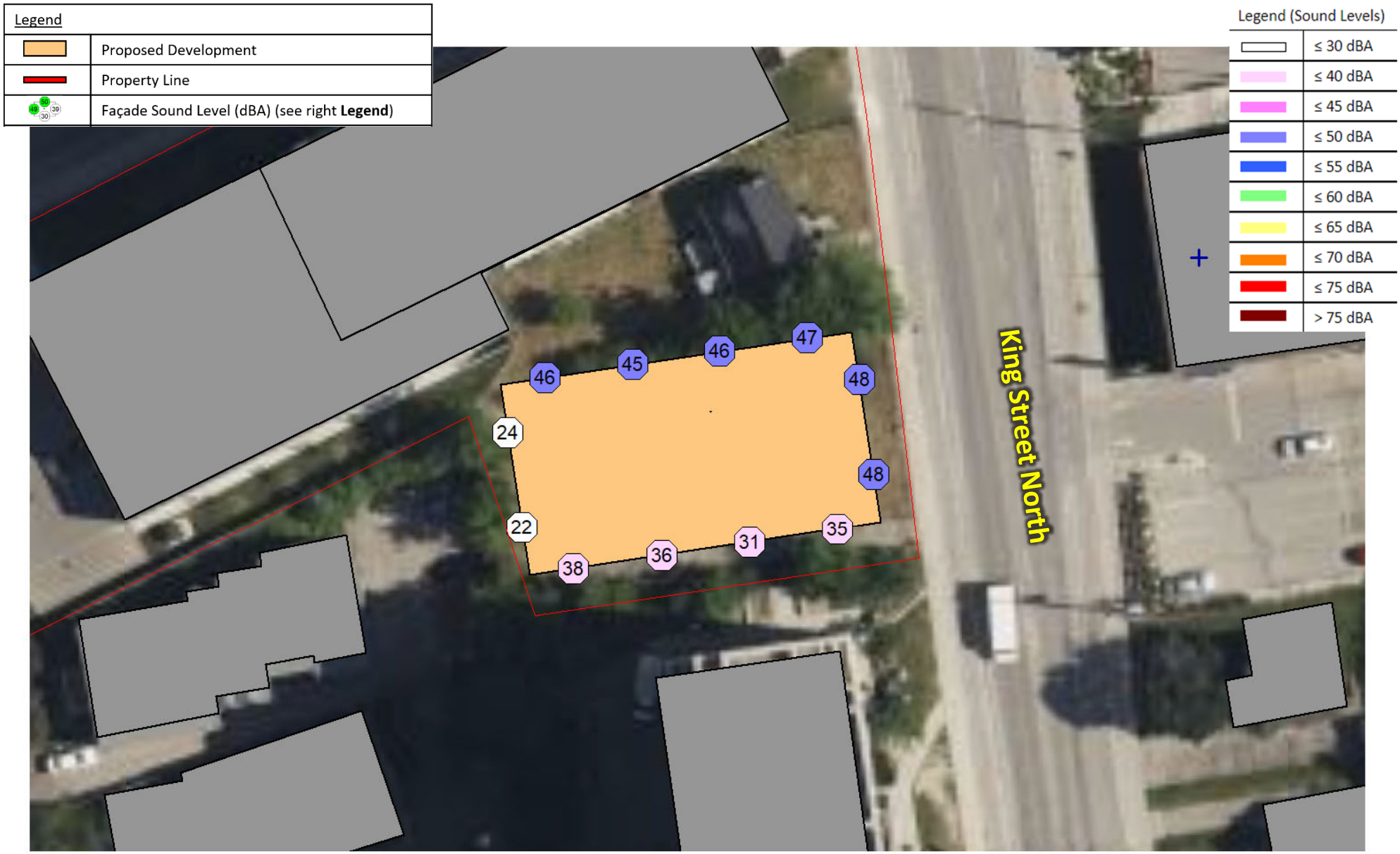


STUDIO LIMINA INC.	True North	Scale: 1:500	METRES
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. **3**
PREDICTED FAÇADE SOUND LEVELS – ROAD – NIGHTTIME		Project No. 241.30640.00000	

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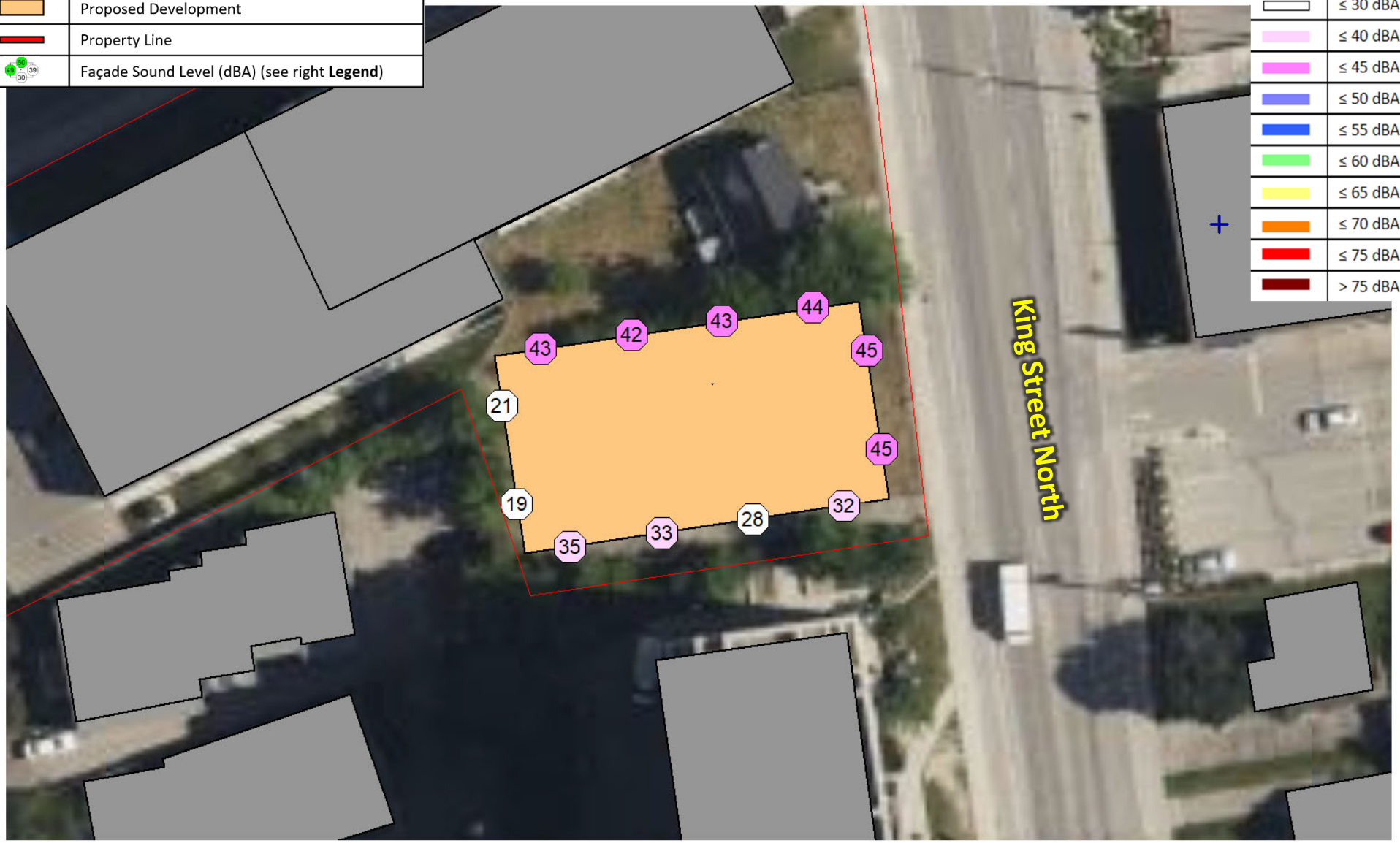


STUDIO LIMINA INC.	True North	Scale: 1:1000	METRES	SLR global environmental solutions
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. **4**	
MODELLED STATIONARY SOURCES		Project No. 241.30640.00000		



STUDIO LIMINA INC.	True North	Scale: 1:500	METRES
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. **5**
PREDICTED FAÇADE SOUND LEVELS – STATIONARY SOURCES – DAYTIME/EVENING		Project No. 241.30640.00000	

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STUDIO LIMINA INC.	True North	Scale: 1:500	METRES
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. **6**
PREDICTED FAÇADE SOUND LEVELS – STATIONARY SOURCES – NIGHTTIME		Project No. 241.30640.00000	

SLR global environmental solutions

Appendix A Declaration Statement

Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

SLR Project No. 241.30640.00000

November 18, 2022

CANADA	)	In the Matter of the
	)	Environmental Protection
PROVINCE OF ONTARIO	)	Act and the Planning Act
	)	
	)	
	)	And in the Matter of
	)	1 Columbia Street West
	)	in the City of Waterloo
	)	in the Regional Municipality
	)	of Waterloo

I, Aaron Haniff, P.Eng., of the Town of Guelph in Wellington Region, SOLEMNLY DECLARE THAT:

1. I am a Professional Engineer employed by SLR Consulting Ltd. (Canada), which holds a Certificate of Authorization from the Association of Professional Engineers of Ontario and have personal knowledge of the matters set out below.

2. I was retained or employed as the principal consultant to undertake the assessment of noise impacts and recommendation of noise mitigation measures for the property described as 1 Columbia Street in Waterloo, Ontario.

3. I had the expertise required to perform these services. Any assessment activities or recommendations requiring the application of engineering principles have been undertaken or supervised by an engineer qualified to perform such services.

4. The information used in the study entitled Environmental Noise Assessment - 1 Columbia Street, Waterloo – 241. 30640.00000 dated November 18, 2022, is based on the best information available as of the date of the study.

5. The noise level calculations, the interpretation of noise attenuation requirements, and the recommended measures are in accordance with Ministry of Environment guidelines, Region of Waterloo policies, and any applicable policy or guidelines of the Area Municipality, and any other applicable policy or guideline.

6. The physical noise attenuation measures proposed in this study are feasible to implement and will provide the level of attenuation indicated in the study.

7. I acknowledge that this study may be subject to a peer review conducted at my cost.

8. I acknowledge that public authorities and future owners, occupants and others may rely on this statement.

AND I make this solemn Declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

DECLARED before me at the City of Guelph, in the County of Wellington, this 21 day of December, 2022.

WANDA-LEE HARRIS NOTARY PUBLIC ONTARIO

Wanda-Lee Harris, Notary Public, County of Wellington, limited to the attestation of instruments and the taking of affidavits, for SLR Consulting (Canada) Ltd. and Novus Environmental. Expires January 14, 2023

Wanda-Lee Harris
DEC 21/22

CANADA

PROVINCE OF ONTARIO

In the Matter of the Environmental Protection Act and the Planning Act

And in the Matter of 1 Columbia Street West in the City of Waterloo in the Regional Municipality of Waterloo

I, Jack Price, of the City of Toronto,

in the County of Canada, SOLEMNLY DECLARE THAT:

1. I am the owner of the property, or the owner's agent, and that I understand and agree with the study entitled 221118 Environmental Noise Assessment - 1 Columbia Street, Waterloo – 241. 30640.00000 dated November 18, 2022, is based on the best information available as of the date of the study.

2. The application has been designed to avoid the use of berms or walls as noise attenuation features where feasible. Where berms or walls are recommended, the Noise Assessment provides economic, planning and engineering justification.

3. If the application is changed in a way that may affect the noise level calculations, I will have a revised noise study submitted to the Region.

AND I make this solemn Declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.



December 15, 2022.

Appendix B Development Drawings

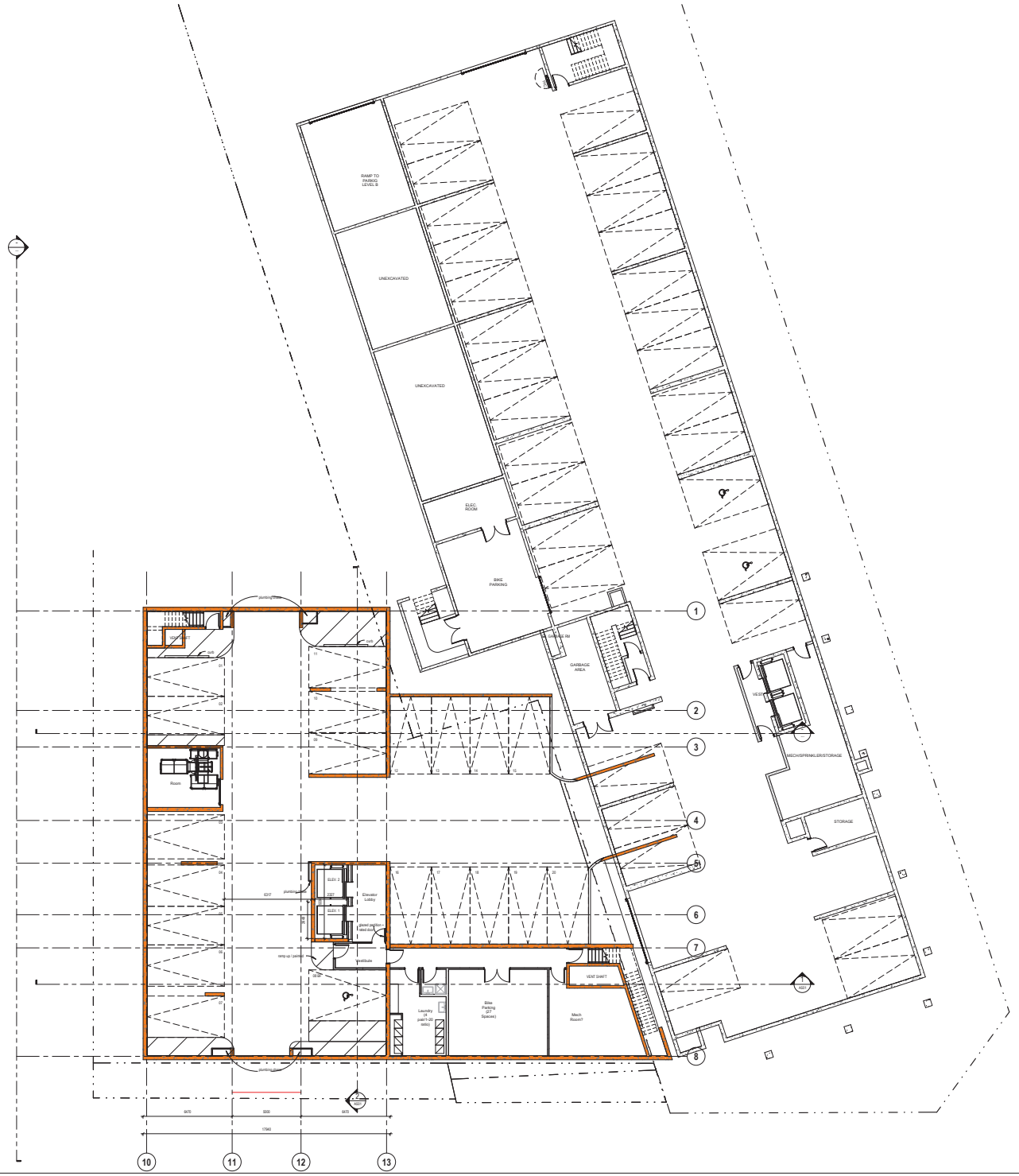
Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

SLR Project No. 241.30640.00000

November 18, 2022



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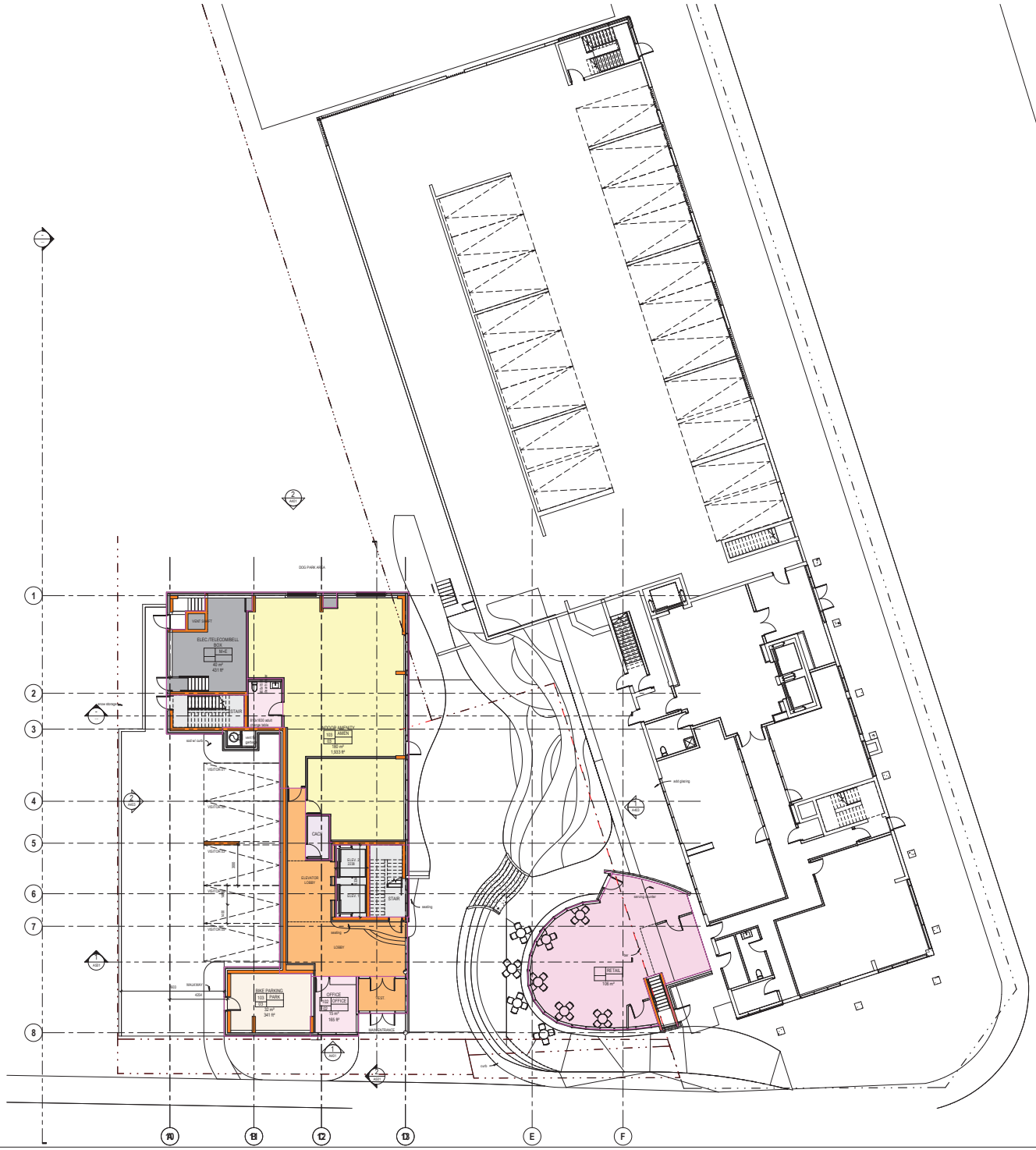
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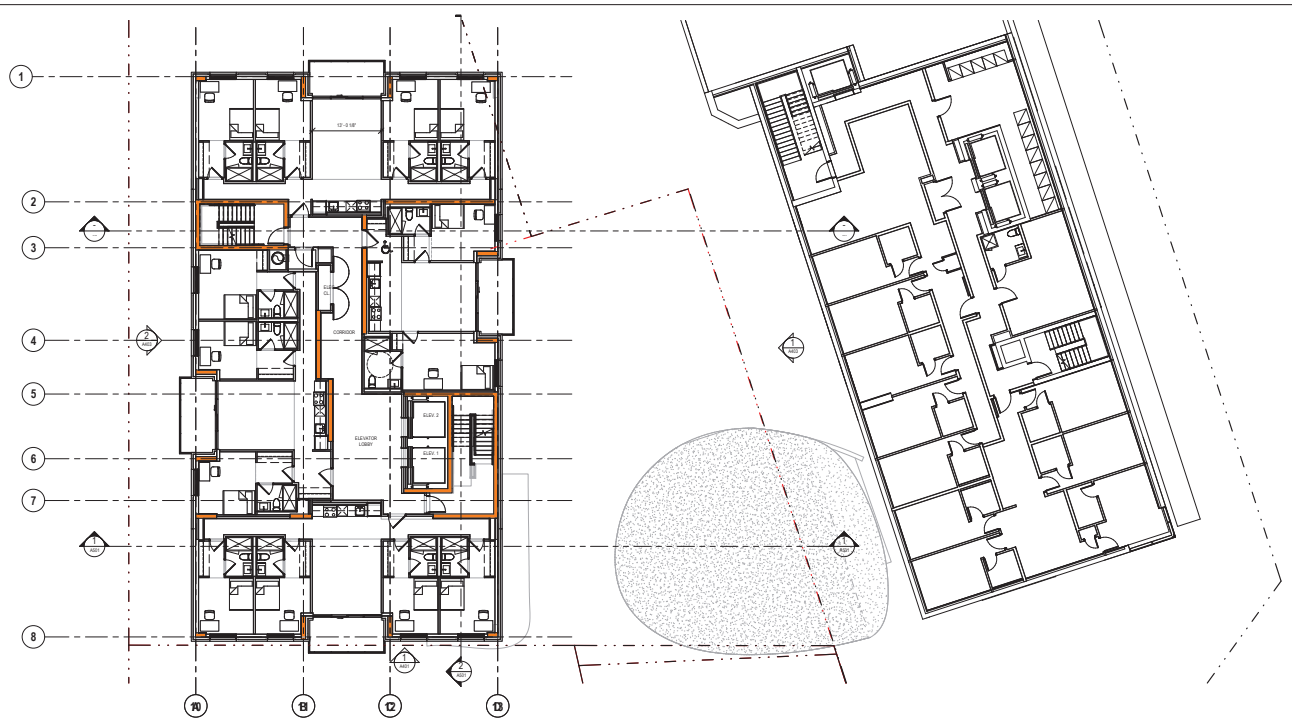
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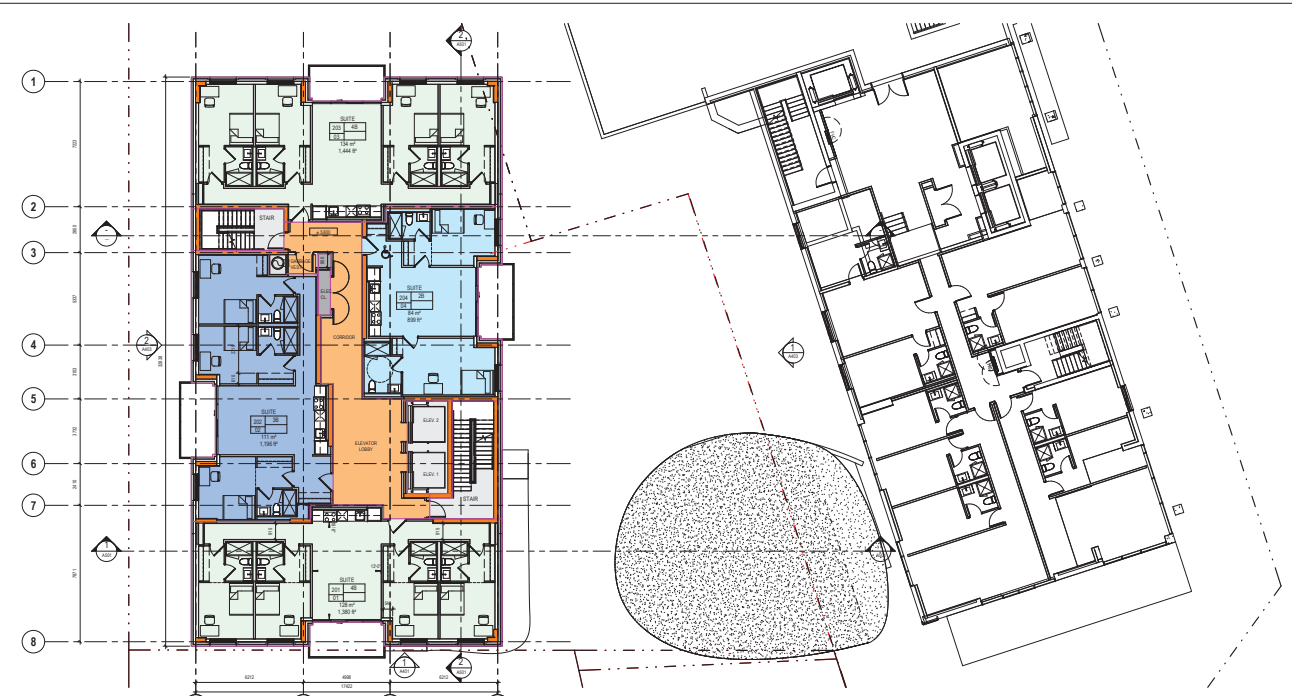
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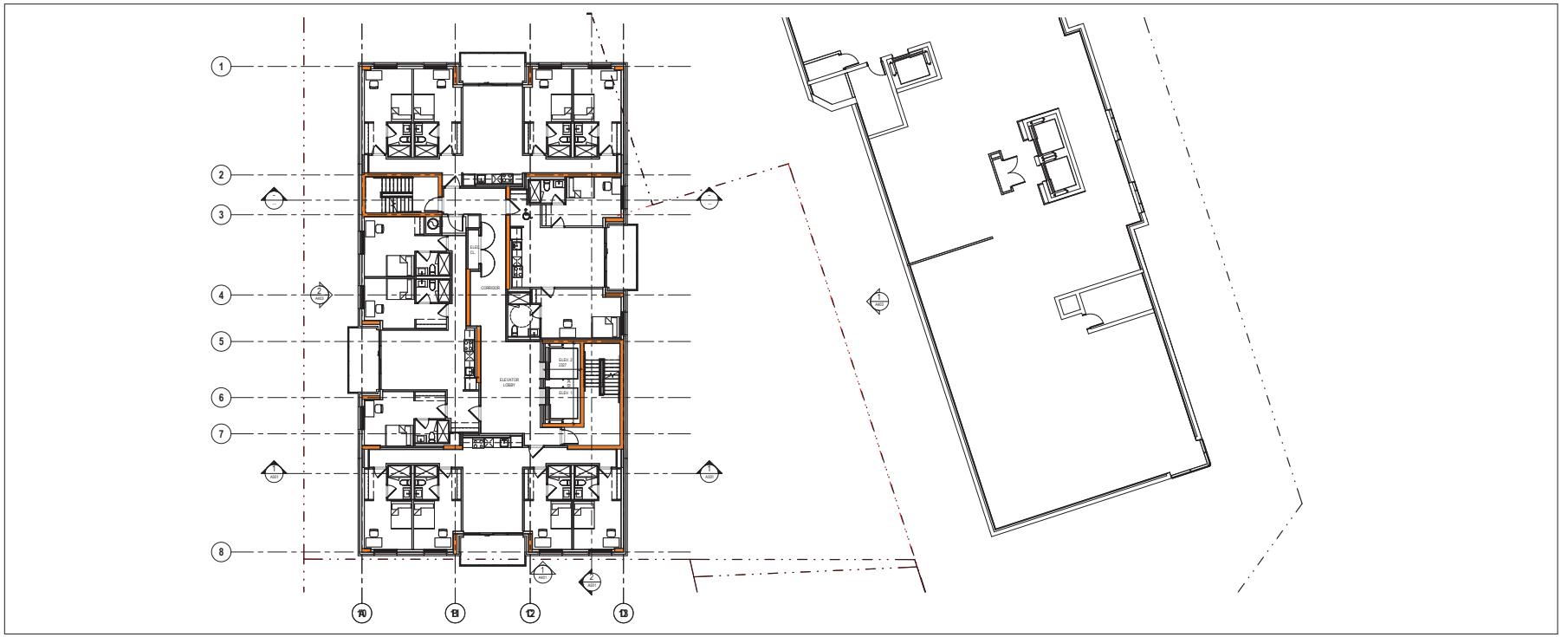
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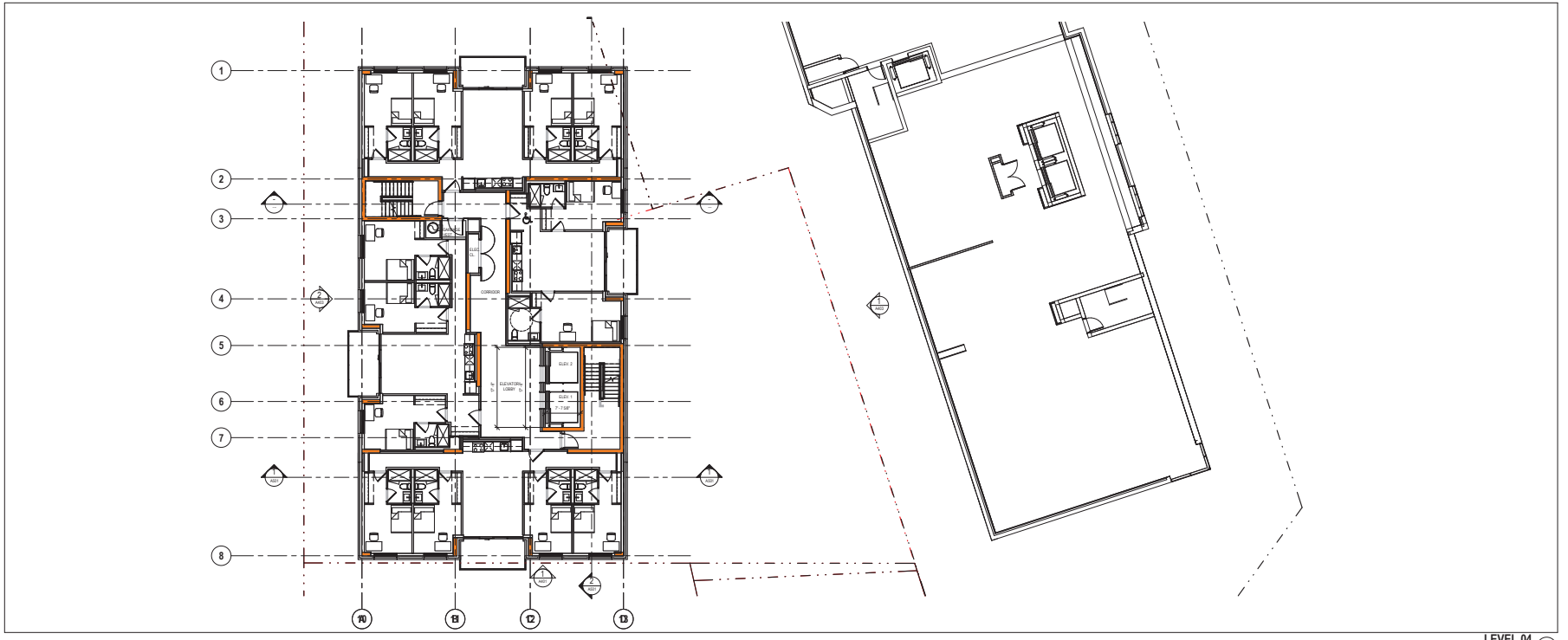
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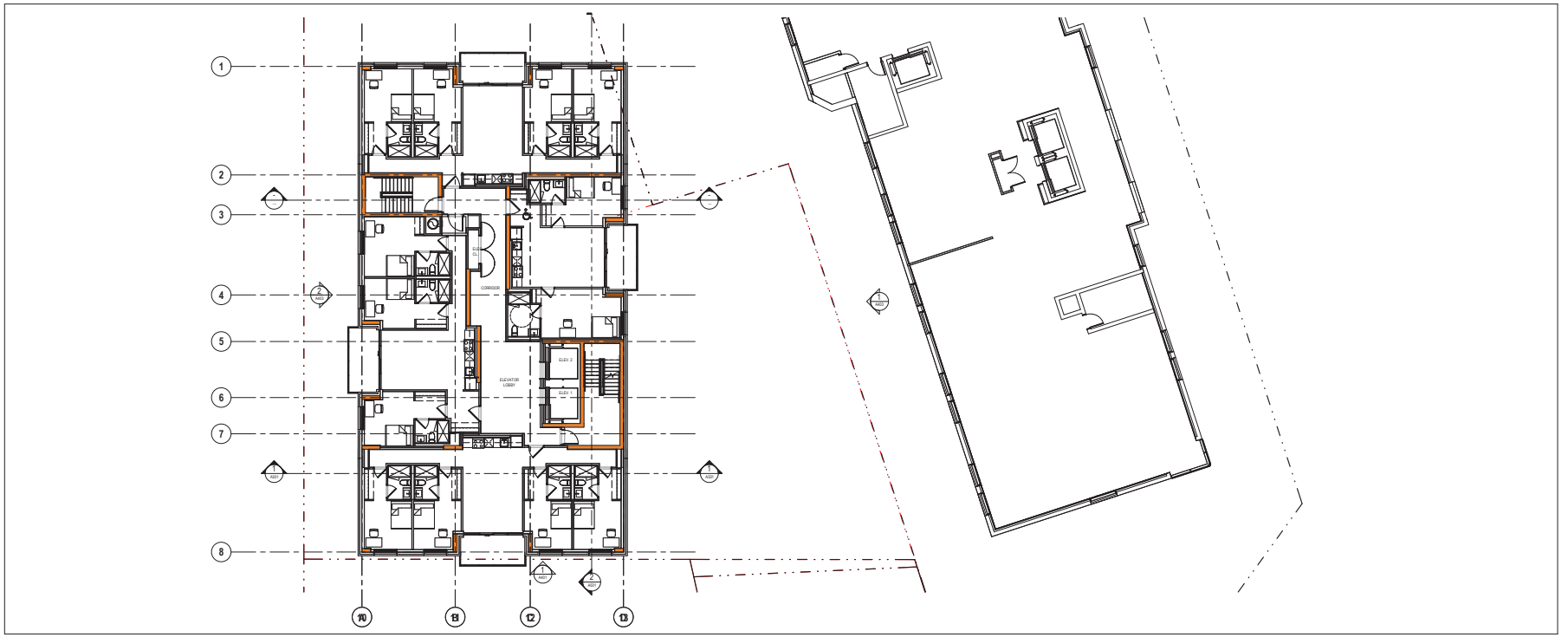
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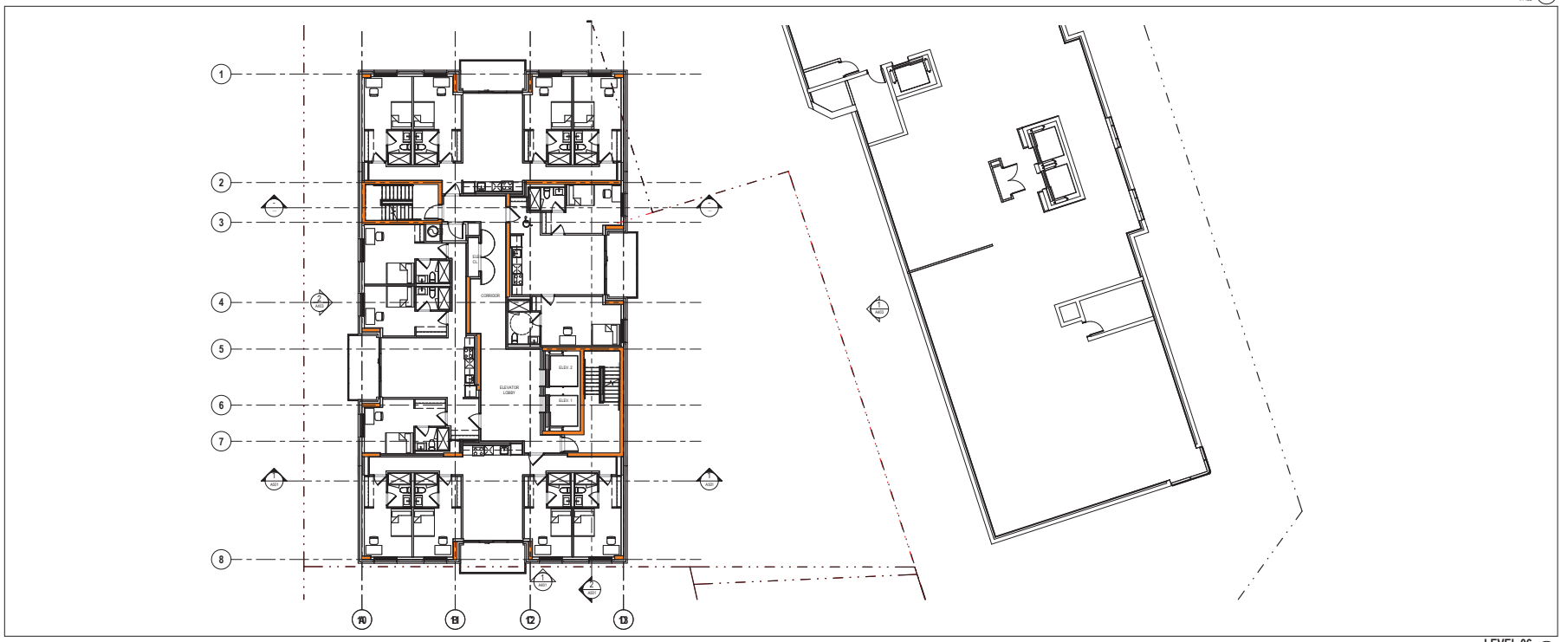
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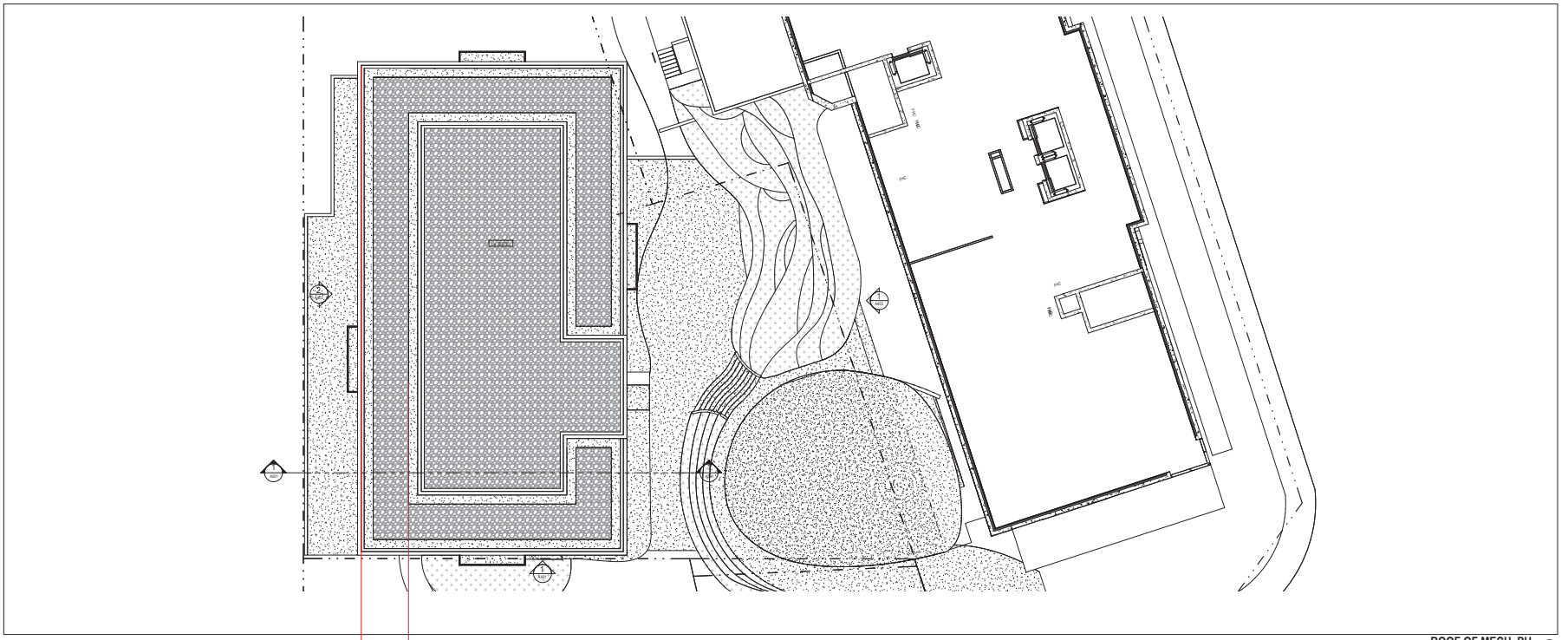
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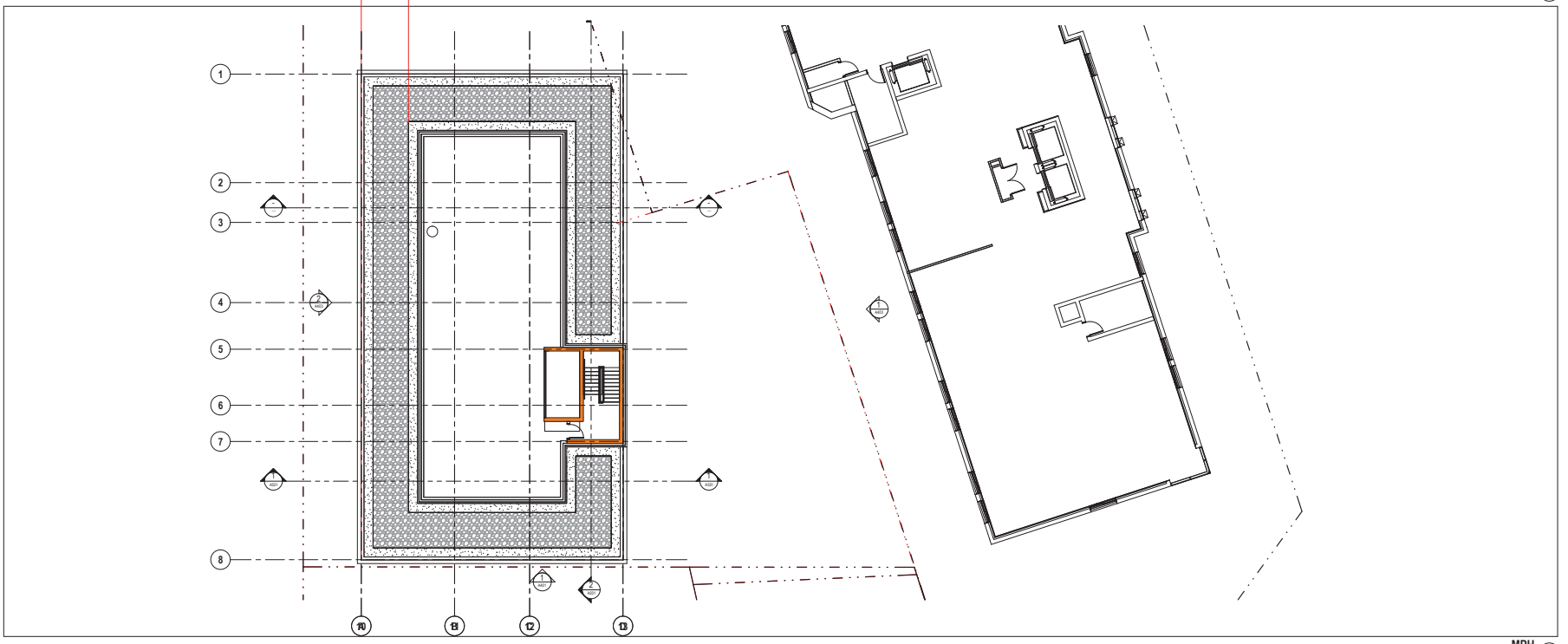
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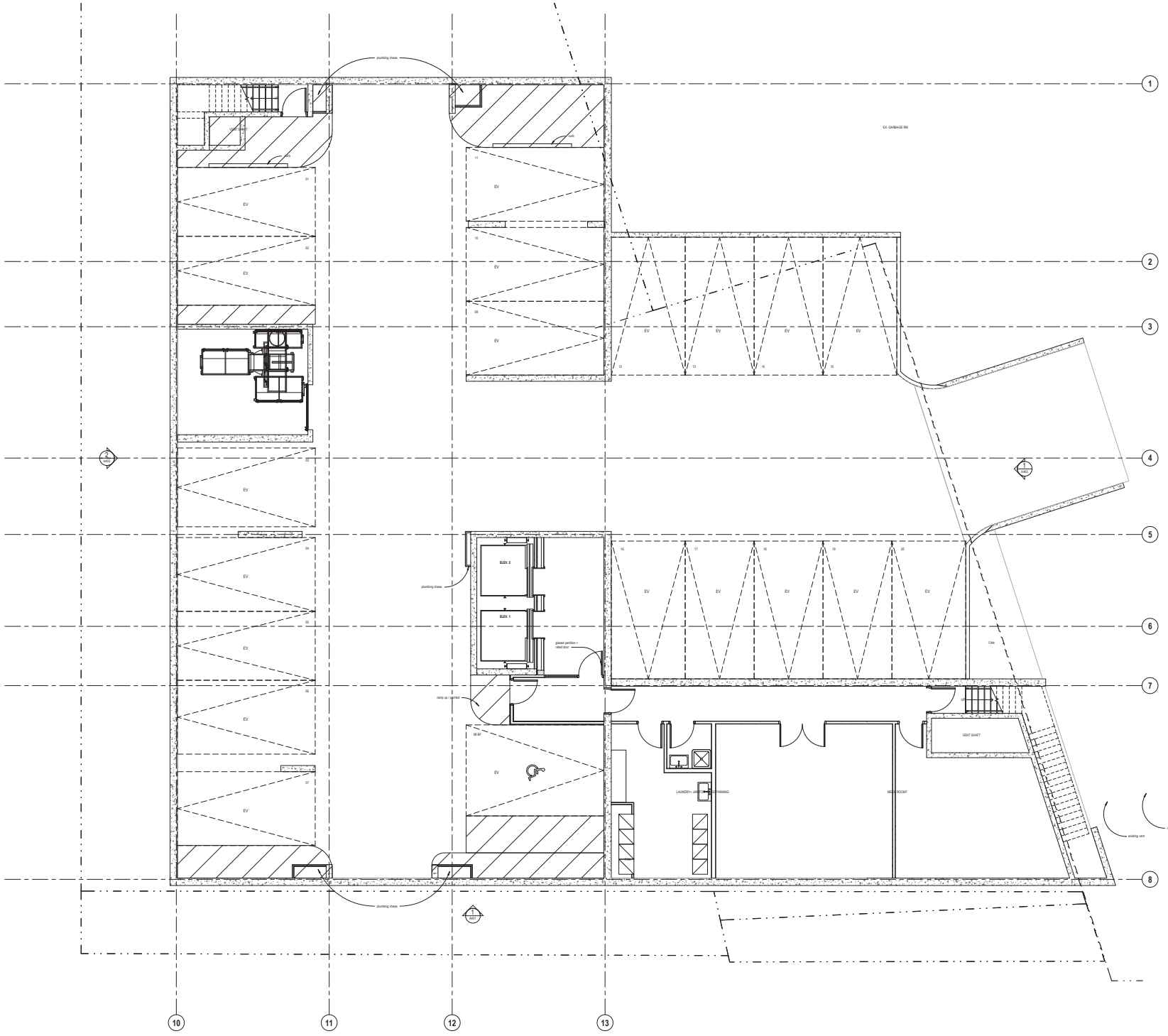
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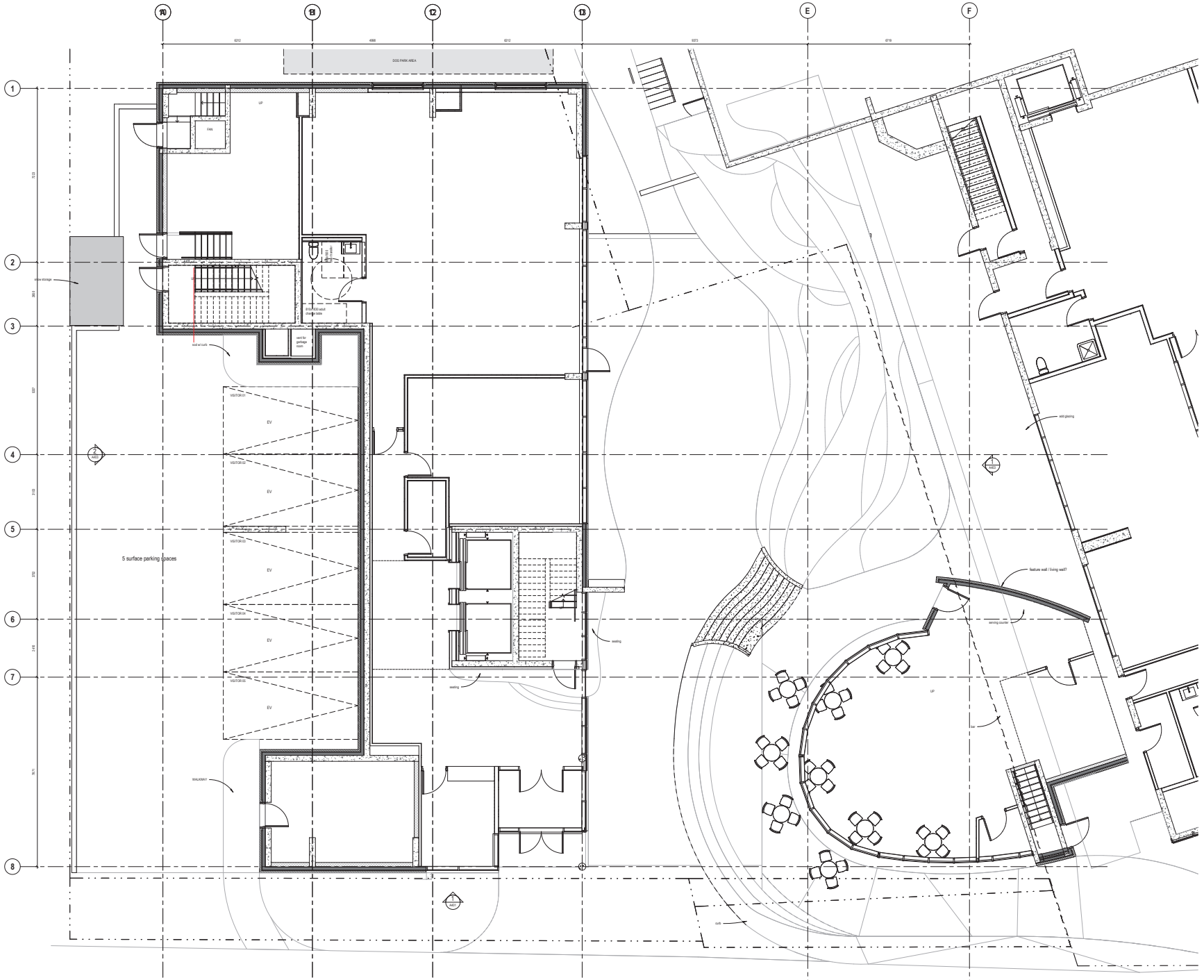
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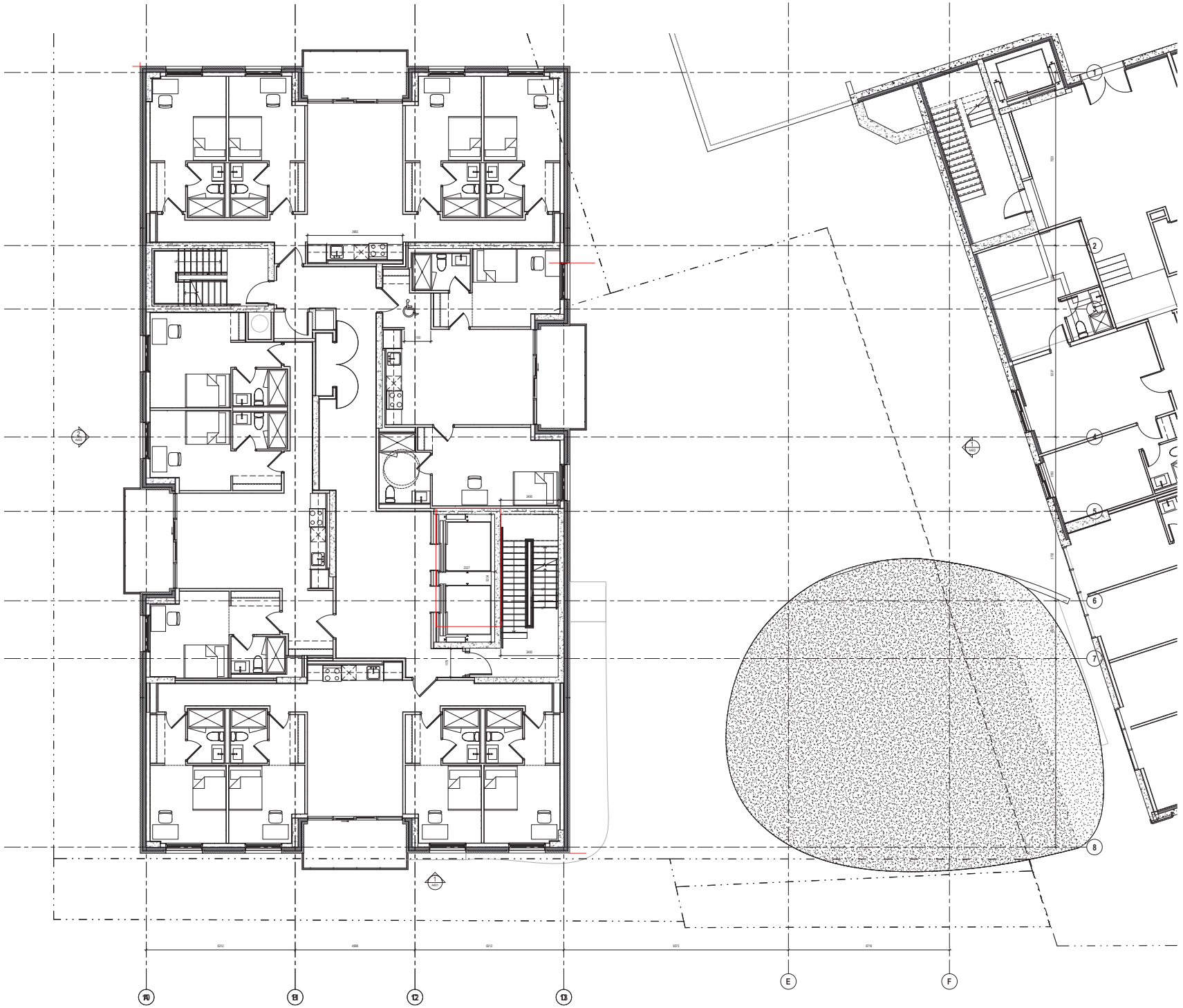
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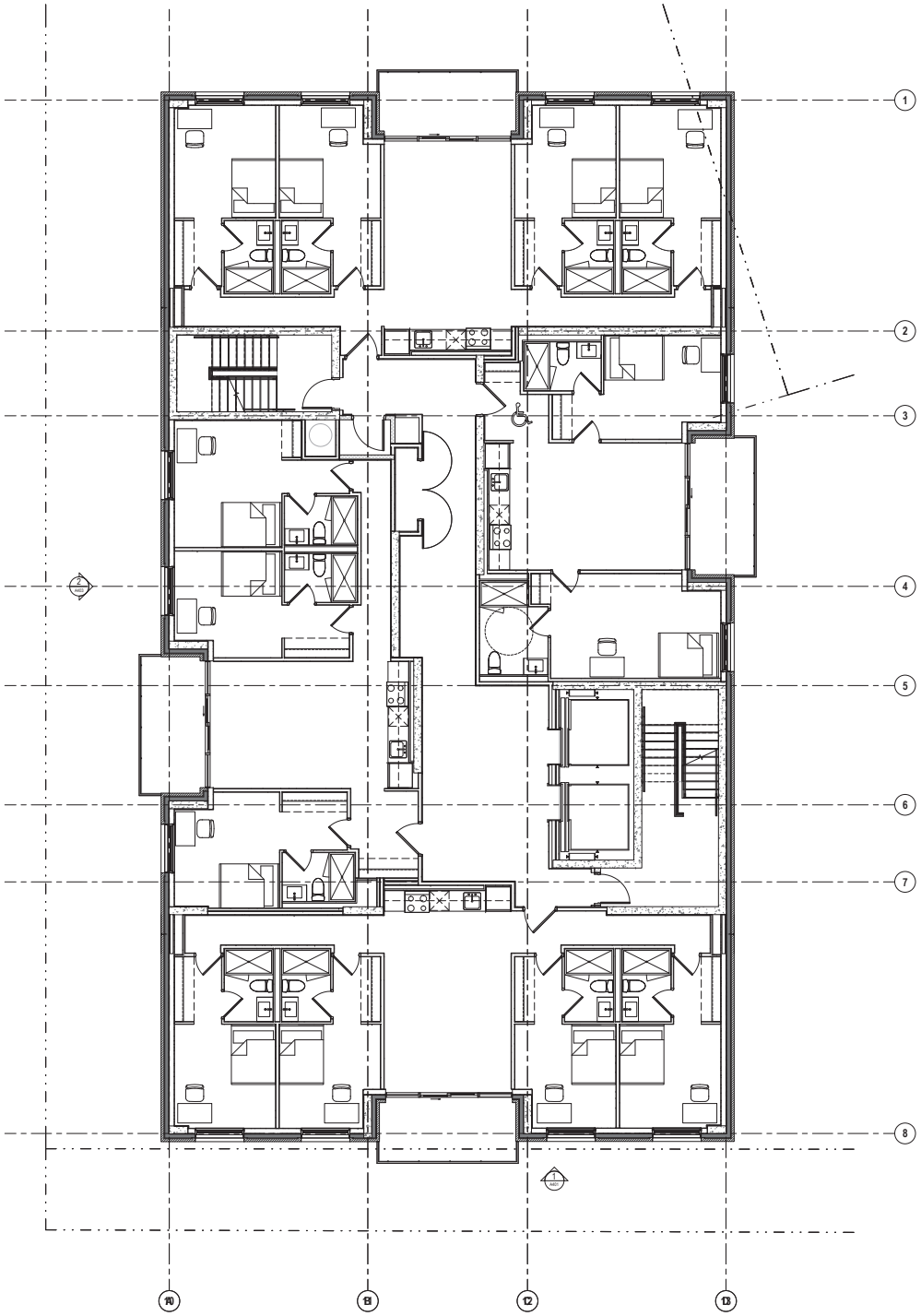
PLAN NORTH

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ENLARGED 02 PLAN

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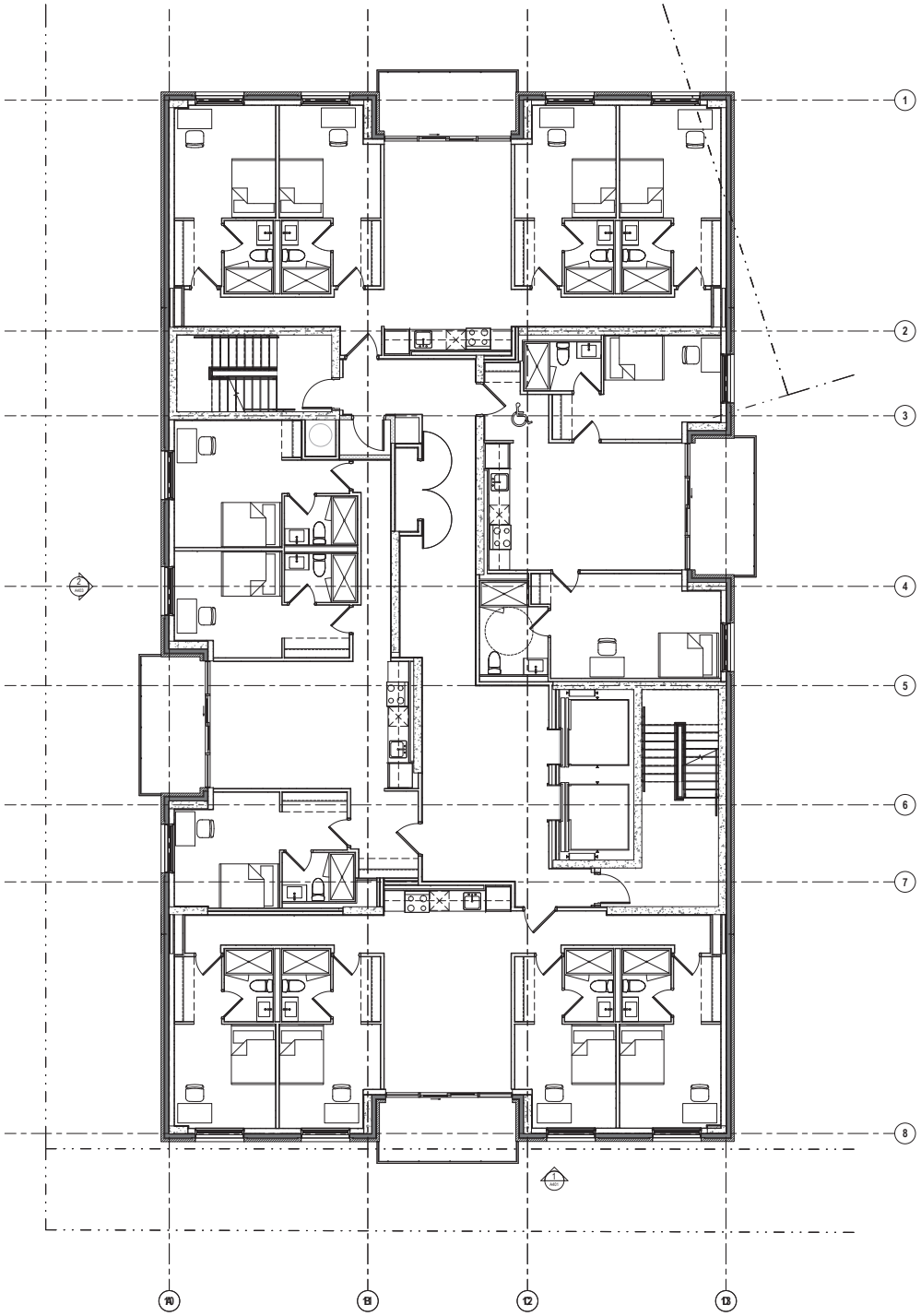
PLAN NORTH

SEAL

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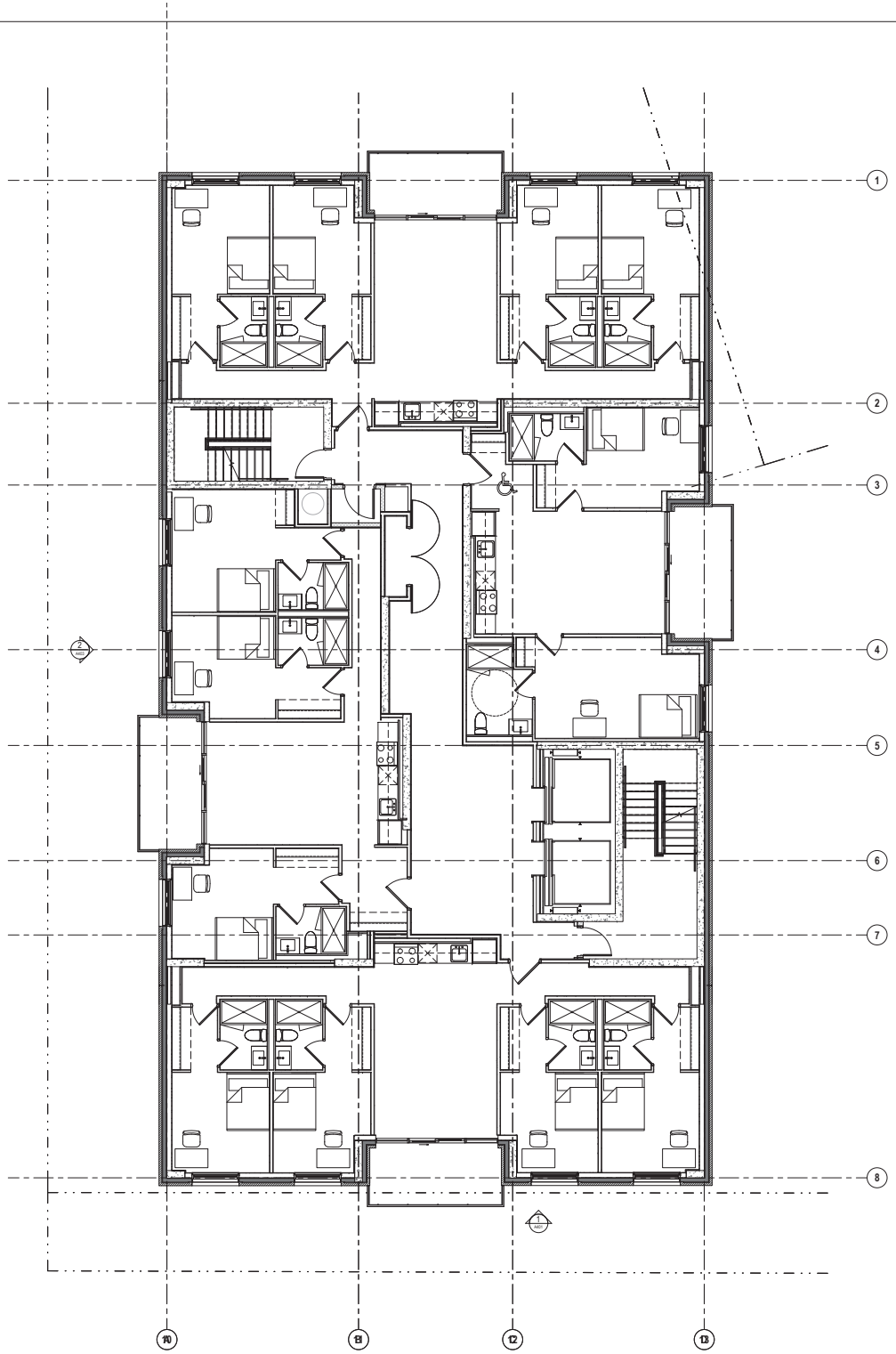
PLAN NORTH

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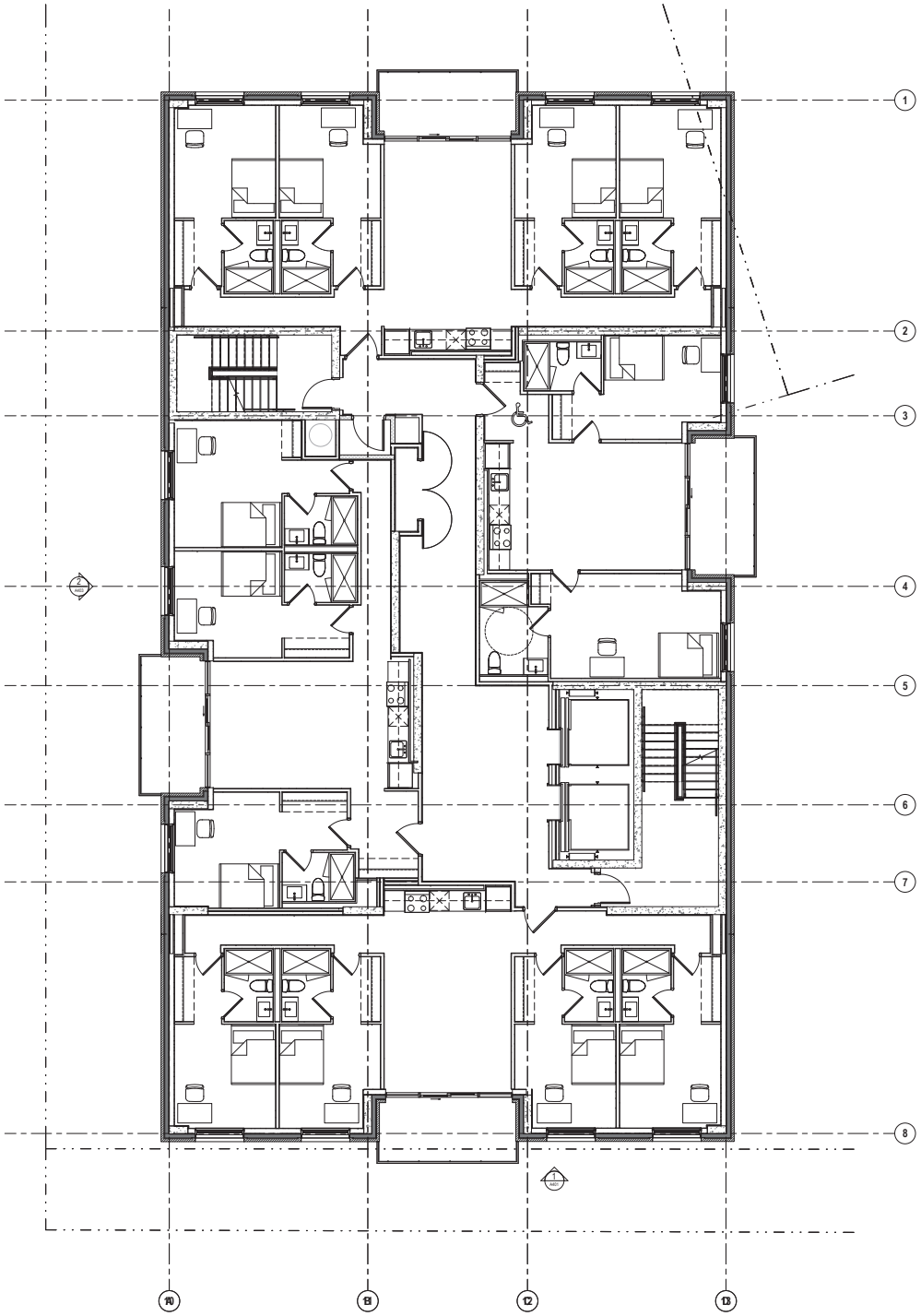
PLAN NORTH

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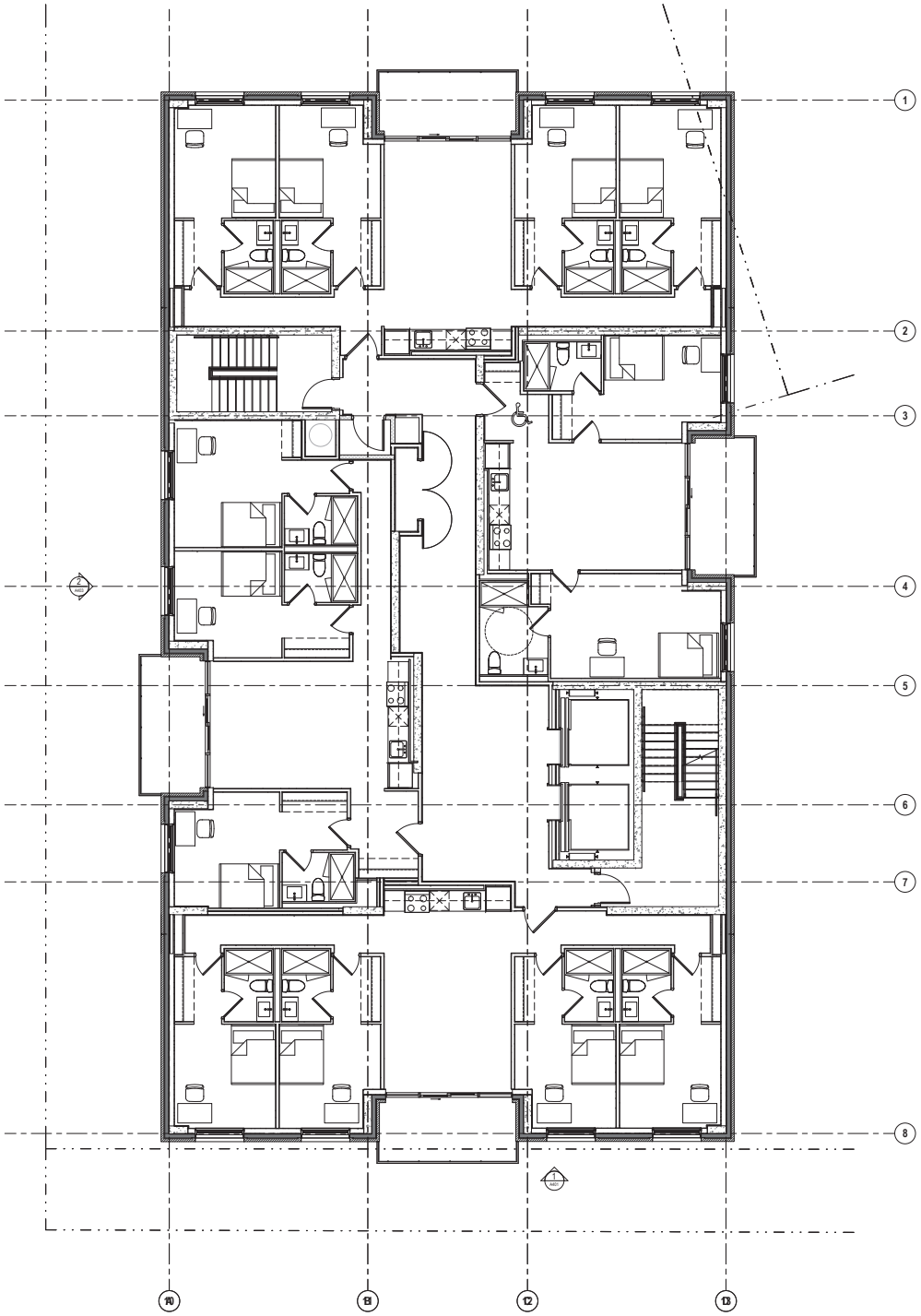
PLAN NORTH

SEAL

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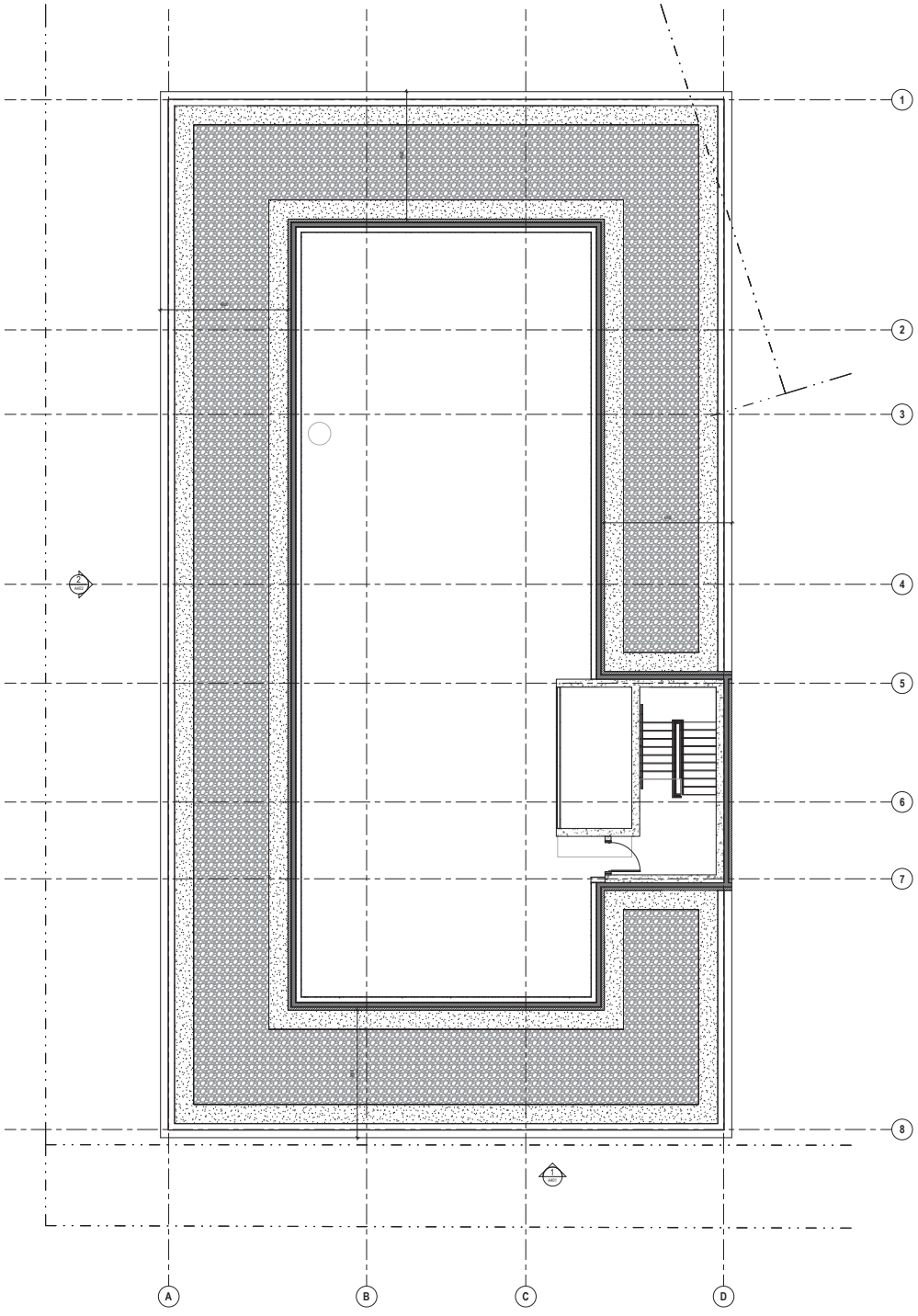
PLAN NORTH

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MPH 1

REFERENCED FROM 1 / A401 1 : 50

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PLAN NORTH

SEAL

ENLARGED MPH PLAN & ROOF OF MPH

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NORTH ELEV 2
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SOUTH ELEV 1
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SEAL

SOUTH + NORTH ELEVATION

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WEST ELEV (2)

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PLAN NORTH

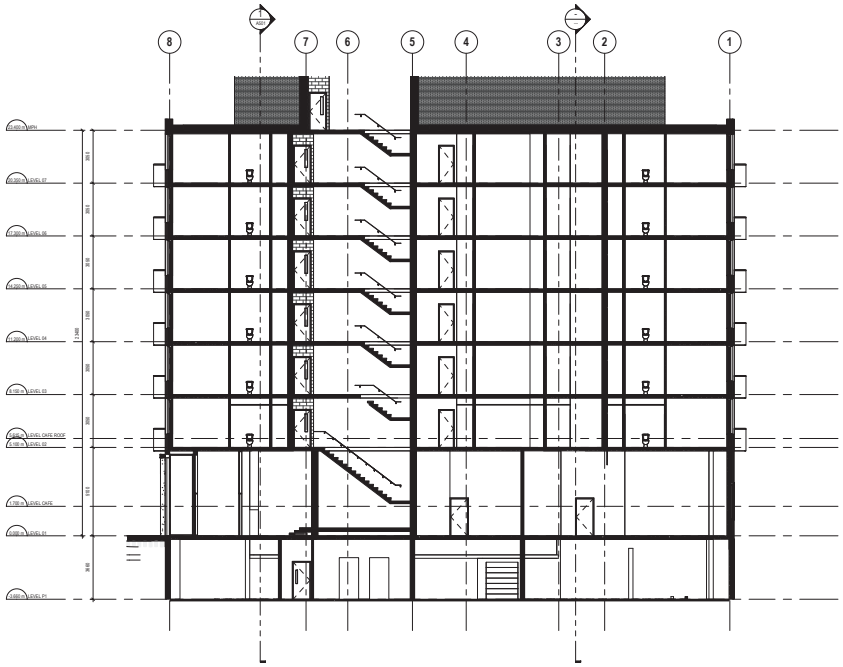
SEAL

EAST & WEST ELEVATION

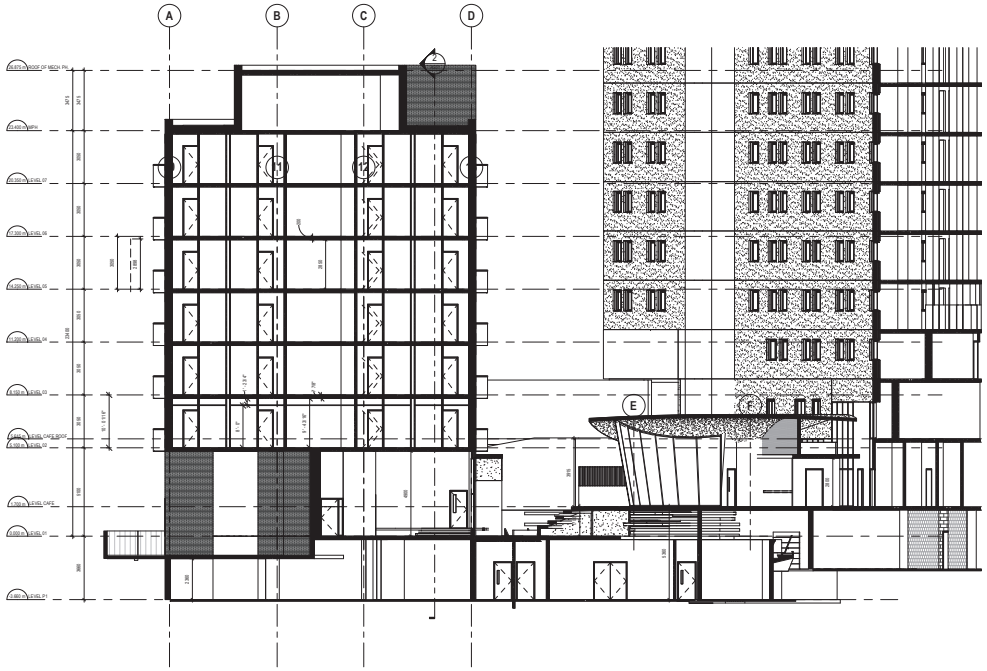
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A403 EAST E

REFERENCED FROM 1 / A201



BUILDING SECTION N-S 2
REFERENCED FROM 1 / A200 1 : 100



BUILDING SECTION E-W 1
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BUILDING SECTIONS

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A501

Appendix C Traffic Data and Calculations

Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

SLR Project No. 241.30640.00000

November 18, 2022

Region of Waterloo AADT Forecast for Noise Studies

1. Development/Location

King St N & Columbia St Intersection

2. Current AADT (2022)

South Leg/King St N	West Leg/Columbia St
16,700	22,900

3. Forecast AADT (2032)

South Leg/King St N	West Leg/Columbia St
18,400	25,300

4. Commercial Vehicle Rates

	South Leg/King St N	West Leg/Columbia St
% Medium Trucks	1.3%	1.0%
% Heavy Trucks	1.5%	1.1%

5. Posted Speed Limit

South Leg/King St N	West Leg/Columbia St
50 KM/h	(Check with COW) 50 KM/h

6. Day/Night Splits

Regional Standard 90/10 Day/Night Split

7. Validity Period

December 31st, 2024

8. Notes

This forecast is intended for the purpose of carrying out a noise study only. The above AADTs represent the south and west **Legs** traffic volumes at the intersection of King St N & Columbia St considering King St N is running North - South direction. The City of Waterloo should be contacted to validate the traffic data included in this document for Columbia St as this street falls under the jurisdiction of the City of Waterloo. This forecast remains valid up to the date indicated above. The Region of Waterloo should be contacted for an updated forecast if there are plans to use this forecast beyond the above validity period.

O R N A M E N T - Sound Power Emissions & Source Heights

Ontario Road Noise Analysis Method for Environment and Transportation

Road Segment ID	Roadway Name	Link Description	Speed (kph)	Period (h)	Total Traffic Volumes	Auto %	Med %	Hvy %	Auto	Med	Heavy	Road Gradient (%)	PWL (dBA)	Source Height, s (m)
King_avg	King Street North	Daytime Impacts	50	16	16560	97.2%	1.3%	1.5%	16096	215	248	0	**80.5**	**1.1**
		Nighttime Impacts	50	8	1840	97.2%	1.3%	1.5%	1788	24	28	0	**74.0**	**1.1**
Columbia_avg	Columbia Street	Daytime Impacts	50	16	22770	97.9%	1.0%	1.1%	22292	228	250	0	**81.3**	**1.0**
		Nighttime Impacts	50	8	2530	97.9%	1.0%	1.1%	2477	25	28	0	**74.8**	**1.0**

Appendix D STAMSON Validation Files

Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

SLR Project No. 241.30640.00000

November 18, 2022

STAMSON 5.0 NORMAL REPORT Date: 28-10-2022 11:52:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 1Colum.te Time Period: 16 hours
Description:

Road data, segment # 1: King St

Car traffic volume : 16560 veh/TimePeriod
Medium truck volume : 215 veh/TimePeriod
Heavy truck volume : 248 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: King St

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Road data, segment # 2: Columbia Str

Car traffic volume : 22292 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 250 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Columbia Str

Angle1 Angle2 : -15.00 deg 30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 58.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Results segment # 1: King St

Source height = 1.10 m

ROAD (0.00 + 65.53 + 0.00) = 65.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.53	0.00	0.00	0.00	0.00	0.00	0.00	65.53

Segment Leq : 65.53 dBA

🡅

Results segment # 2: Columbia Str

Source height = 1.02 m

ROAD (0.00 + 54.32 + 0.00) = 54.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	30	0.00	66.22	0.00	-5.87	-6.02	0.00	0.00	0.00	54.32

Segment Leq : 54.32 dBA

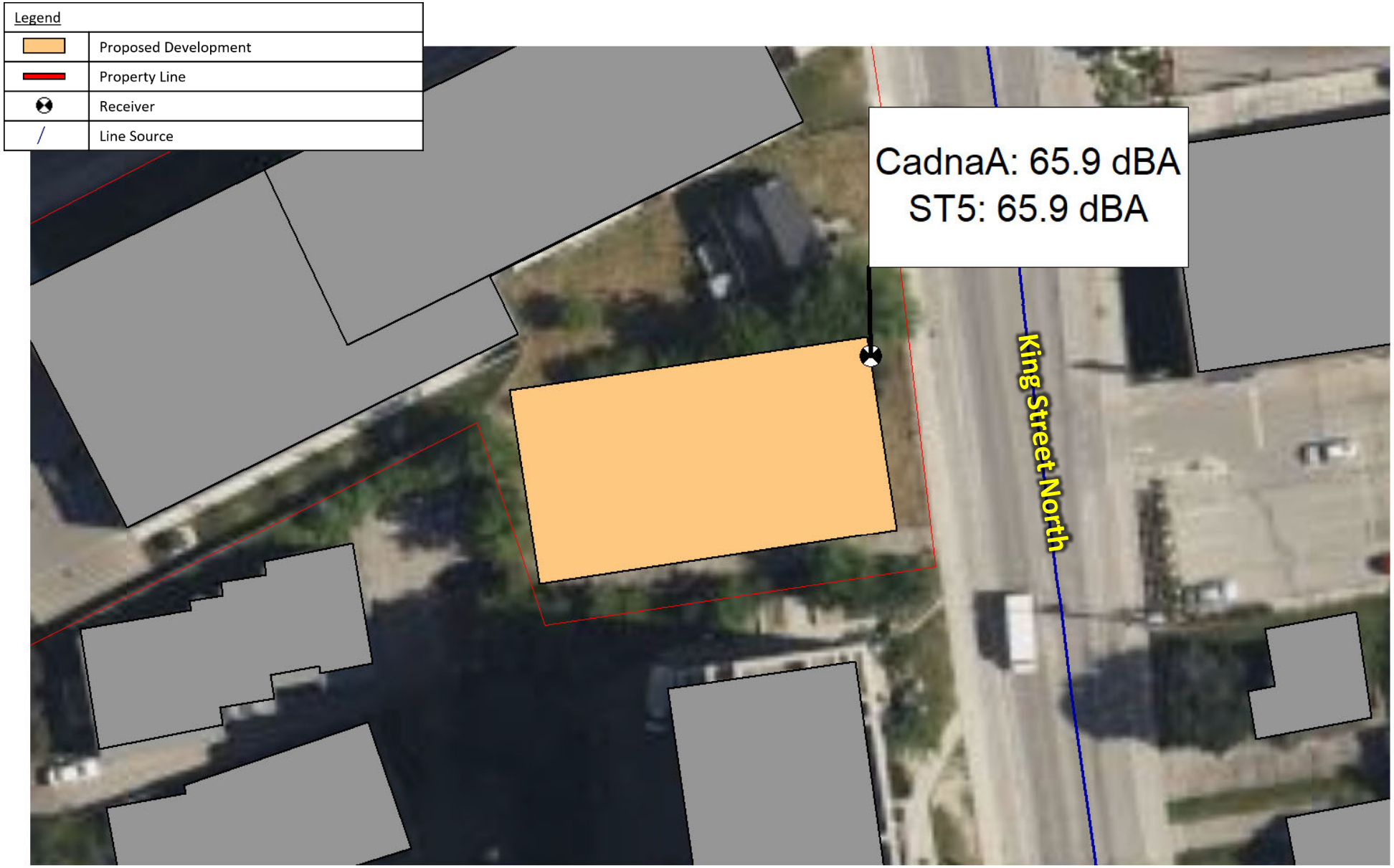
Total Leq All Segments: 65.85 dBA

🡅

TOTAL Leq FROM ALL SOURCES: 65.85

🡅

🡅



STUDIO LIMINA INC.	True North	Scale: 1:500	METRES	SLR global environmental solutions
1 COLUMBIA STREET		Date: Nov 18, 2022 Rev 1.0	Figure No. **D.1**	
STAMSON VS. CADNAA VALIDATION		Project No. 241.30640.00000		

Appendix E Ventilation, Warning Clause and Barrier Summary

Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

SLR Project No. 241.30640.00000

November 18, 2022

Ventilation, Warning Clause and Barrier Summary

The following Warning Clauses are recommended for inclusion in agreements registered on Title for the residential units, and included in all agreements of purchase and sale or lease, and all rental agreements.

A summary of the Warning Clause and Ventilation Requirements is included in **Table E.1** below.

> **MECP Type C Warning Clause:** "This 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 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."
>
> **MECP Type E Warning Clause:** "Purchasers/tenants are advised that due to the proximity of adjacent industries, noise from these facilities may at times be audible."

Table E.1: Summary of Ventilation, Warning Clause, and Barrier Requirements

Residential Units/Locations	Barrier Required?	Air Conditioning Requirement [1]	Warning Clauses
North, East, and South Facades	No	Provision for AC	Type C, Type E
West Facade	No	No	Type E

Notes: [1] Provision for AC = forced air heating with a provision for installation of central air conditioning.

Appendix F Modelled Stationary Sources

Environmental Noise Assessment

1 Columbia Street West, Waterloo, Ontario

Studio Limina Inc.

SLR Project No. 241.30640.00000

November 18, 2022

Table F.1: Summary of Noise Source Sound Power Levels

Source Description	ID	Maximum Sound Power Levels (1/1 Octave Band Levels)									Total PWL (dBA)	Notes
		32 (dB)	63 (dB)	125 (dB)	250 (dB)	500 (dB)	1000 (dB)	2000 (dB)	4000 (dB)	8000 (dB)		
HVAC Unit (5 ton)	HVAC_5ton	77	80	81	81	80	78	74	70	64	83	- Based on SLR historical data - Assumed to operate continuously during the daytime and evening with 50% duty cycle during the nighttime
HVAC Unit (10 ton)	HVAC_10ton	80	83	84	84	83	81	77	73	67	86	- Based on SLR historical data - Assumed to operate continuously during the daytime and evening with 50% duty cycle during the nighttime

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