

Noise Impact Study

5580 Manotick Main Street

Proposed Commercial Development

City of Ottawa (Manotick)

February 13, 2025
Project: 123-0003

Prepared for

Ignite Architecture Inc.

Prepared by



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VALCOUSTICS
Canada Ltd.

Version History

Version #	Date	Comments
0.1	November 15, 2024	Initial Draft
1.0	February 13, 2025	Final Report

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Noise Impact Study

5580 Manotick Main Street

Proposed Commercial Development

City of Ottawa

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) has been retained to prepare a Noise Impact Study to support the proposed Site Plan Approval (SPA) application submission to the City of Ottawa. The proposed development will consist of a 311 m² 3-storey commercial building.

This report addresses the potential noise impact from transportation sources onto the proposed building as well as the potential noise impact from the proposed development onto the existing nearby noise sensitive receptors.

The transportation noise source with potential to impact the proposed development is road traffic on Manotick Main Street.

The main noise sources associated with the proposed development with the potential to create noise impact at the neighbouring receptors are the rooftop mechanical units. There are noise sensitive residential dwellings immediately to the north, south and east of the site.

The sound levels on and off-site have been determined and compared with the Ministry of the Environment, Conservation and Parks (MECP) noise guidelines to determine the need for noise mitigation.

The sound levels due to the activities at the proposed development are predicted to meet the noise guideline limits at the neighbouring receptors without any noise mitigation measures.

Wall and window construction meeting the non-acoustical requirements of the Ontario Building Code (OBC) is sufficient to meet the MECP noise guidelines for office uses.

The assessment was based on VCL on-site observations and empirical data on hand for the proposed rooftop mechanical units. The assessment should be reviewed if the development plans or if details regarding the noise sources are updated.

1.0 INTRODUCTION

VCL has been retained to prepare a Noise Impact Study to support the proposed Site Plan Approval (SPA) application submission to the City of Ottawa. The proposed development will consist of a 311 m² 3-storey commercial building.

Sound levels at the proposed office space within the development due to transportation noise were assessed. Sound levels at the nearby off-site noise sensitive receptors due to the noise sources within the proposed development have also been predicted. These sound levels were then compared to the applicable MECP noise guideline limits.

The site is located at 5580 Manotick Main Street, in the City of Ottawa (Manotick), and is bounded by:

- Existing residential development to the north and south;
- Manotick Main Street, with existing residential development beyond, to the east; and
- A grocery store with other various commercial uses beyond, to the west.

A Key Plan is included as Figure 1.

This report is based on architectural drawings, prepared by Ignite Architecture Inc., latest revised February 11, 2025. The drawings are included as Appendix A. The Site Plan from the drawings is shown as Figure 2.

2.0 TRANSPORTATION NOISE IMPACT ON THE PROJECT

2.1 TRANSPORTATION NOISE SOURCES

The transportation noise source with potential to impact the proposed development is road traffic on Manotick Main Street.

Traffic volumes on other surrounding roadways are anticipated to be minor and no significant noise impact at the subject site is expected. Thus, the other roadways have not been considered further in this assessment.

2.1.1 Road Traffic

Current (year 2019) 24-hour traffic volumes for Manotick Main Street were obtained from the City of Ottawa Open Data Source website. Data in the form of 24-hour count was provided at the intersection of Eastman Avenue and Manotick Main Street. Future (year 2035) traffic volumes were obtained by escalating the current volumes at a growth rate of 2%, compounded annually. Truck percentages and day/night split were assumed. The posted speed limit for Manotick Main Street in the vicinity of the site is 40 km/hr. There is a slight grade in the road that was also taken into consideration.

Table 1 summarizes the road traffic volumes used in the assessment. Appendix B contains the traffic data correspondence.

TABLE 1: ROAD TRAFFIC DATA

Roadway	Year	AADT ⁽¹⁾	% Trucks ⁽²⁾		Day/Night Split (%) ⁽²⁾	Speed (km/hr)
			Medium	Heavy		
Manotick Main Street ⁽³⁾	2019 (2035)	8 071 (11 981) ⁽⁴⁾	2	2	90/10	40

Notes:

- (1) AADT – Annual Average Traffic Data.
- (2) Current (year 2019) volumes were obtained from the City of Ottawa Open Data Source website.
- (3) Assumed
- (4) Future (year 2035) volumes, shown in brackets, were obtained by escalating the current volumes at a growth rate of 2%, compounded annually. The day/night split was assumed.

2.2 NOISE GUIDELINES – TRANSPORTATION SOURCES

2.2.1 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP)

The applicable transportation noise guidelines for new residential developments are those in MECP Publication NPC-300, “*Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning.*”

For road traffic sources, the MECP noise guidelines are defined in terms of the daytime and nighttime sound level ($L_{eq,Day}^{(1)}$ and $L_{eq,Night}^{(2)}$, in dBA). The requirements to address noise from road traffic are summarized in the following sections and also in Appendix C.

For office buildings, the only noise criterion indicated in NPC-300 is an indoor daytime sound level limit. For road traffic sound sources, the indoor daytime noise guideline is $L_{eq,Day}$ is 45 dBA, for individual or semi-private offices, conference or meeting rooms.

There are no ventilation requirements for offices and any associated outdoor spaces would not be considered noise sensitive. As such, the air conditioning and sound barrier requirements typically applied to residential buildings do not apply to office buildings.

Office are not considered noise sensitive relative to stationary source noise (i.e., noise from adjacent buildings).

2.3 TRANSPORTATION NOISE IMPACT ASSESSMENT

Using the traffic data in Table 1, the daytime and nighttime sound levels ($L_{eq,Day}$ and $L_{eq,Night}$) were calculated using STAMSON V5.04 – ORNAMENT, the computerized road traffic noise prediction model of the MECP.

(1) 16-hour daytime (0700 to 2300 hours) equivalent continuous sound pressure level.
(2) 8-hour nighttime (2300 to 0700 hours) equivalent continuous sound pressure level.

The daytime sound levels were calculated at the worst-case windows of the upper-floor office space at the facade closest to Manotick Main Street.

The highest unmitigated daytime sound level of 65 dBA is predicted to occur at the east-facade windows.

Table 2 summarizes the predicted sound levels at the worst-case locations. Appendix D contains a sample calculation.

TABLE 2: OUTDOOR SOUND LEVELS DUE TO TRANSPORTATION SOURCES

Location	Source	Distance (m) ⁽¹⁾	L _{eq} Day (dBA)
Office Building East facade	Manotick Main Street	15	62

Notes:

(1) Distance from centreline of roadway to the building façade.

2.4 TRANSPORTATION NOISE CONTROL REQUIREMENTS

The indoor noise level guidelines for the transportation sources can be achieved by using appropriate construction for exterior walls, windows and doors. In determining the worst-case architectural requirements for the office building, exterior wall and window areas relative to the associated floor area were taken from the floor plans in Appendix A.

For the worst-case office location, exterior wall and window construction meeting minimum non-acoustical requirements of OBC will achieve the applicable indoor sound level limits for offices.

The window and wall STC requirements should be updated if floor plans and elevations are revised.

3.0 STATIONARY NOISE SOURCE ASSESSMENT

The main noise sources associated with the proposed development with the potential to create noise impact at the neighbouring receptors are the rooftop mechanical units. Deliveries are expected to infrequent and be limited to medium trucks or cube vans.. The noise sensitive receptors in vicinity are the closest dwellings to the north, south and east of the site.

3.1 ENVIRONMENTAL NOISE GUIDELINES – STATIONARY NOISE SOURCES

The environmental noise guidelines of the MECP for stationary noise sources, as provided in Publication NPC-300, are discussed briefly below and summarized in Appendix C.

Stationary sources are treated differently by the MECP guidelines than transportation sources of noise (such as road traffic and railways). Stationary source noise criteria used for noise impact study are dependent on the type of area and the ambient sound environment. The site and surrounding area are Class 1 – Urban; i.e. an area where the ambient sound environment is

dominated by “urban hum”, given the proximity of the area road network and surrounding industrial/commercial uses.

3.1.1 Non-Impulsive Sources

As summarized in Table 3 below, the sound level limits for steady, non-impulse sources are defined as the higher of the ambient (due to road traffic) or the minimum exclusion limits given by:

- 50 dBA during any hour in the daytime (0700 to 1900) and evening (1900 to 2300) at the exterior plane of window (POW) to a noise-sensitive space or at an outdoor point of reception (OPOR); and
- 45 dBA during any hour in the nighttime (2300 to 0700) at a POW.

The guideline limits for stationary sources do not apply to OPORs at night or indoors (at any time).

3.1.2 Impulsive Sources

Impulsive sounds are a category of sounds which last for a brief time (typically fractions of one second). Examples are the sounds of hammering on metal, a forklift drives over a dock leveler plate while loading/unloading goods or when a truck couples/uncouples from a trailer. This type of noise source is not anticipated for the development and is not discussed further.

TABLE 3: EXCLUSION LIMITS - STATIONARY NOISE SOURCES

Time of Day	Source Sound Power Level Exclusion Limits (dBA)	
	Class 1 Area Plane of Window (POW)	Class 1 Area Outdoor Point or Reception (OPOR)
Daytime (0700 - 1900 hours)	50	50
Evening (1900 - 2300 hours)	50	50
Nighttime (2300 - 0700 hours)	45	–

3.1.3 Receptor Location

The closest noise sensitive receptors in the vicinity of the site are the dwellings immediately to the north and south and those on the directly across Manotick Main Street. Sound levels were calculated at the upper floor of each dwelling as well as at the closest rear yards (OPORs) for the dwellings.

The receptors are shown in Figure 3.

3.1.4 Applicable Guideline Limits

To be conservative, the minimum exclusion limits provided in Table 3 above have been taken to apply at the residential receptors in the vicinity.

3.2 NOISE SOURCES AND OPERATING SCENARIOS

Noise sources at the proposed industrial development include rooftop units (RTU's) on the roof of the office building.

Detailed mechanical design for the building has not yet been completed. However, based on information provided by the mechanical engineer, it was assumed that there would be three HVAC units with 7.5 tons of cooling capacity located towards the back of the building, as shown on Figure 3. Sound data for the HVAC units was taken from manufacturer's data (Lennox LGT series).

For the worst case hour, the operating scenarios are described as:

- Daytime/evening working scenario hour (worst-case hour between 0700 and 2300):
 - All three HVAC units operating for the full hour (60 minutes/hr).
- Nighttime scenario hour (between 2300 and 0700):
 - All three HVAC units operating for the half hour (30 minutes/hr).

The noise sources are shown on Figure 3. The reference sound level data is shown in Table 4.

TABLE 4: SOURCE SOUND POWER LEVELS – NON-IMPULSIVE SOURCES

Source ID ⁽¹⁾	Source Description	Source Sound Power Level (dBA)	Source Height (m)	Operating Time (minutes or movements per hour)	
				Daytime	Nighttime
RTU1, 2 and 3	7.5-Ton HVAC unit	87	1.2 ⁽²⁾	60	30

Notes:

(1) See Figure 3.

(2) Source height is relative to the top of the roof.

3.3 ANALYSIS METHOD

The analysis was done using CadnaA V2023 environmental noise modelling software, which follows the protocol of ISO Standard 9613-2, "*Acoustics – Attenuation of Sound during Propagation Outdoors*". This model was used to predict the sound levels (in terms of $L_{eq, 1hr}$) at each of the affected points of noise reception, accounting for distance attenuation, ground attenuation, inherent screening, and barrier attenuation.

The following assessment parameters were used:

- The site and surrounding area were modelled with existing topography.
- Surrounding areas were modelled as soft ground ($G = 0.8$).
- The proposed buildings were modelled at a height of 7.2 m with higher sections at the east and west ends of the building and a 1.1 m high parapet wall.

Additional calculation details are included in Appendix E.

3.4 PREDICTED SOUND LEVELS

Figure 3 summarizes the predicted sound levels at the closest receptors. As shown, the predicted sound levels due to noise sources from the site meet the daytime/evening and nighttime guideline limits at the closest noise sensitive receptors in the vicinity. As such, noise mitigation measures are not required for the proposed development.

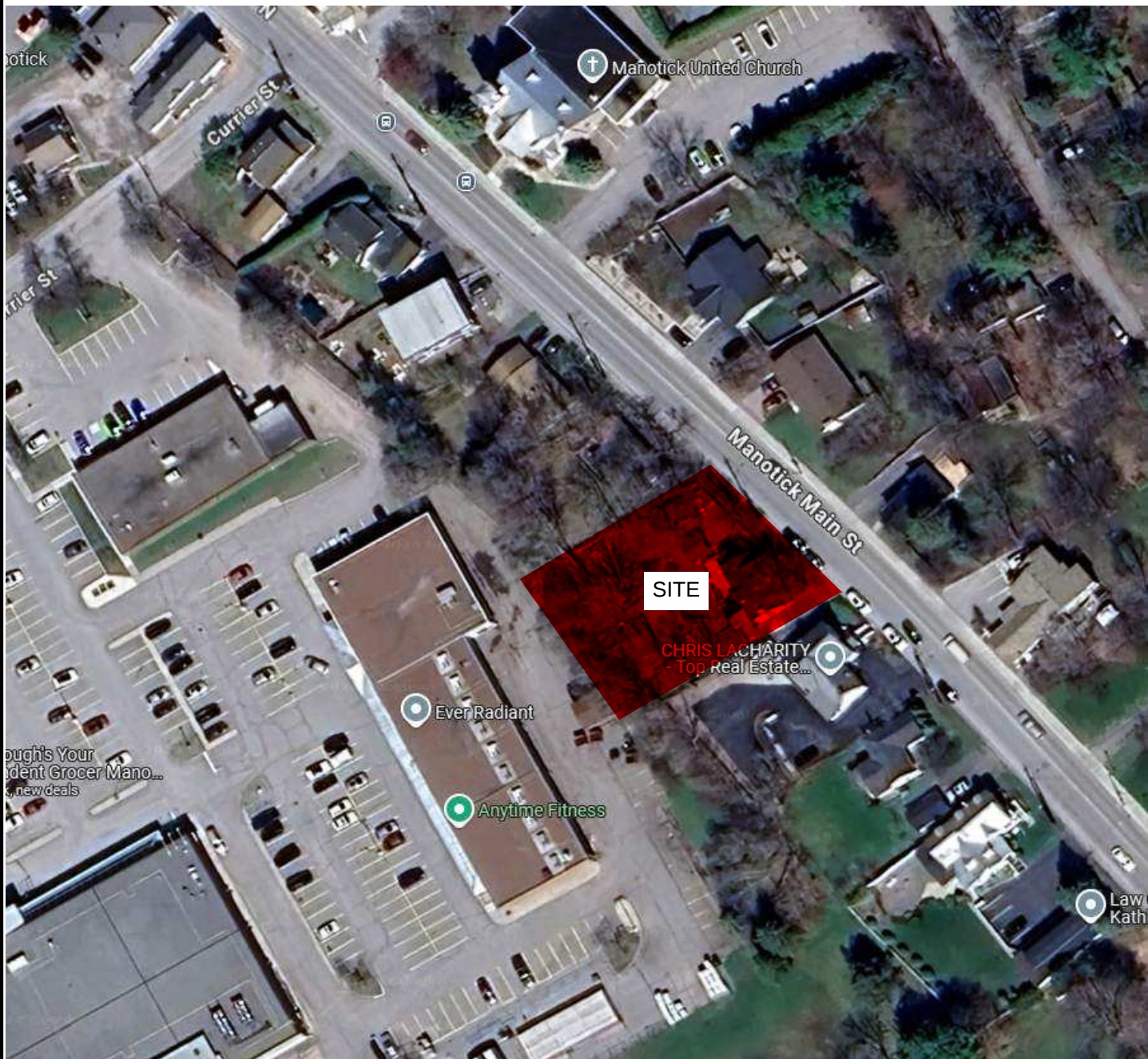
4.0 CONCLUSION

With the incorporation of the recommended noise mitigation measures, the applicable MECP noise guidelines can be met and a suitable acoustic environment provided. The approvals and administrative procedures are available to ensure that the noise requirements are implemented. Requirements should be confirmed once mechanical plans are developed.

5.0 REFERENCES

1. PC STAMSON 5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.
2. Building Practice Note No. 56, "Controlling Sound Transmission into Buildings", by J.D. Quirt, Division of Building Research, National Council of Canada, September 1985.
3. "Environmental Noise Guideline – Stationary and Transportation Sources, Approval and Planning", Ontario Ministry of the Environment, Publication NPC-300, October 2013.
4. CadnaA, version 2023, DataKustik GmbH.
5. ISO 9613-2, "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation".

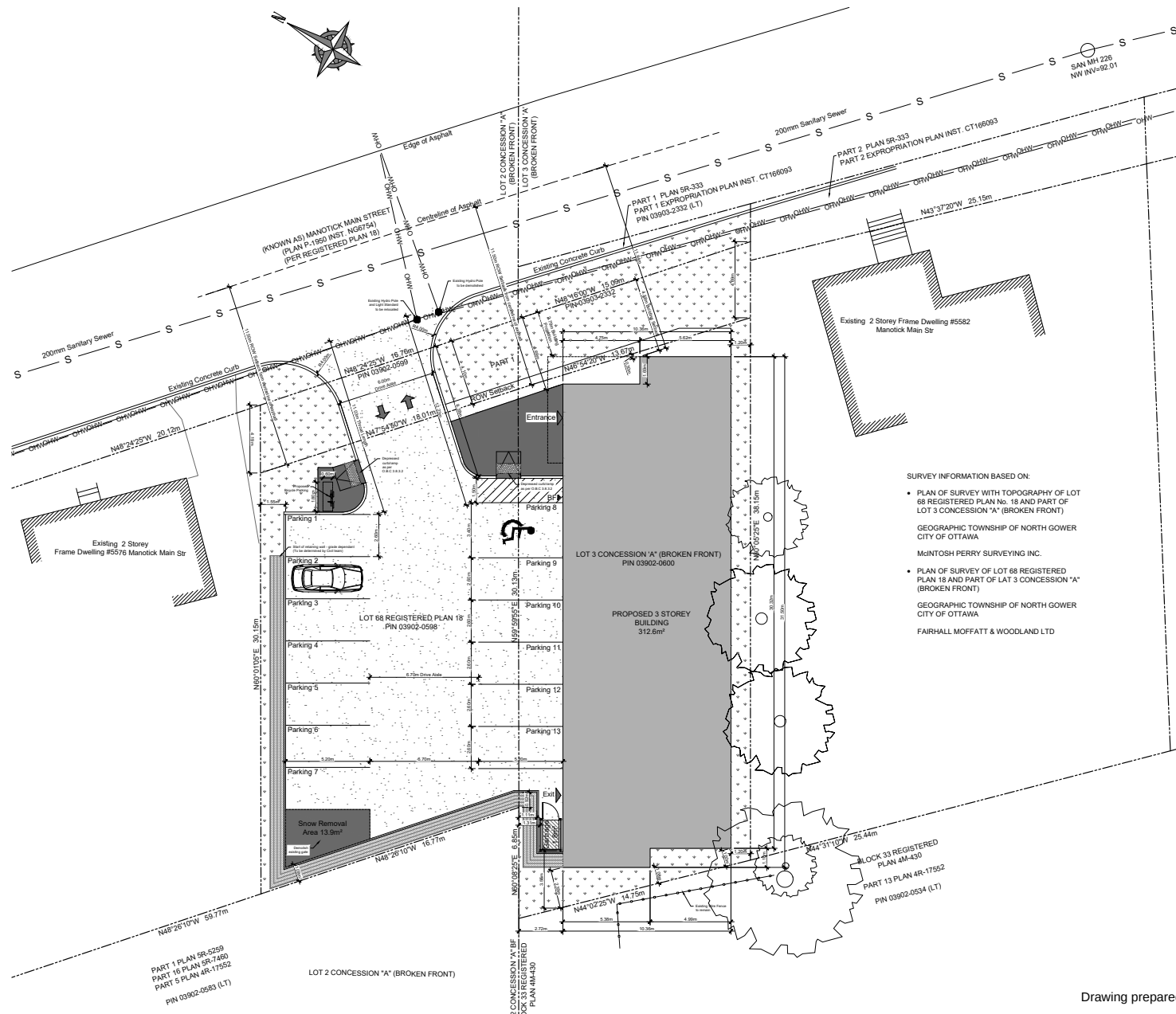
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5580 Manotick Main St, Ottawa - Noise V0_2.docx



Title	Key Plan
Project Name	5580 Manotick Main Street

Date	2025-02-13
Project No.	124-0003

Figure	1
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Drawing prepared by Ignite Architecture Inc.



	Title		Date	Figure 3
	Predicted Sound Levels (dBA) due to Mechanical Equipment		2025-02-12	
	Project Name		Project No.	
	5580 Manotick Main St.		124-0003	

APPENDIX A

ARCHITECTURAL DRAWINGS

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DRAWING REVISIONS

No.	Issued for:	Date:
1	Issued for Site Plan Application	11 Feb 2024

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Fairhall Moffatt & Woodland
LIMITED
ONTARIO LAND SURVEYORS
Surveying and Land Information Services
100-400 Terry Fox Dr., Kanata, ON K2L 4B4
Tel: 613-591-2580 www.fmw.on.ca

DRAWING TITLE:

PROPOSED SITE PLAN
AND ELEVATIONS

PROJECT:

DWG NO:

2208 A0



LOCATION PLAN

Building Analysis	
Building Area:	
Basement Floor Area:	312.6m ²
Ground Floor Area:	312.6m ²
Second Floor Area:	312.6m ²
Third Floor Area:	131.8m ²
Gross Floor Area:	1069.6m ²

O.B.C. Requirements	
Classification:	3.2.2.62
No. of Storeys:	Group D, up to 3 Storeys
No. of Facing Streets:	3
Sprinkler System:	No
Maximum Area:	1600m ²
Construction:	Combustible or Noncombustible Construction

Parking Requirements				
Space:	Area Classification:	Area:	Parking Requirement:	Total Parking required:
Ground Floor Pharmacy	Retail Store	93 m ²	3.4 per 100sqm	3.162
Ground Floor Office	Office Space	46.5 m ²	2.4 per 100sqm	1.116
Ground Floor Office	Office Space	46 m ²	2.4 per 100sqm	1.104
Second Floor Office	Office Space	46.5 m ²	2.4 per 100sqm	1.116
Second Floor Medical Suite	Medical Facility	171.3 m ²	4 per 100sqm	6.852
Third Floor Office (Owner's)	Office Space	76.6 m ²	2.4 per 100sqm	1.838
Total:				15.188

Weekday				Saturday			
Morning	Noon	Afternoon	Evening	Morning	Noon	Afternoon	Evening
13.6	13	14.2	6.2	5.6	7.6	7.4	3.7

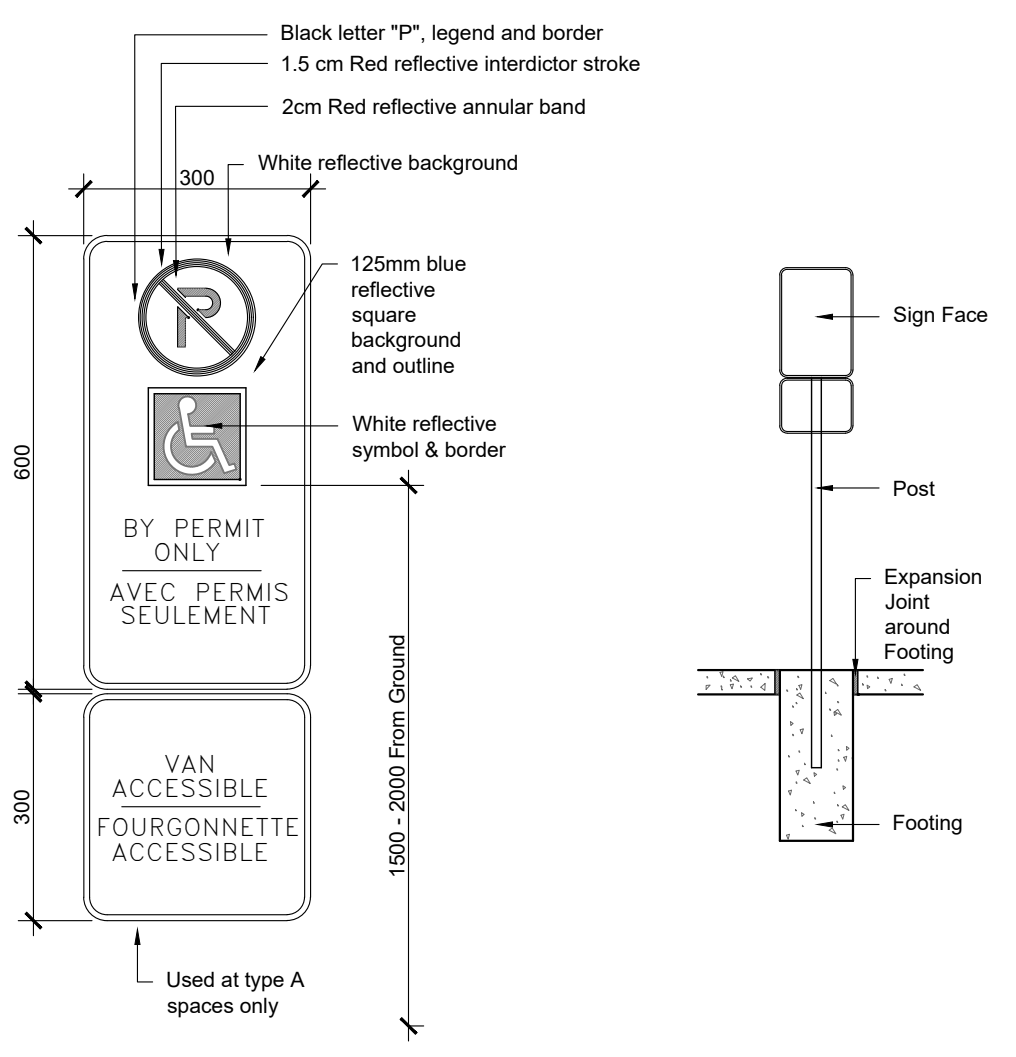
Mechanism	Provision	Provided
Minimum lot area	1350m ²	1016.6m ²
Minimum lot width	20m	31.85m
Minimum front yard setback	(i) minimum - no minimum (ii) maximum - 3m	4.58m
Right of way setback	Minimum 11.5m from centreline of road	11.84m from centreline of road
Minimum corner side yard setback	(i) minimum - 3m (ii) maximum - 4.5m	n/a
Minimum interior side yard setback	Where abutting Residential Zone: 3m Where abutting any other zone: no minimum	n/a
Minimum rear yard setback	(i) residential use building: 25% of lot depth, minimum of 7.5m (ii) non-residential use and mixed use buildings abutting a residential zone: 7.5m (iii) all other cases: no minimum	n/a
Maximum building height	(i) minimum - 6.7m (ii) maximum - 11m	n/a
Minimum required parking	Minimum Required: 14.2 Parkings	13 Parkings (Minor Variance Required)
Barrier free parking required	1 for the first 25 parking spaces required (Traffic and Parking By-law No. 2017-301)	1 Barrier Free Parking Provided
Barrier free parking space size	3.4 m wide (Traffic and Parking By-law No. 2017-301)	3.4 m width Provided
Minimum required bicycle parking space	1 space for every 1000m ² of GFA	1 Bicycle Parking Provided
Minimum width of landscaped area	No minimum, except that where a yard is provided and not used for required driveways, aisles, parking or loading spaces, the whole yard must be landscaped	Whole yard is landscaped
Landscape area surrounding parking lot	For a parking lot containing more than 10 but fewer than 100 spaces: 3 m abutting a street and 1.5 m not abutting a street (Table 110) Must be located 9m from a lot line abutting a public street and 3 m from any other lot line and screened from view with an opaque screen with a minimum height of 2 m	Abutting the street: 8.38 m Not abutting a street: 0.92 m (Minor Variance Re quired)
Outdoor garbage		Not abutting a street: 1.31 m (Minor Variance Re quired)

All Accessible parking stalls shall be designated by one sign per bay meeting accessibility design standards:

- Mark with international symbol of accessibility;
- Ensure size of 300mm wide by 300mm high (minimum);
- Mount at height of 1500mm to 2000mm (centre) (E.G. wall or post mounted) from ground floor;
- Ensure a high tonal contrast is provided between sign and background environment;
- Provide information text, compliant with city by law requirements; and
- Provide additional bilingual signage that identifies type A spaces as "van accessible/ fourgonnette accessible".

Signage face: 0.64mm gauge aluminum sign blank, white background with top and bottom mount holes.

Mounting: The sign face must be secured to a post with two galvanized 12mm hex. head bolts and nuts with flat washers on both sides.



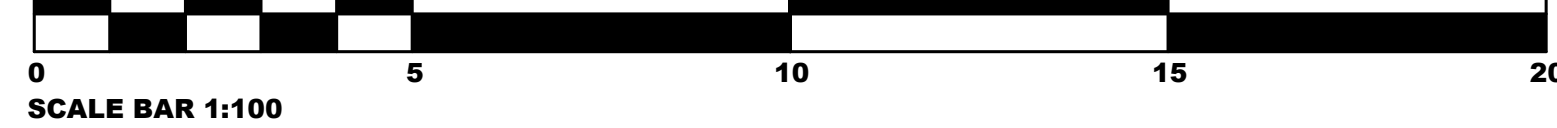
Barrier Free Sign Face

Mounting Detail

Legend:	
Sodded Areas (Landscape Design by Others)	Retaining Wall
Tactile Attention Indicator as per O.B.C. 3.8.3.18	Two way traffic
Concrete Pad	Entrance to Building
Asphalt	Barrier Free Parking Sign

SITE PLAN

SCALE: 1:100



BIKE RACK PLAN

SCALE: 1:50

BIKE RACK ELEVATION

SCALE: 1:50

GARBAGE ELEVATION

SCALE: 1:50

GARBAGE PLAN

SCALE: 1:50

SURVEY INFORMATION BASED ON:

- PLAN OF SURVEY WITH TOPOGRAPHY OF LOT 68 REGISTERED PLAN No. 18 AND PART OF LOT 3 CONCESSION "A" (BROKEN FRONT)

GEOGRAPHIC TOWNSHIP OF NORTH GOWER
CITY OF OTTAWA

McINTOSH PERRY SURVEYING INC.

- PLAN OF SURVEY OF LOT 68 REGISTERED PLAN 18 AND PART OF LAT 3 CONCESSION "A" (BROKEN FRONT)

GEOGRAPHIC TOWNSHIP OF NORTH GOWER
CITY OF OTTAWA

FAIRHALL MOFFATT & WOODLAND LTD

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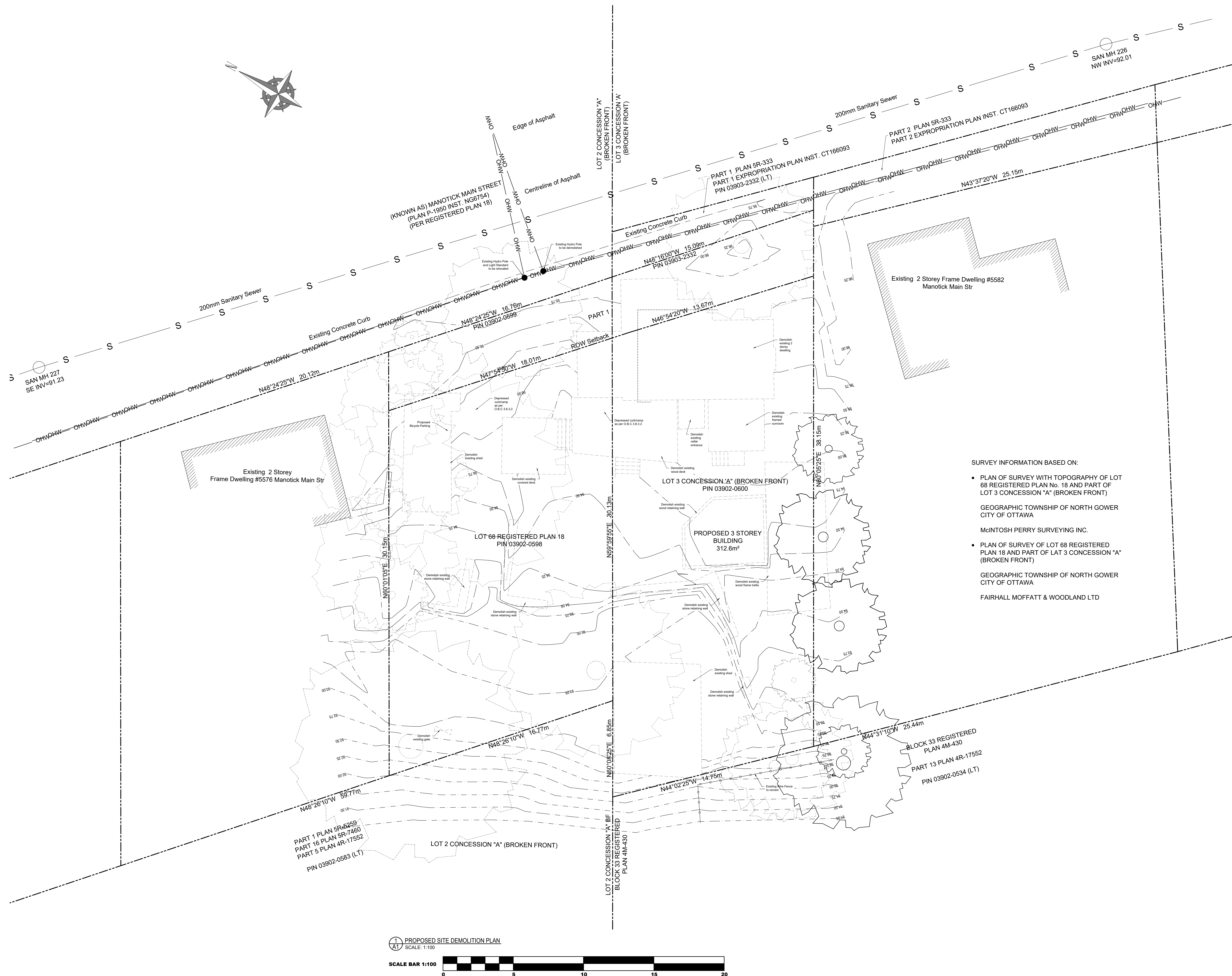
PROPOSED
DEMOLITION SITE PLAN

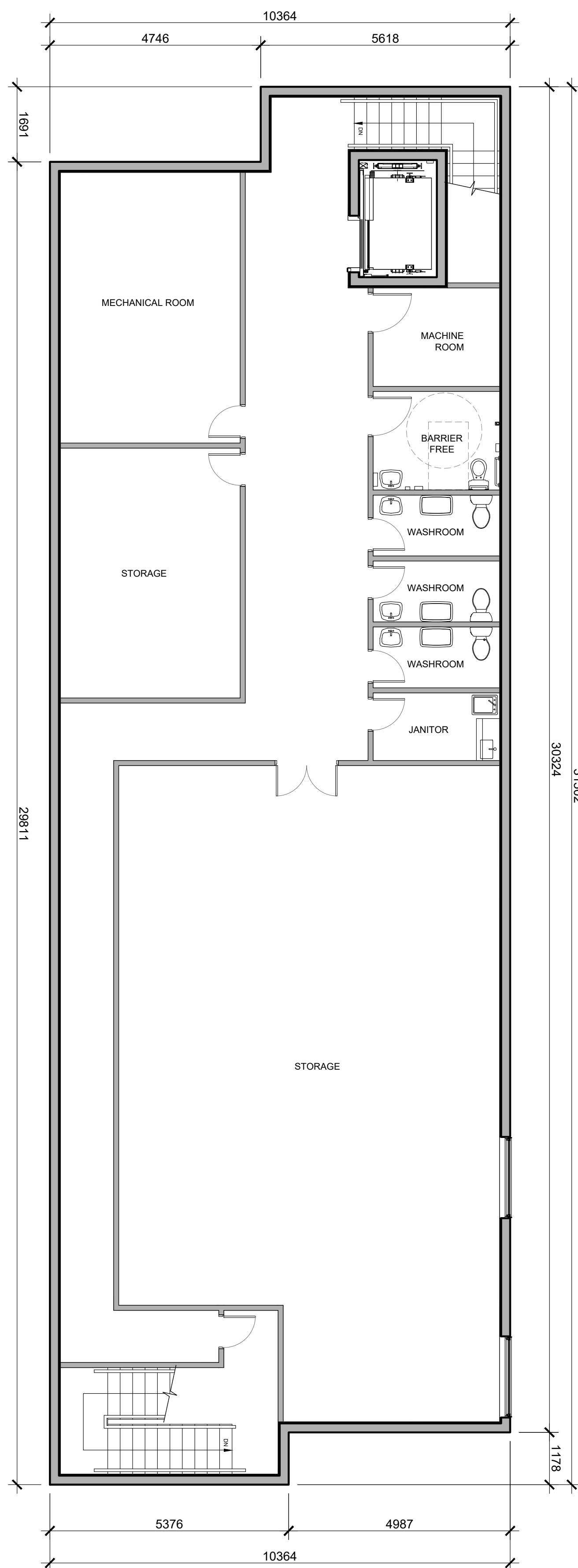
PROJECT:

2208

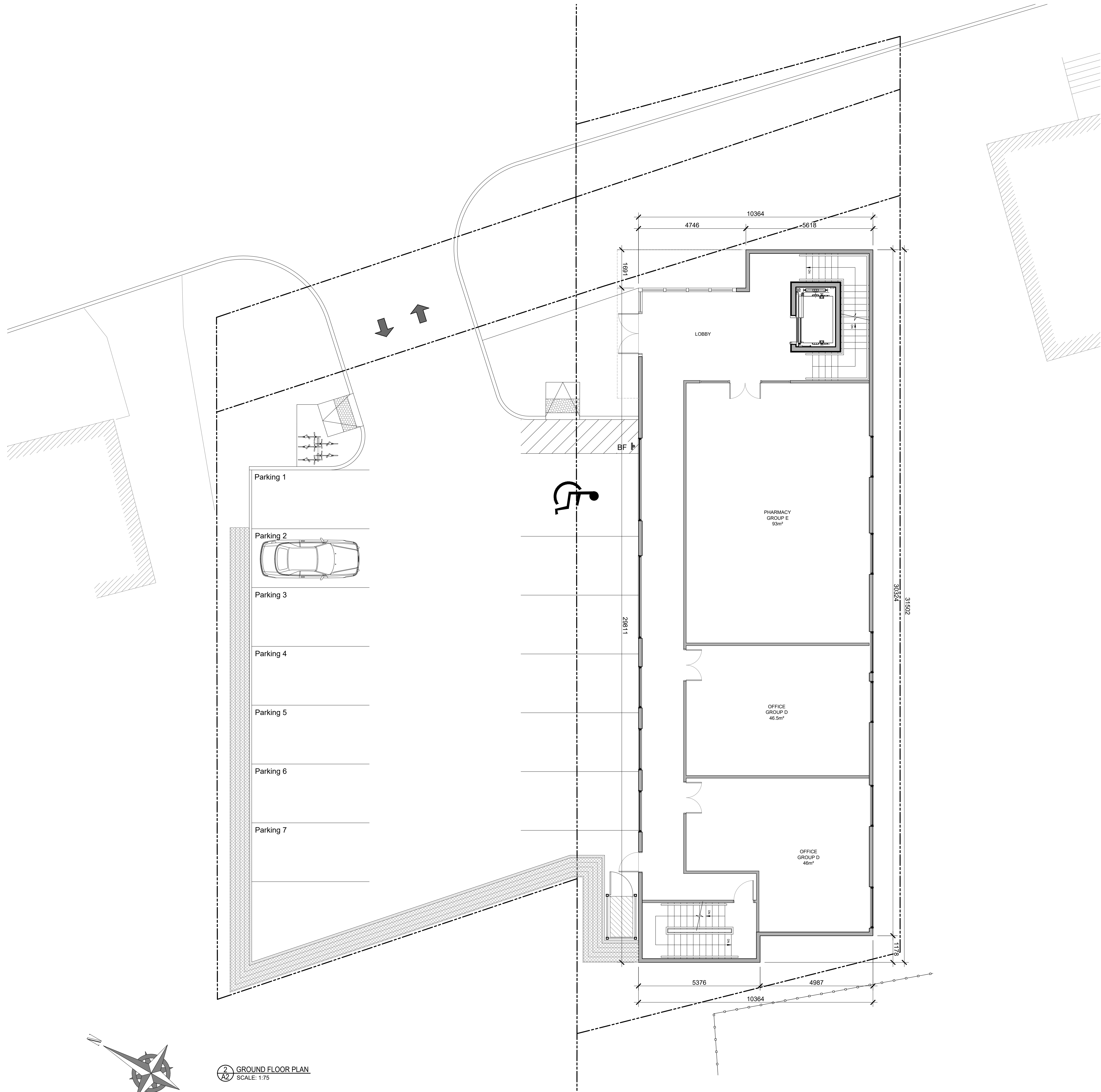
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A1

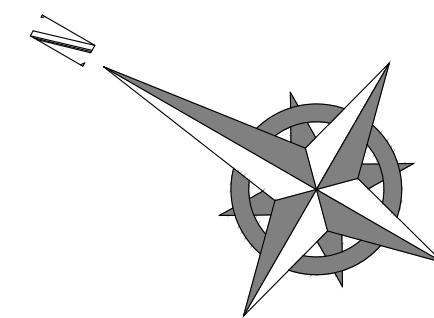




1 BASEMENT PLAN
A2 SCALE: 1:75



2 GROUND FLOOR PLAN
A2 SCALE: 1:75



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Fairhall Moffatt & Woodland
LIMITED
ONTARIO LAND SURVEYORS
Surveying and Land Information Services
100-600 Terry Fox Dr., Kanata, ON K2L 4B6
Tel: 613-591-2580 www.fmw.on.ca

DRAWING TITLE:

PROPOSED
FLOOR PLANS

PROJECT:

2208

DWG NO:

A2



1 VIEW OF PROPOSED BUILDING FROM MANOTICK MAIN STREET



2 VIEW OF PROPOSED BUILDING FROM MANOTICK MAIN STREET



3 PROPOSED MANOTICK MAIN STREET VIEW



4 PROPOSED NORTH ELEVATION



5 VIEW OF PROPOSED PARKING



6 PROPOSED WEST ELEVATION



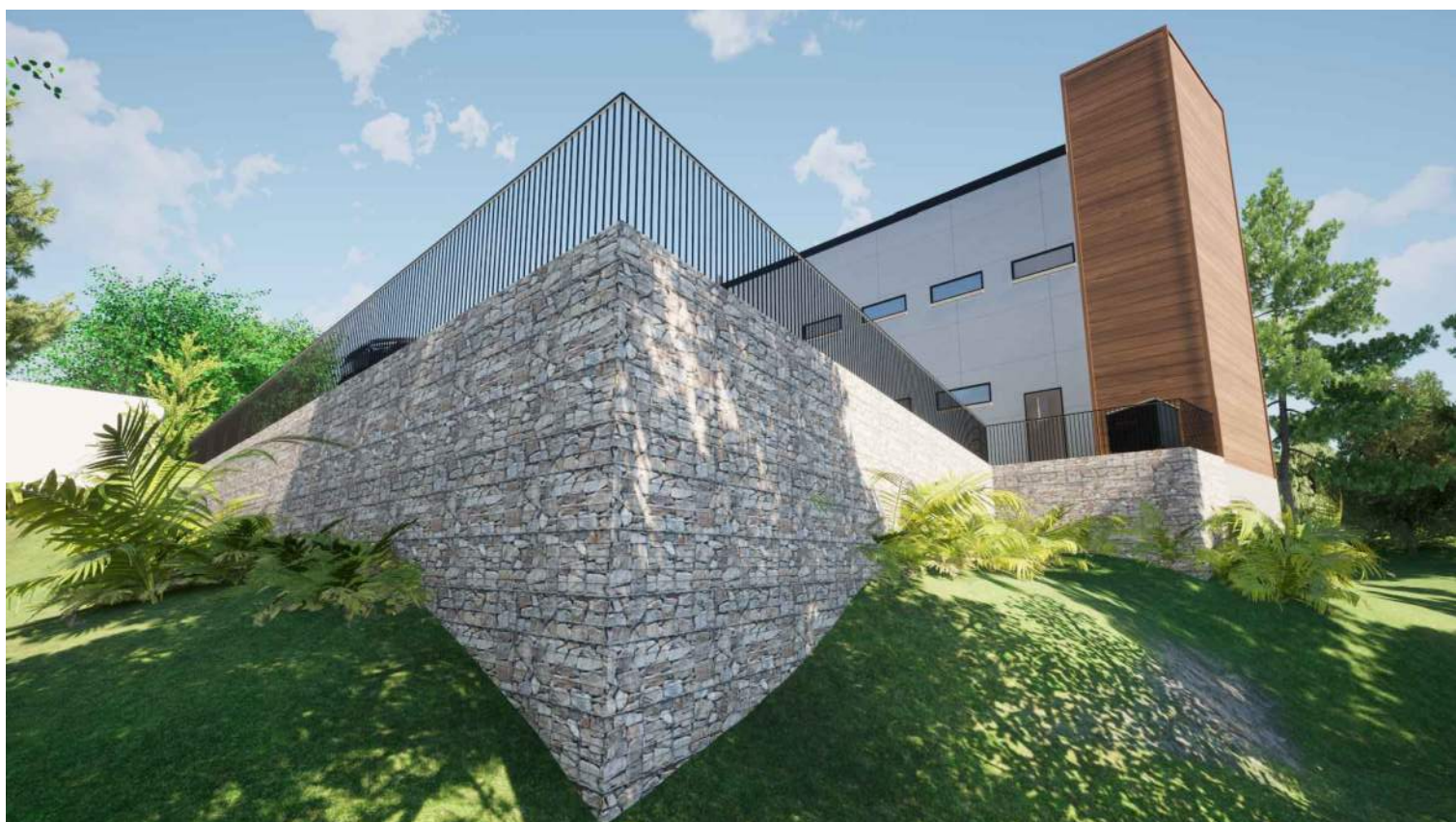
7 VIEW OF SOUTH ELEVATION



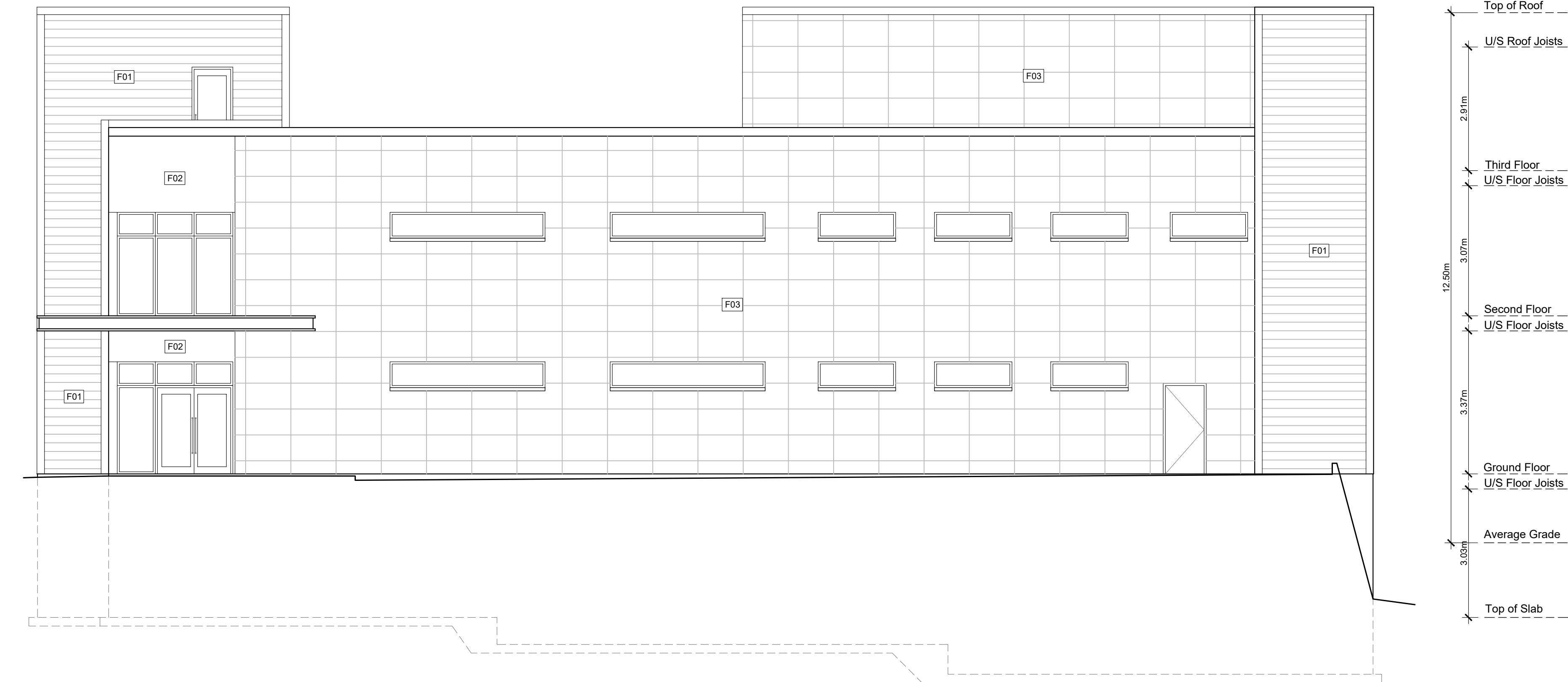
8 PROPOSED ROOFTOP



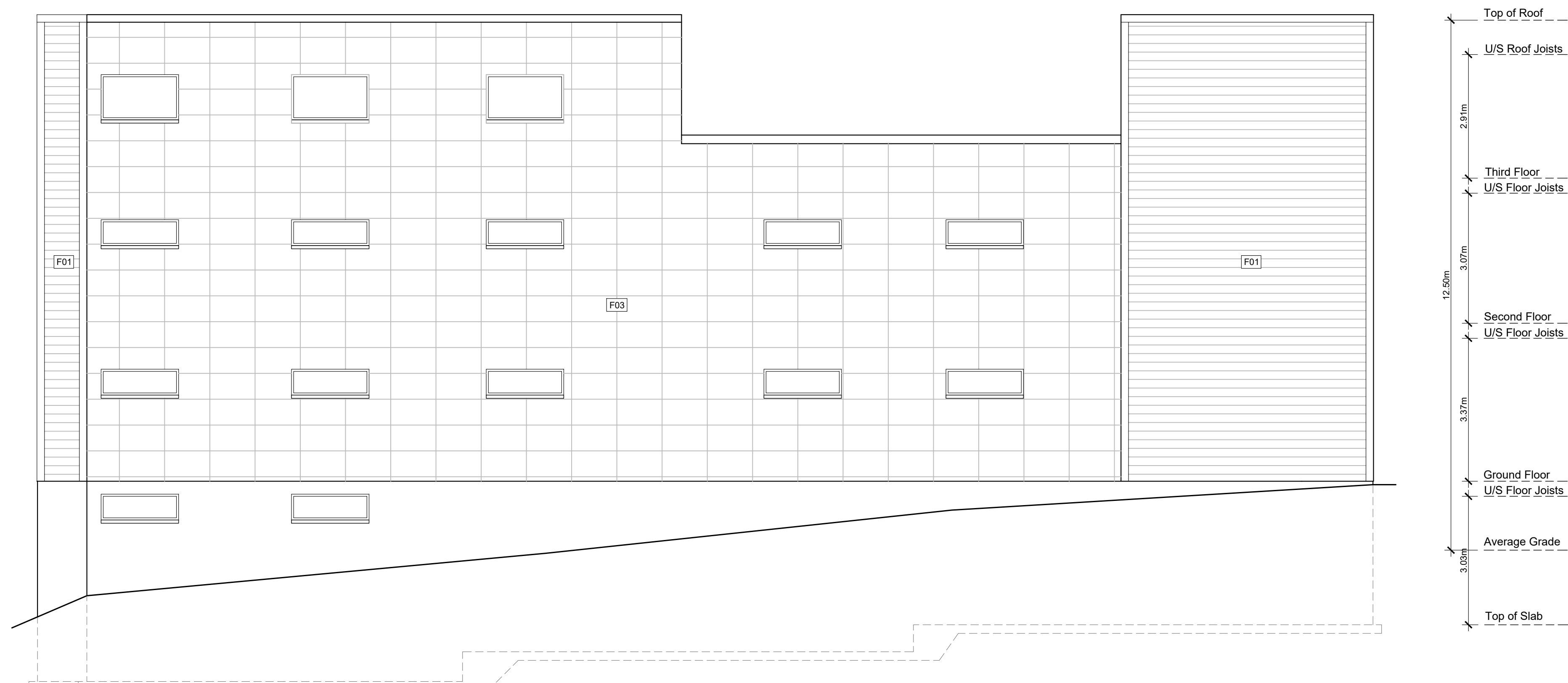
9 VIEW OF PARKING LOT GABION WALL



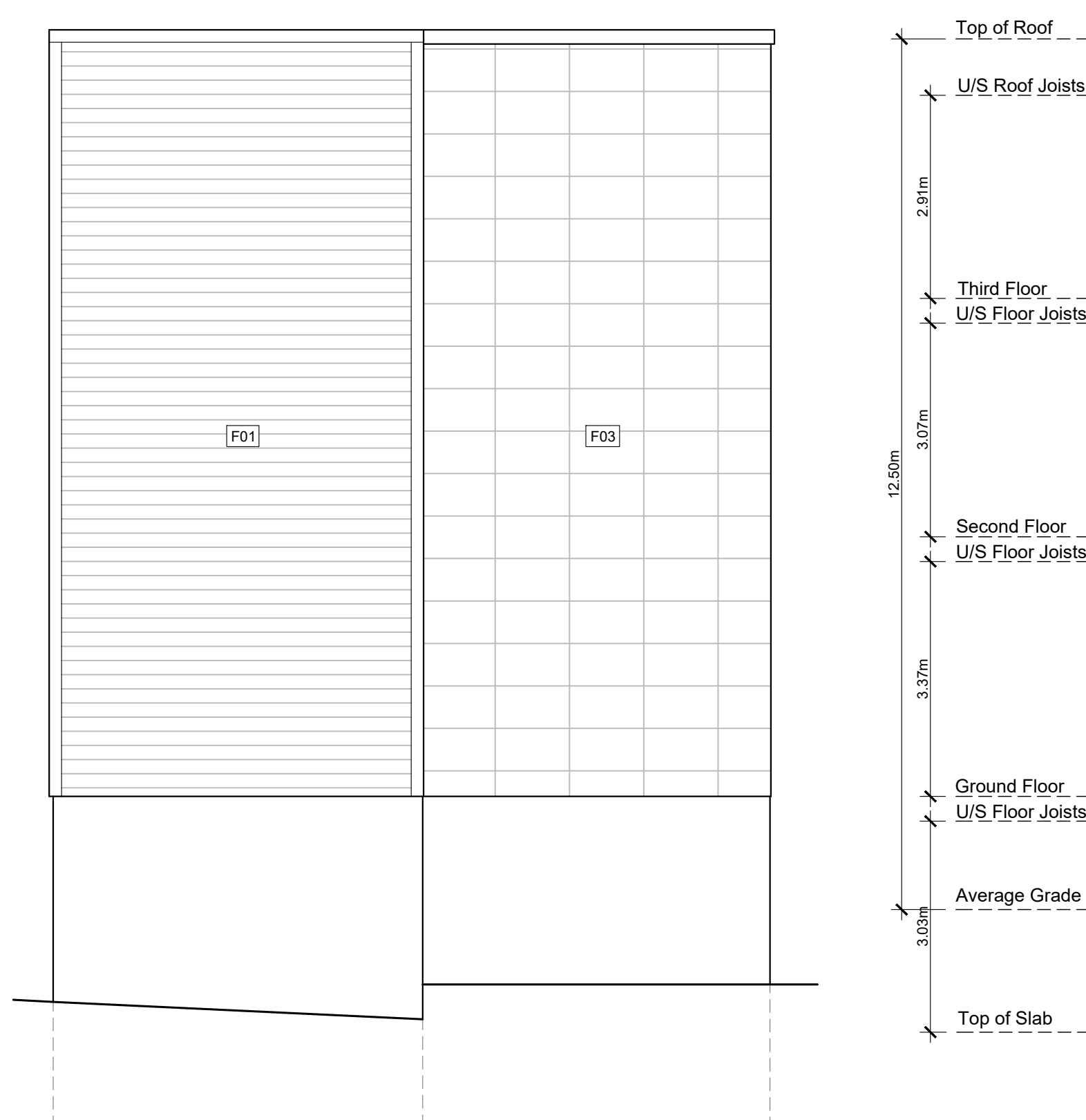
10 VIEW OF PARKING LOT GABION WALL



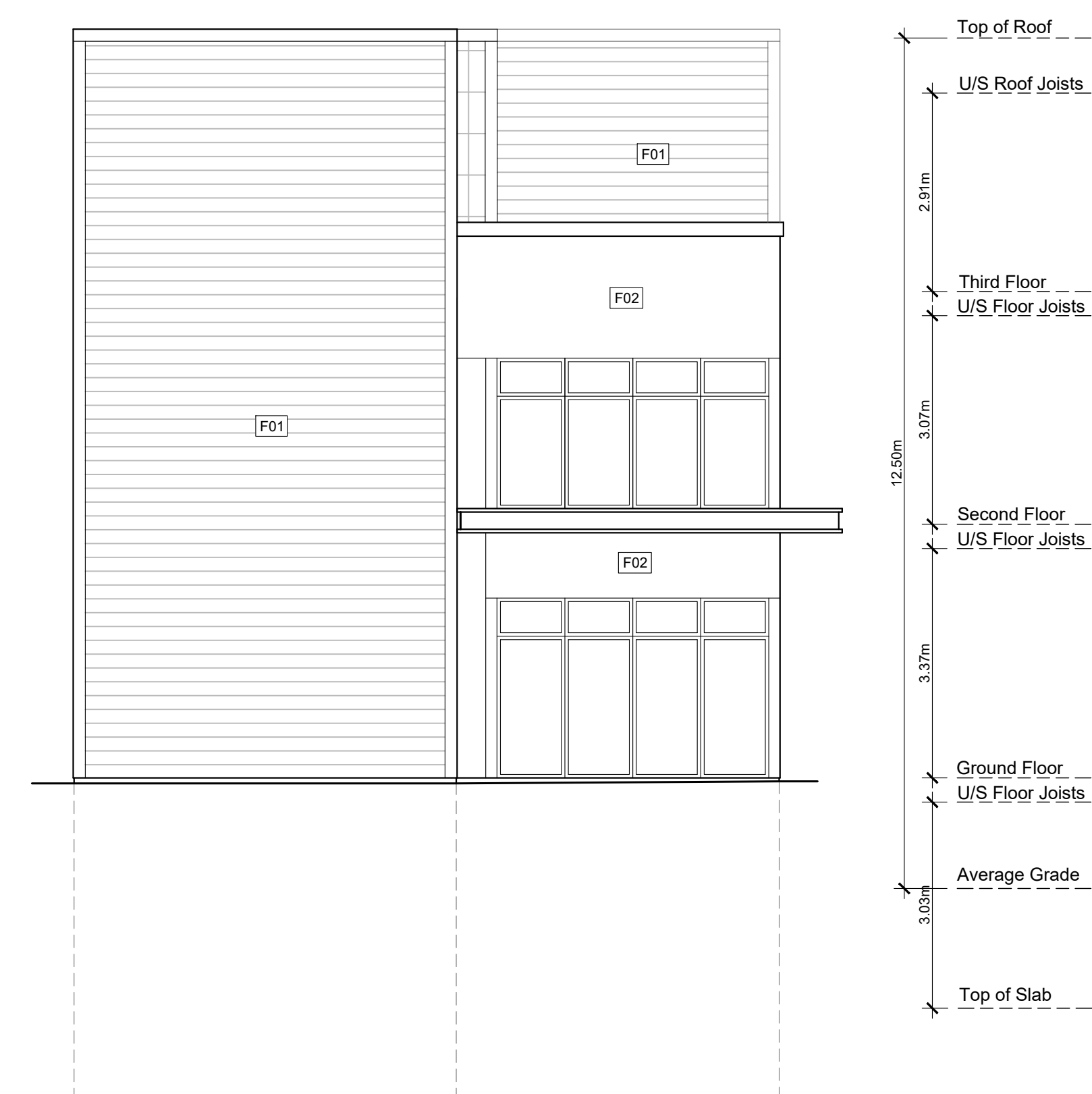
11 NORTH ELEVATION
SCALE: 1:100



12 SOUTH ELEVATION
SCALE: 1:100



13 WEST ELEVATION
SCALE: 1:100



14 EAST ELEVATION
SCALE: 1:100

FINISH NOTES
F01 PVC "Wood-Like" Siding F02 Aluminum Siding F03 Fibre Cement Panels - Hardie Panel

GENERAL NOTES:

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- The contractor shall check and verify all dimensions on site and report all discrepancies to the Architect.
- All work shall comply with the Ontario Building Code and the requirements of all authorities having jurisdiction.
- This drawing is the exclusive property of Ignite Architecture Inc. copyright reserved.

Note:
This Drawings shall be used only for the Site Plan Application, it is not to be used for Permit or Construction purposes.

SEAL:

ONTARIO ASSOCIATION
OF
ARCHITECTS
NICOLE CHILTON-JONES
LICENCE
9766

DRAWING REVISIONS		
No.	Issued for:	Date:
1	Issued for Site Plan Application	11 Feb 2024

SITE ADDRESS:
5580 Manotick Main Str
Manotick
ON K4M 1E2

APPLICANT:
ARCADIS
Arcadis Professional Services (Canada) Inc.
Suite 500, 333 Preston Street
Ottawa ON | K1S 5N4 | Canada
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www.arcadis.com

OWNER INFORMATION:
Abdulla Real Estate Holdings
Box 819 Manotick
K4M 1A7

ARCHITECT:
IGNITE
ARCHITECTURE INC.
533 Landswood Way
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Email: nicole@ignitearchitecture.ca

ENGINEERS:
Capacity Engineering Limited
www.celottawa.ca
505 March Rd. Suite 400,
Ottawa ON K2K 3A4

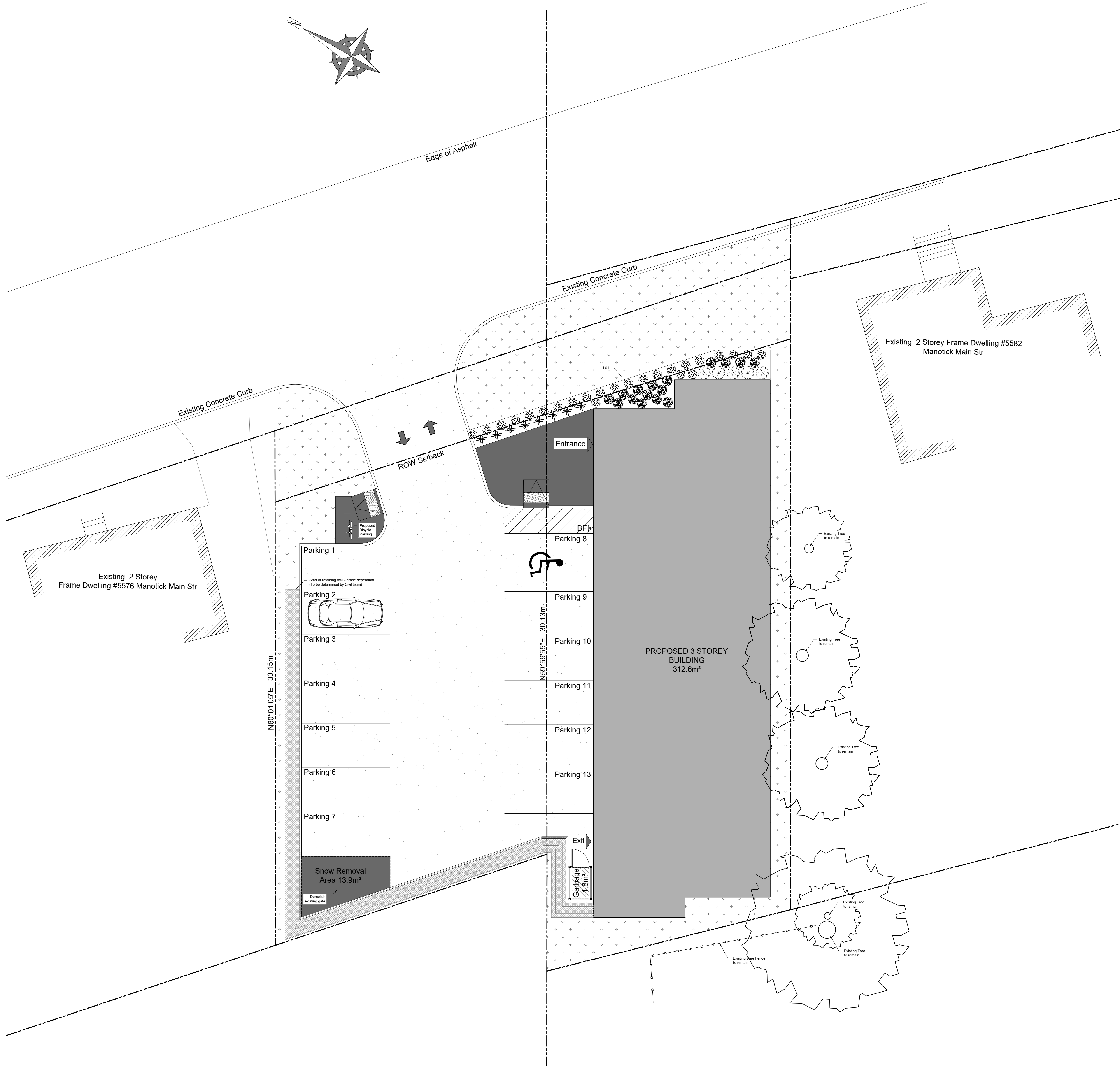
LRJ
ENGINEERING
5430 Carleton Rd., Ottawa ON K1J 9G2
www.lrl.ca 613-662-3454

SURVEYORS:
McINTOSH PERRY
SURVEYING INC.
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DRAWING TITLE:

PROPOSED ELEVATIONS

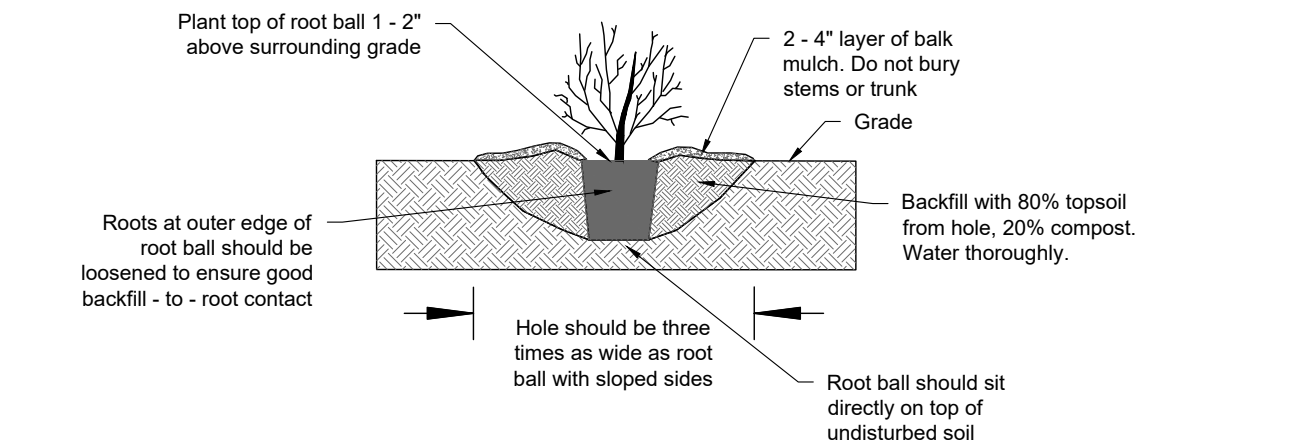
PROJECT:	DWG NO:
2208	A4



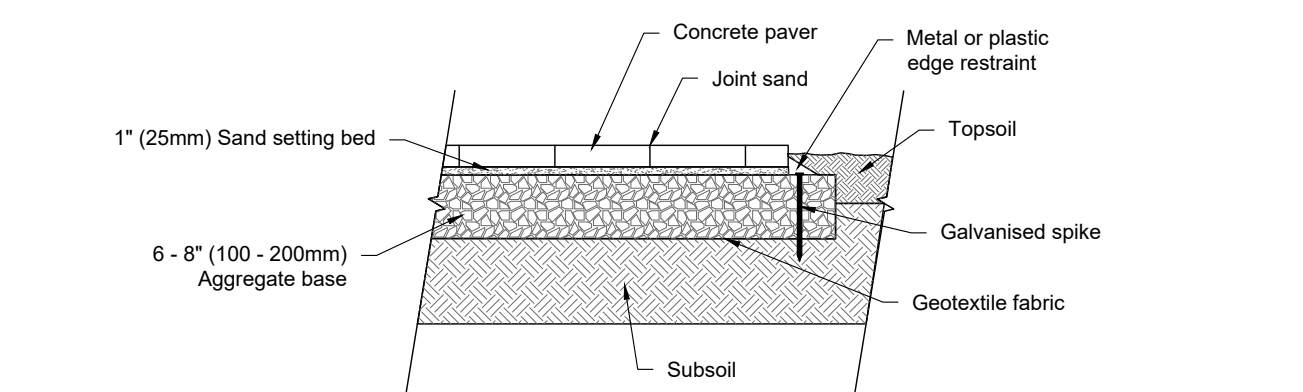
Legend:	
	Sodded Areas (Landscape Design by Others)
	Tactile Attention Indicator as per O.B.C. 3.8.3.18
	Concrete Pad
	Asphalt
	Retaining Wall
	Two way traffic
	Entrance to Building
	Barrier Free Parking Sign

LANDSCAPING NOTES

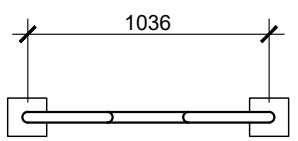
- Notes:
- All disturbed soft landscape areas to be seeded unless otherwise indicated
 - For sidewalks, curbs and parking, refer to Engineer's Drawings
- LD1 The planter bed will comprise of a mixture of deciduous shrubs listed below:
- Canada Yew (Evergreen) - Taxus Canadensis
 - Choisberry - Azygium Mennonifolium (also known as Photinia Melanocarpa)
 - High Bush Cranberry, Maple-Leaved Viburnum or Nannyberry - Viburnum Opulus var. Amersburgum (also known as V. Thibaultii), V. Kerriolium, or V. Lantago
 - Purple flowered Raspberry (large, showy flowers and leaves) - Rubus Odoratus



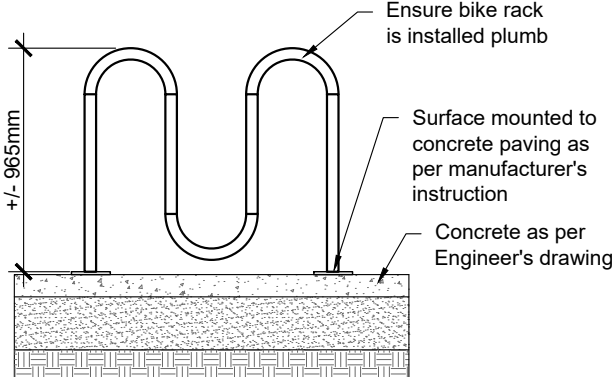
2 AS Typical Shrub and Perennial Planting Diagram



3 AS Typical Walkway and Patio Paver Cross Section

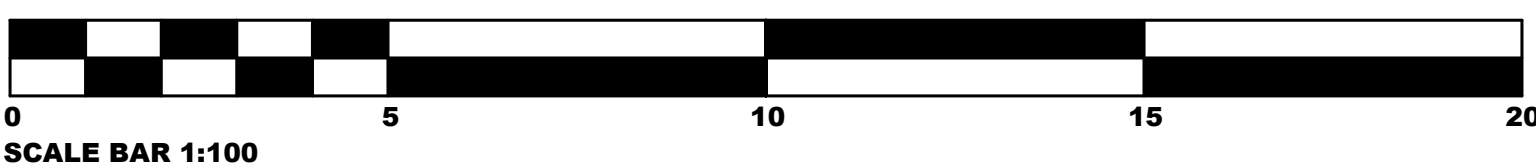


4 AS BIKE RACK PLAN SCALE: 1:50



5 AS BIKE RACK ELEVATION SCALE: 1:50

1 AS LANDSCAPE PLAN SCALE: 1:100



GENERAL NOTES:

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Note:
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SEAL:



DRAWING REVISIONS

No.	Issued for:	Date:
1	Issued for Site Plan Application	11 Feb 2024

SITE ADDRESS:

5580 Manotick Main Str
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ON K4M 1E2

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DRAWING TITLE:

LANDSCAPE PLAN

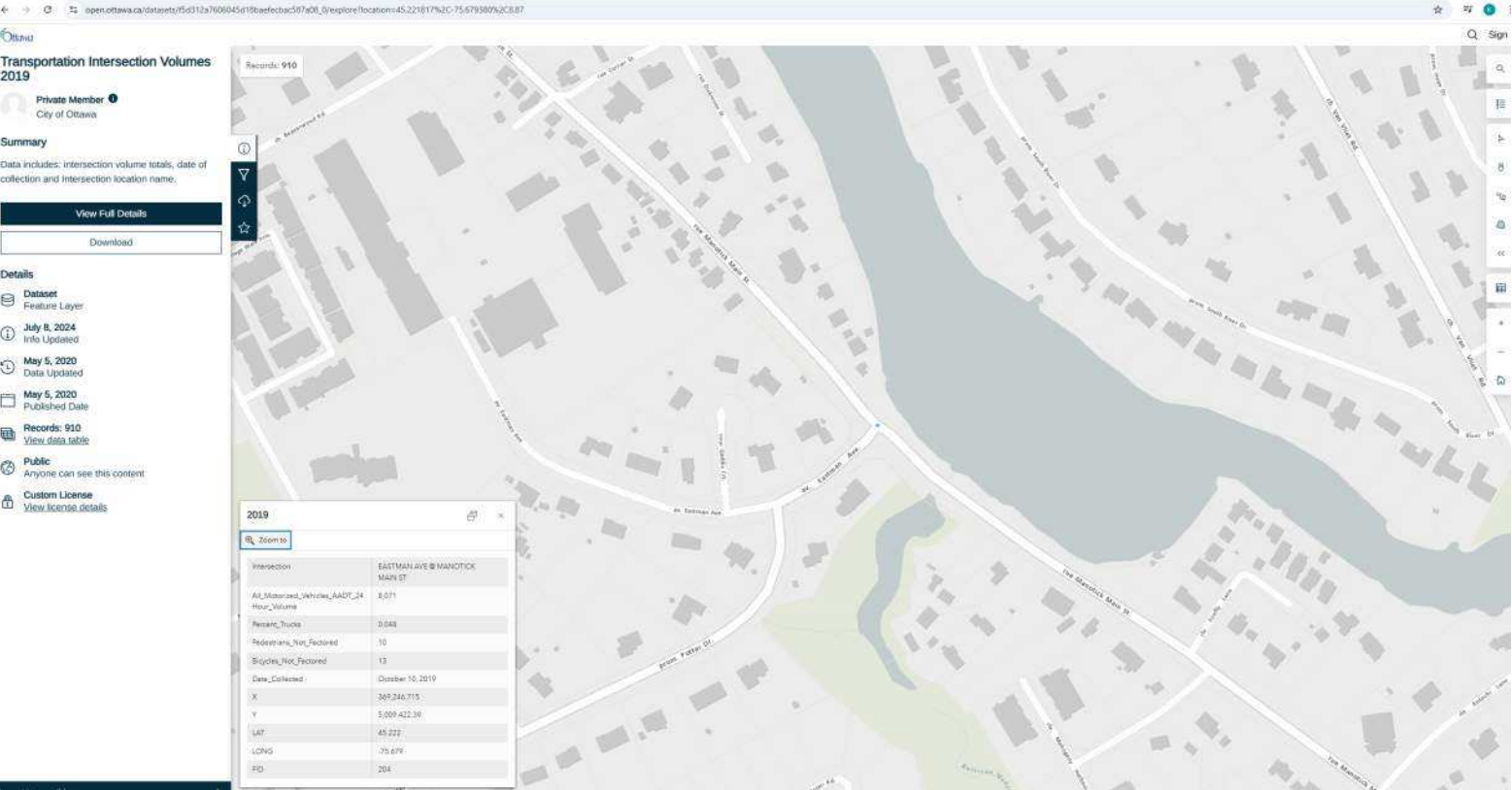
PROJECT: DWG NO:

2208 A5

APPENDIX B

TRAFFIC DATA

City of Ottawa Open Data Source - Manotick Main Street



APPENDIX C

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX C

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

Reference: MECP Publication NPC-300, October 2013: “*Environmental Noise Guideline, Stationary and Transportation Source – Approval and Planning*”.

SPACE	SOURCE	TIME PERIOD	CRITERION
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road	23:00 to 07:00	45 dBA
	Rail	23:00 to 07:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Sleeping quarters	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 0
Sleeping quarters	Road	23:00 to 07:00	40 dBA
	Rail	23:00 to 07:00	35 dBA
	Aircraft	24-hour period	NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30 [#]
Stationary Source			
Class 1 Area		07:00 to 19:00 ⁽¹⁾	50 ⁺ dBA
		19:00 to 23:00 ⁽¹⁾	50 ⁺ dBA
Class 2 Area		07:00 to 19:00 ⁽²⁾	50 ⁺ dBA
		19:00 to 23:00 ⁽²⁾	45 ⁺ dBA
Class 3 Area		07:00 to 19:00 ⁽³⁾	45 ⁺ dBA
		19:00 to 23:00 ⁽³⁾	40 ⁺ dBA
Class 4 Area		07:00 to 19:00 ⁽⁴⁾	55 ⁺ dBA
		19:00 to 23:00 ⁽⁴⁾	55 ⁺ dBA

..../cont'd

SPACE	SOURCE	TIME PERIOD	CRITERION
Plane of a Window of Noise Sensitive Spaces	Stationary Source Class 1 Area	07:00 to 19:00 ⁽¹⁾	50* dBA
		19:00 to 23:00 ⁽¹⁾	50* dBA
		23:00 to 07:00 ⁽¹⁾	45* dBA
	Class 2 Area	07:00 to 19:00 ⁽²⁾	50* dBA
		19:00 to 23:00 ⁽²⁾	50* dBA
		23:00 to 07:00 ⁽²⁾	45* dBA
	Class 3 Area	07:00 to 19:00 ⁽³⁾	45* dBA
		19:00 to 23:00 ⁽³⁾	45* dBA
		23:00 to 07:00 ⁽³⁾	40* dBA
	Class 4 Area	07:00 to 19:00 ⁽⁴⁾	60* dBA
		19:00 to 23:00 ⁽⁴⁾	60* dBA
		23:00 to 07:00 ⁽⁴⁾	55* dBA

- # may not apply to in-fill or re-development.
 * or the minimum hourly background sound exposure $L_{eq(1)}$, due to road traffic, if higher.
 (1) Class 1 Area: Urban.
 (2) Class 2 Area: Urban during day; rural-like evening and night.
 (3) Class 3 Area: Rural.
 (4) Class 4 Area: Subject to land use planning authority's approval.

Reference: MECP Publication ISBN 0-7729-2804-5, 1987: "Environmental Noise Assessment in Land-Use Planning".

EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)	CHANGE IN SUBJECTIVE LOUDNESS ABOVE	MAGNITUDE OF THE NOISE PROBLEM	NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)
No excess (<55 dBA)	—	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

MINIMUM EXCLUSION LIMITS FOR IMPULSIVE NOISE

Actual Number of Impulses in Period of One-Hour	Sound Level Limits (dBA)				
	Class 1 Areas			Class 4 Areas	
	Daytime/ Evening POW ⁽¹⁾	Nighttime POW ⁽¹⁾	Daytime/ Evening OPOR ⁽²⁾	Daytime/ Evening POW	Nighttime POW and Daytime/ Evening OPOR
9 or more	50	45	50	60	55
7 to 8	55	50	55	65	60
5 to 6	60	55	60	70	65
4	65	60	65	75	70
3	70	65	70	80	75
2	75	70	75	85	80
1	80	75	80	90	85

Notes:

- (1) POW – plane of window of noise-sensitive spaces.
(2) OPOR – outdoor point of reception. There are no sound level limits for OPORs during the nighttime period.

APPENDIX D

TRANSPORTATION NOISE SAMPLE CALCULATIONS

STAMSON 5.0 NORMAL REPORT Date: 15-11-2024 17:29:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te Time Period: Day/Night 16/8 hours
Description: **Daytime sound levels at façade closest to Manotick Main St**

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

Car traffic volume : 10352/1150 veh/TimePeriod *
Medium truck volume : 216/24 veh/TimePeriod *
Heavy truck volume : 216/24 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8071
Percentage of Annual Growth : 2.50
Number of Years of Growth : 16.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: ManotickMain (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 8.00 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: ManotickMain (day)

Source height = 1.19 m

ROAD (0.00 + 61.85 + 0.00) = 61.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.47	62.98	0.00	0.00	-1.13	0.00	0.00	0.00	61.85

Segment Leq : 61.85 dBA

Total Leq All Segments: 61.85 dBA

Results segment # 1: ManotickMain (night)

Source height = 1.19 m

ROAD (0.00 + 55.13 + 0.00) = 55.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	56.45	0.00	0.00	-1.32	0.00	0.00	0.00	55.13

Segment Leq : 55.13 dBA

Total Leq All Segments: 55.13 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.85

APPENDIX E

STATIONARY NOISE SAMPLE CALCULATIONS

124-0003

Point Source Table

Name	Sel.	M.	ID	Result. PWL			Lw / Li		Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates			
				Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night				X	Y	Z		
				(dBA)	(dBA)	(dBA)				dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		(m)	(m)	(m)	(m)	
RTU1			RTU1	86.7	86.7	86.7	Lw	AC		0.0	0.0	0.0				60.00	0.00	30.00	0.0		(none)	1.20	g	17917520.81	5021520.33	8.40
RTU2			RTU2	86.7	86.7	86.7	Lw	AC		0.0	0.0	0.0				60.00	0.00	30.00	0.0		(none)	1.20	g	17917526.46	5021523.65	8.40
RTU3			RTU3	86.7	86.7	86.7	Lw	AC		0.0	0.0	0.0				60.00	0.00	30.00	0.0		(none)	1.20	g	17917523.53	5021521.84	8.40

Sound Power Levels

Name		ID	Type	1/3 Oktave Spectrum (dB)													Source	
				Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin			
Lennox LGT092H4ES1Y		AC	Lw			0.0	76.0	79.0	84.0	83.0	79.0	73.0	66.0	86.7	88.3	Manufacturer's data		

Receiver

Name	Sel.	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
				Day	Eve	Night	Day	Eve	Night	Type	Auto	Noise Type			X	Y	Z
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
			R1	32.6	-80.2	29.6	0.0	0.0	0.0		x	Total	1.50	r	17917539.33	5021511.07	2.90
			R2	45.7	-80.2	42.7	0.0	0.0	0.0		x	Total	1.50	r	17917509.50	5021543.99	2.23
			R3	43.4	-80.2	40.4	0.0	0.0	0.0		x	Total	1.50	r	17917492.39	5021556.13	2.70
			R4	27.7	-80.2	24.7	0.0	0.0	0.0		x	Total	1.50	r	17917552.69	5021496.89	2.90
			R5	24.8	-80.2	21.8	0.0	0.0	0.0		x	Total	1.50	r	17917567.68	5021480.84	2.90

Receiver

Name: (untitled)

ID: R2

X: 17917509.50 m

Y: 5021543.99 m

Z: 2.23 m

Point Source, ISO 9613, Name: "RTU3", ID: "RTU3"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3	17917523.53	5021521.84	8.40	0	D	125	59.9	0.0	0.0	0.0	0.0	39.6	0.0	-0.0	0.0	0.0	5.2	0.0	0.0	15.1
3	17917523.53	5021521.84	8.40	0	D	250	70.4	0.0	0.0	0.0	0.0	39.6	0.0	1.3	0.0	0.0	4.3	0.0	0.0	25.2
3	17917523.53	5021521.84	8.40	0	D	500	80.8	0.0	0.0	0.0	0.0	39.6	0.1	0.7	0.0	0.0	5.6	0.0	0.0	34.8
3	17917523.53	5021521.84	8.40	0	D	1000	83.0	0.0	0.0	0.0	0.0	39.6	0.1	-0.5	0.0	0.0	7.5	0.0	0.0	36.3
3	17917523.53	5021521.84	8.40	0	D	2000	80.2	0.0	0.0	0.0	0.0	39.6	0.3	-0.7	0.0	0.0	9.2	0.0	0.0	31.9
3	17917523.53	5021521.84	8.40	0	D	4000	74.0	0.0	0.0	0.0	0.0	39.6	0.9	-0.7	0.0	0.0	11.4	0.0	0.0	22.9
3	17917523.53	5021521.84	8.40	0	D	8000	64.9	0.0	0.0	0.0	0.0	39.6	3.1	-0.7	0.0	0.0	13.9	0.0	0.0	9.0
3	17917523.53	5021521.84	8.40	0	N	125	59.9	0.0	-3.0	0.0	0.0	39.6	0.0	-0.0	0.0	0.0	5.2	0.0	0.0	12.1
3	17917523.53	5021521.84	8.40	0	N	250	70.4	0.0	-3.0	0.0	0.0	39.6	0.0	1.3	0.0	0.0	4.3	0.0	0.0	22.2
3	17917523.53	5021521.84	8.40	0	N	500	80.8	0.0	-3.0	0.0	0.0	39.6	0.1	0.7	0.0	0.0	5.6	0.0	0.0	31.8
3	17917523.53	5021521.84	8.40	0	N	1000	83.0	0.0	-3.0	0.0	0.0	39.6	0.1	-0.5	0.0	0.0	7.5	0.0	0.0	33.3
3	17917523.53	5021521.84	8.40	0	N	2000	80.2	0.0	-3.0	0.0	0.0	39.6	0.3	-0.7	0.0	0.0	9.2	0.0	0.0	28.9
3	17917523.53	5021521.84	8.40	0	N	4000	74.0	0.0	-3.0	0.0	0.0	39.6	0.9	-0.7	0.0	0.0	11.4	0.0	0.0	19.9
3	17917523.53	5021521.84	8.40	0	N	8000	64.9	0.0	-3.0	0.0	0.0	39.6	3.1	-0.7	0.0	0.0	13.9	0.0	0.0	6.0
6	17917523.53	5021521.84	8.40	1	D	125	59.9	0.0	0.0	0.0	0.0	43.4	0.0	-0.9	0.0	0.0	12.6	0.0	2.0	2.8
6	17917523.53	5021521.84	8.40	1	D	250	70.4	0.0	0.0	0.0	0.0	43.4	0.0	0.2	0.0	0.0	16.5	0.0	2.0	8.3
6	17917523.53	5021521.84	8.40	1	D	500	80.8	0.0	0.0	0.0	0.0	43.4	0.1	-0.3	0.0	0.0	20.8	0.0	2.0	14.9
6	17917523.53	5021521.84	8.40	1	D	1000	83.0	0.0	0.0	0.0	0.0	43.4	0.2	-1.4	0.0	0.0	24.2	0.0	2.0	14.6
6	17917523.53	5021521.84	8.40	1	D	2000	80.2	0.0	0.0	0.0	0.0	43.4	0.4	-1.6	0.0	0.0	25.0	0.0	2.0	11.0
6	17917523.53	5021521.84	8.40	1	D	4000	74.0	0.0	0.0	0.0	0.0	43.4	1.4	-1.6	0.0	0.0	25.0	0.0	2.0	3.8
6	17917523.53	5021521.84	8.40	1	D	8000	64.9	0.0	0.0	0.0	0.0	43.4	4.9	-1.6	0.0	0.0	25.0	0.0	2.0	-8.8
6	17917523.53	5021521.84	8.40	1	N	125	59.9	0.0	-3.0	0.0	0.0	43.4	0.0	-0.9	0.0	0.0	12.6	0.0	2.0	-0.2
6	17917523.53	5021521.84	8.40	1	N	250	70.4	0.0	-3.0	0.0	0.0	43.4	0.0	0.2	0.0	0.0	16.5	0.0	2.0	5.3
6	17917523.53	5021521.84	8.40	1	N	500	80.8	0.0	-3.0	0.0	0.0	43.4	0.1	-0.3	0.0	0.0	20.8	0.0	2.0	11.9
6	17917523.53	5021521.84	8.40	1	N	1000	83.0	0.0	-3.0	0.0	0.0	43.4	0.2	-1.4	0.0	0.0	24.2	0.0	2.0	11.6
6	17917523.53	5021521.84	8.40	1	N	2000	80.2	0.0	-3.0	0.0	0.0	43.4	0.4	-1.6	0.0	0.0	25.0	0.0	2.0	8.0
6	17917523.53	5021521.84	8.40	1	N	4000	74.0	0.0	-3.0	0.0	0.0	43.4	1.4	-1.6	0.0	0.0	25.0	0.0	2.0	0.8
10	17917523.53	5021521.84	8.40	1	D	125	59.9	0.0	0.0	0.0	0.0	40.8	0.0	-0.3	0.0	0.0	6.0	0.0	2.0	11.4
10	17917523.53	5021521.84	8.40	1	D	250	70.4	0.0	0.0	0.0	0.0	40.8	0.0	0.9	0.0	0.0	6.0	0.0	2.0	20.6
10	17917523.53	5021521.84	8.40	1	D	500	80.8	0.0	0.0	0.0	0.0	40.8	0.1	0.3	0.0	0.0	8.1	0.0	2.0	29.5
10	17917523.53	5021521.84	8.40	1	D	1000	83.0	0.0	0.0	0.0	0.0	40.8	0.1	-0.9	0.0	0.0	10.4	0.0	2.0	30.5
10	17917523.53	5021521.84	8.40	1	D	2000	80.2	0.0	0.0	0.0	0.0	40.8	0.3	-1.0	0.0	0.0	12.8	0.0	2.0	25.3
10	17917523.53	5021521.84	8.40	1	D	4000	74.0	0.0	0.0	0.0	0.0	40.8	1.0	-1.0	0.0	0.0	15.4	0.0	2.0	15.8
10	17917523.53	5021521.84	8.40	1	D	8000	64.9	0.0	0.0	0.0	0.0	40.8	3.6	-1.0	0.0	0.0	18.2	0.0	2.0	1.2
10	17917523.53	5021521.84	8.40	1	N	125	59.9	0.0	-3.0	0.0	0.0	40.8	0.0	-0.3	0.0	0.0	6.0	0.0	2.0	8.4
10	17917523.53	5021521.84	8.40	1	N	250	70.4	0.0	-3.0	0.0	0.0	40.8	0.0	0.9	0.0	0.0	6.0	0.0	2.0	17.6
10	17917523.53	5021521.84	8.40	1	N	500	80.8	0.0	-3.0	0.0	0.0	40.8	0.1	0.3	0.0	0.0	8.1	0.0	2.0	26.5
10	17917523.53	5021521.84	8.40	1	N	1000	83.0	0.0	-3.0	0.0	0.0	40.8	0.1	-0.9	0.0	0.0	10.4	0.0	2.0	27.5
10	17917523.53	5021521.84	8.40	1	N	2000	80.2	0.0	-3.0	0.0	0.0	40.8	0.3	-1.0	0.0	0.0	12.8	0.0	2.0	22.3
10	17917523.53	5021521.84	8.40	1	N	4000	74.0	0.0	-3.0	0.0	0.0	40.8	1.0	-1.0	0.0	0.0	15.4	0.0	2.0	12.8
10	17917523.53	5021521.84	8.40	1	N	8000	64.9	0.0	-3.0	0.0	0.0	40.8	3.6	-1.0	0.0	0.0	18.2	0.0	2.0	-1.8

Point Source, ISO 9613, Name: "RTU1", ID: "RTU1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
14	17917520.81	5021520.33	8.40	0	D	125	59.9	0.0	0.0	0.0	0.0	39.6	0.0	-0.1	0.0	0.0	4.0	0.0	0.0	16.3
14	17917520.81	5021520.33	8.40	0	D	250	70.4	0.0	0.0	0.0	0.0	39.6	0.0	1.2	0.0	0.0	3.7	0.0	0.0	25.9
14	17917520.81	5021520.33	8.40	0	D	500	80.8	0.0	0.0	0.0	0.0	39.6	0.1	0.6	0.0	0.0	5.1	0.0	0.0	35.5
14	17917520.81	5021520.33	8.40	0	D	1000	83.0	0.0	0.0	0.0	0.0	39.6	0.1	-0.6	0.0	0.0	6.8	0.0	0.0	37.1
14	17917520.81	5021520.33	8.40	0	D	2000	80.2	0.0	0.0	0.0	0.0	39.6	0.3	-0.8	0.0	0.0	8.4	0.0	0.0	32.7
14	17917520.81	5021520.33	8.40	0	D	4000	74.0	0.0	0.0	0.0	0.0	39.6	0.9	-0.8	0.0	0.0	10.5	0.0	0.0	23.8
14	17917520.81	5021520.33	8.40	0	D	8000	64.9	0.0	0.0	0.0	0.0	39.6	3.1	-0.8	0.0	0.0	13.0	0.0	0.0	9.9
14	17917520.81	5021520.33	8.40	0	N	125	59.9	0.0	-3.0	0.0	0.0	39.6	0.0	-0.1	0.0	0.0	4.0	0.0	0.0	13.3

Point Source, ISO 9613, Name: "RTU1", ID: "RTU1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
14	17917520.81	5021520.33	8.40	0	N	250	70.4	0.0	-3.0	0.0	0.0	39.6	0.0	1.2	0.0	0.0	3.7	0.0	0.0	22.9
14	17917520.81	5021520.33	8.40	0	N	500	80.8	0.0	-3.0	0.0	0.0	39.6	0.1	0.6	0.0	0.0	5.1	0.0	0.0	32.5
14	17917520.81	5021520.33	8.40	0	N	1000	83.0	0.0	-3.0	0.0	0.0	39.6	0.1	-0.6	0.0	0.0	6.8	0.0	0.0	34.1
14	17917520.81	5021520.33	8.40	0	N	2000	80.2	0.0	-3.0	0.0	0.0	39.6	0.3	-0.8	0.0	0.0	8.4	0.0	0.0	29.7
14	17917520.81	5021520.33	8.40	0	N	4000	74.0	0.0	-3.0	0.0	0.0	39.6	0.9	-0.8	0.0	0.0	10.5	0.0	0.0	20.8
14	17917520.81	5021520.33	8.40	0	N	8000	64.9	0.0	-3.0	0.0	0.0	39.6	3.1	-0.8	0.0	0.0	13.0	0.0	0.0	6.9
18	17917520.81	5021520.33	8.40	1	D	125	59.9	0.0	0.0	0.0	0.0	43.5	0.0	-1.0	0.0	0.0	12.6	0.0	2.0	2.7
18	17917520.81	5021520.33	8.40	1	D	250	70.4	0.0	0.0	0.0	0.0	43.5	0.0	0.2	0.0	0.0	16.4	0.0	2.0	8.2
18	17917520.81	5021520.33	8.40	1	D	500	80.8	0.0	0.0	0.0	0.0	43.5	0.1	-0.3	0.0	0.0	20.7	0.0	2.0	14.9
18	17917520.81	5021520.33	8.40	1	D	1000	83.0	0.0	0.0	0.0	0.0	43.5	0.2	-1.4	0.0	0.0	24.1	0.0	2.0	14.7
18	17917520.81	5021520.33	8.40	1	D	2000	80.2	0.0	0.0	0.0	0.0	43.5	0.4	-1.6	0.0	0.0	25.0	0.0	2.0	10.9
18	17917520.81	5021520.33	8.40	1	D	4000	74.0	0.0	0.0	0.0	0.0	43.5	1.4	-1.6	0.0	0.0	25.0	0.0	2.0	3.7
18	17917520.81	5021520.33	8.40	1	D	8000	64.9	0.0	0.0	0.0	0.0	43.5	4.9	-1.6	0.0	0.0	25.0	0.0	2.0	-8.9
18	17917520.81	5021520.33	8.40	1	N	125	59.9	0.0	-3.0	0.0	0.0	43.5	0.0	-1.0	0.0	0.0	12.6	0.0	2.0	-0.3
18	17917520.81	5021520.33	8.40	1	N	250	70.4	0.0	-3.0	0.0	0.0	43.5	0.0	0.2	0.0	0.0	16.4	0.0	2.0	5.2
18	17917520.81	5021520.33	8.40	1	N	500	80.8	0.0	-3.0	0.0	0.0	43.5	0.1	-0.3	0.0	0.0	20.7	0.0	2.0	11.9
18	17917520.81	5021520.33	8.40	1	N	1000	83.0	0.0	-3.0	0.0	0.0	43.5	0.2	-1.4	0.0	0.0	24.1	0.0	2.0	11.6
18	17917520.81	5021520.33	8.40	1	N	2000	80.2	0.0	-3.0	0.0	0.0	43.5	0.4	-1.6	0.0	0.0	25.0	0.0	2.0	7.9
18	17917520.81	5021520.33	8.40	1	N	4000	74.0	0.0	-3.0	0.0	0.0	43.5	1.4	-1.6	0.0	0.0	25.0	0.0	2.0	0.7
20	17917520.81	5021520.33	8.40	1	D	125	59.9	0.0	0.0	0.0	0.0	40.9	0.0	-0.4	0.0	0.0	5.9	0.0	2.0	11.4
20	17917520.81	5021520.33	8.40	1	D	250	70.4	0.0	0.0	0.0	0.0	40.9	0.0	0.9	0.0	0.0	6.0	0.0	2.0	20.5
20	17917520.81	5021520.33	8.40	1	D	500	80.8	0.0	0.0	0.0	0.0	40.9	0.1	0.3	0.0	0.0	8.1	0.0	2.0	29.4
20	17917520.81	5021520.33	8.40	1	D	1000	83.0	0.0	0.0	0.0	0.0	40.9	0.1	-0.9	0.0	0.0	10.3	0.0	2.0	30.5
20	17917520.81	5021520.33	8.40	1	D	2000	80.2	0.0	0.0	0.0	0.0	40.9	0.3	-1.1	0.0	0.0	12.7	0.0	2.0	25.3
20	17917520.81	5021520.33	8.40	1	D	4000	74.0	0.0	0.0	0.0	0.0	40.9	1.0	-1.1	0.0	0.0	15.4	0.0	2.0	15.8
20	17917520.81	5021520.33	8.40	1	D	8000	64.9	0.0	0.0	0.0	0.0	40.9	3.7	-1.1	0.0	0.0	18.2	0.0	2.0	1.2
20	17917520.81	5021520.33	8.40	1	N	125	59.9	0.0	-3.0	0.0	0.0	40.9	0.0	-0.4	0.0	0.0	5.9	0.0	2.0	8.4
20	17917520.81	5021520.33	8.40	1	N	250	70.4	0.0	-3.0	0.0	0.0	40.9	0.0	0.9	0.0	0.0	6.0	0.0	2.0	17.5
20	17917520.81	5021520.33	8.40	1	N	500	80.8	0.0	-3.0	0.0	0.0	40.9	0.1	0.3	0.0	0.0	8.1	0.0	2.0	26.4
20	17917520.81	5021520.33	8.40	1	N	1000	83.0	0.0	-3.0	0.0	0.0	40.9	0.1	-0.9	0.0	0.0	10.3	0.0	2.0	27.5
20	17917520.81	5021520.33	8.40	1	N	2000	80.2	0.0	-3.0	0.0	0.0	40.9	0.3	-1.1	0.0	0.0	12.7	0.0	2.0	22.3
20	17917520.81	5021520.33	8.40	1	N	4000	74.0	0.0	-3.0	0.0	0.0	40.9	1.0	-1.1	0.0	0.0	15.4	0.0	2.0	12.7
20	17917520.81	5021520.33	8.40	1	N	8000	64.9	0.0	-3.0	0.0	0.0	40.9	3.7	-1.1	0.0	0.0	18.2	0.0	2.0	-1.8

Point Source, ISO 9613, Name: "RTU2", ID: "RTU2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
22	17917526.46	5021523.65	8.40	0	D	125	59.9	0.0	0.0	0.0	0.0	39.7	0.0	-0.0	0.0	0.0	5.2	0.0	0.0	15.0
22	17917526.46	5021523.65	8.40	0	D	250	70.4	0.0	0.0	0.0	0.0	39.7	0.0	1.2	0.0	0.0	4.4	0.0	0.0	25.0
22	17917526.46	5021523.65	8.40	0	D	500	80.8	0.0	0.0	0.0	0.0	39.7	0.1	0.6	0.0	0.0	5.8	0.0	0.0	34.6
22	17917526.46	5021523.65	8.40	0	D	1000	83.0	0.0	0.0	0.0	0.0	39.7	0.1	-0.6	0.0	0.0	7.7	0.0	0.0	36.1
22	17917526.46	5021523.65	8.40	0	D	2000	80.2	0.0	0.0	0.0	0.0	39.7	0.3	-0.8	0.0	0.0	9.5	0.0	0.0	31.6
22	17917526.46	5021523.65	8.40	0	D	4000	74.0	0.0	0.0	0.0	0.0	39.7	0.9	-0.8	0.0	0.0	11.7	0.0	0.0	22.5
22	17917526.46	5021523.65	8.40	0	D	8000	64.9	0.0	0.0	0.0	0.0	39.7	3.2	-0.8	0.0	0.0	14.2	0.0	0.0	8.6
22	17917526.46	5021523.65	8.40	0	N	125	59.9	0.0	-3.0	0.0	0.0	39.7	0.0	-0.0	0.0	0.0	5.2	0.0	0.0	12.0
22	17917526.46	5021523.65	8.40	0	N	250	70.4	0.0	-3.0	0.0	0.0	39.7	0.0	1.2	0.0	0.0	4.4	0.0	0.0	22.0
22	17917526.46	5021523.65	8.40	0	N	500	80.8	0.0	-3.0	0.0	0.0	39.7	0.1	0.6	0.0	0.0	5.8	0.0	0.0	31.6
22	17917526.46	5021523.65	8.40	0	N	1000	83.0	0.0	-3.0	0.0	0.0	39.7	0.1	-0.6	0.0	0.0	7.7	0.0	0.0	33.1
22	17917526.46	5021523.65	8.40	0	N	2000	80.2	0.0	-3.0	0.0	0.0	39.7	0.3	-0.8	0.0	0.0	9.5	0.0	0.0	28.6
22	17917526.46	5021523.65	8.40	0	N	4000	74.0	0.0	-3.0	0.0	0.0	39.7	0.9	-0.8	0.0	0.0	11.7	0.0	0.0	19.5
22	17917526.46	5021523.65	8.40	0	N	8000	64.9	0.0	-3.0	0.0	0.0	39.7	3.2	-0.8	0.0	0.0	14.2	0.0	0.0	5.6
24	17917526.46	5021523.65	8.40	1	D	125	59.9	0.0	0.0	0.0	0.0	40.9	0.0	-0.4	0.0	0.0	6.0	0.0	2.0	11.4
24	17917526.46	5021523.65	8.40	1	D	250	70.4	0.0	0.0	0.0	0.0	40.9	0.0	0.8	0.0	0.0	6.1	0.0	2.0	20.5
24	17917526.46	5021523.65	8.40	1	D	500	80.8	0.0	0.0	0.0	0.0	40.9	0.1	0.3	0.0	0.0	8.2	0.0	2.0	29.4
24	17917526.46	5021523.65	8.40	1	D	1000	83.0	0.0	0.0	0.0	0.0	40.9	0.1	-0.9	0.0	0.0	10.4	0.0	2.0	30.5
24	17917526.46	5021523.65	8.40	1	D	2000	80.2	0.0	0.0	0.0	0.0	40.9	0.3	-1.1	0.0	0.0	12.8	0.0	2.0	25.3
24	17917526.46	5021523.65	8.40	1	D	4000	74.0	0.0	0.0	0.0	0.0	40.9	1.0	-1.1	0.0	0.0	15.5	0.0	2.0	15.7
24	17917526.46	5021523.65	8.40	1	D	8000	64.9	0.0	0.0	0.0	0.0	40.9	3.7	-1.1	0.0	0.0	18.3	0.0	2.0	1.1
24	17917526.46	5021523.65	8.40	1	N	125	59.9	0.0	-3.0	0.0	0.0	40.9	0.0	-0.4	0.0	0.0	6.0	0.0	2.0	8.4
24	17917526.46	5021523.65	8.40	1	N	250	70.4	0.0	-3.0	0.0	0.0	40.9	0.0	0.8	0.0	0.0	6.1	0.0	2.0	17.5
24	17917526.46	5021523.65	8.40	1	N	500	80.8	0.0	-3.0	0.0	0.0	40.9	0.1	0.3	0.0	0.0	8.2	0.0	2.0	26.4
24	17917526.46	5021523.65	8.40	1	N	1000	83.0	0.0	-3.0	0.0	0.0	40.9	0.1	-0.9	0.0	0.0	10.4	0.0	2.0	27.4
24	17917526.46	5021523.65	8.40	1	N	2000	80.2	0.0	-3.0	0.0	0.0	40.9	0.3	-1.1	0.0	0.0	12.8	0.0	2.0	22.2

Point Source, ISO 9613, Name: "RTU2", ID: "RTU2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
24	17917526.46	5021523.65	8.40	1	N	4000	74.0	0.0	-3.0	0.0	0.0	40.9	1.0	-1.1	0.0	0.0	15.5	0.0	2.0	12.7
24	17917526.46	5021523.65	8.40	1	N	8000	64.9	0.0	-3.0	0.0	0.0	40.9	3.7	-1.1	0.0	0.0	18.3	0.0	2.0	-1.9