PATERSON GROUP

LRT Confederation Line Level 2 Proximity Study

Proposed Residential Building

342 Roosevelt Avenue
Ottawa, Ontario

Prepared for 342 Roosevelt Limited

Report PG4210-2 Revision 1
dated March 17, 2025

Table of Contents

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by 342 Roosevelt Limited to conduct an LRT Confederation Line – Level 2 Proximity Study for the proposed residential development to be located at 342 Roosevelt Avenue, in the City of Ottawa, Ontario.

The objectives of the current study were to:

- ❑ Review all current information available from the City of Ottawa with regards to the infrastructure of the Confederation Rail Line (O-Train Rail), and Dominion Station, in the vicinity of the subject site.
- ❑ Liaison between the City of Ottawa and 342 Roosevelt Limited team involved with the aforementioned project.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains a collaboration of architectural, civil, structural, and geotechnical information as they pertain to the aforementioned project.

2.0 Development Details

Based on current plans, it is understood that the proposed development at the subject site will consist of a 6.5-storey residential building with 26 units and a basement level. The proposed building will be set back approximately 5 to 7 m from the northern site boundary, 1.3 to 2.4 m from the southern site boundary, 3.6 m from the eastern site boundary, and 1.2 m from the western site boundary.

The existing average ground surface elevation at the subject site is at an approximate geodetic elevation of 67 m. The design underside of footing (USF) elevation of the proposed building will at approximate geodetic elevation of 64 m and will be founded on the clean, surface surface sound bedrock.

The following is known about the Confederation Line and Dominion Station in the vicinity of the subject site:

- ❑ The subject site is proposed to be located to the south of the existing Confederation Rail Line (O-Train Rail) which is located at an approximate geodetic elevation of 66 m.
- ❑ The Confederation Line rail is understood to be located at approximate geodetic elevation 61 m.

- Based on the subsurface profile encountered at the borehole locations at 342 Roosevelt Avenue, and our experience in the general area, bedrock is expected at approximate depths of 0.6 to 0.9 m below the existing ground surface at the subject site, which corresponds to approximate geodetic elevation 65 to 66 m.

3.0 Construction Methodology and Impact Review

Paterson has prepared a construction methodology summary along with possible impacts on the adjacent segment of Confederation Rail Line, based on the current building design details. The Construction Methodology and Impact Review is provided in Appendix A and presents the anticipated construction items, impact review, and mitigation program recommended for construction of the proposed building.

Based on the subsurface conditions encountered at the test pit locations, and the founding depth of the proposed building, bedrock removal is anticipated at the subject site. Therefore, the primary issue will be vibrations associated with the bedrock removal and other construction operations, such as compactor, dozer, crane, and truck traffic. It is recommended that a vibration monitoring program be implemented to ensure vibration levels remain below recommended tolerances. Details of the recommended vibration monitoring program are presented below.

3.1 Vibration Monitoring and Control Program

Proposed Vibration Limits

Due to the presence of the Confederation Rail Line and Dominion Station in the vicinity of the subject site, the contractor should take extra precautions to minimize vibrations. The monitoring program will be required for the full duration of the construction operations. The purpose of the vibration monitoring and control program (VMCP) is to provide a description of the measures to be applied by the contractor to manage excavation operations and any other vibration sources during the construction for the proposed development. The VMCP will also provide a guideline for assessing results against the relevant vibration impact assessment criteria and recommendations to meet the required limits.

The monitoring program will incorporate real time results at the Confederation Line and Dominion Station, located in the vicinity of the subject site. The monitoring equipment will consist of a tri-axial seismograph, capable of continuously measuring vibration intensities up to 254 mm/s at a frequency response of 2 to 250 Hz.

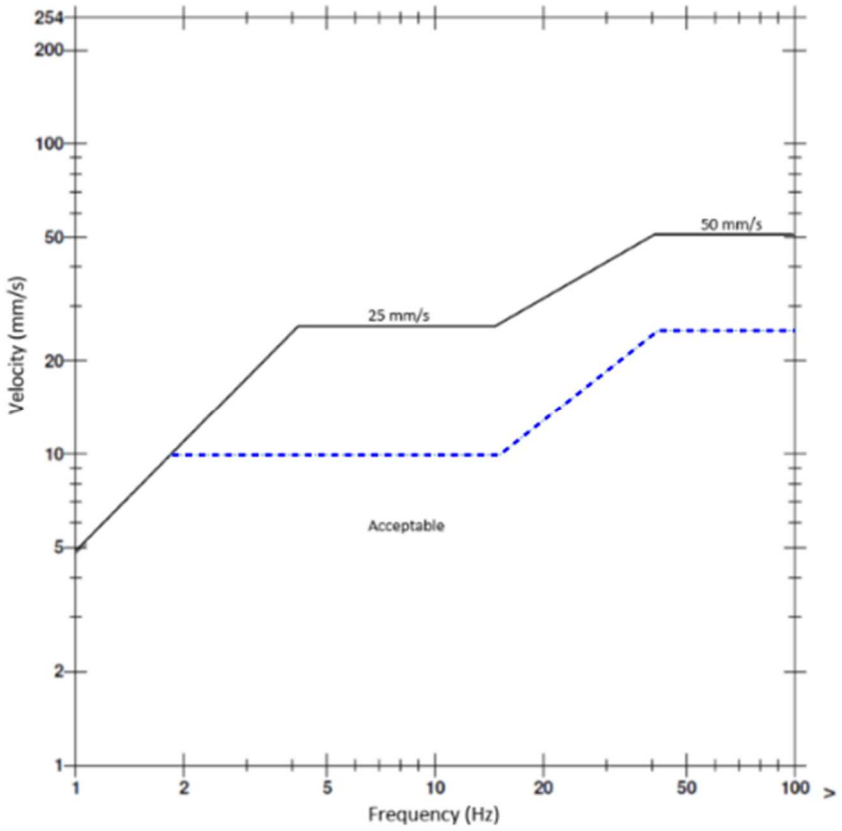
The locations of the seismographs should be reviewed periodically throughout construction to ensure that the monitoring equipment remains along the alignment of the proposed Confederation Rail Line and Dominion Station with the closest radius to the construction activities. The seismograph locations should be approved by the project manager prior to installation.

During construction, the vibration monitor will be relocated for the 'worst case' location for each construction activity. When an event is triggered, Paterson will review the results and provide any necessary feedback. Otherwise, the vibration results will be summarized in the weekly report.

Proposed Vibration Limits

The figure below outlines the recommended vibration limits for the Confederation Rail Line and Dominion Station.

Figure 1 - Proposed Vibration Limits at the Confederation Line and Dominion Station



Monitoring Data

The monitoring protocol should include the following information:

Warning Level Event (indicated by the blue line on Figure 1)

- ❑ Paterson will review all vibrations over the established warning level, and
- ❑ Paterson will notify the contractor if any vibrations occur due to construction activities and are close to exceedance level.

Exceedance Level Event (indicated by the black line on Figure 1)

- ❑ Paterson will notify all the relevant stakeholders via email
- ❑ Ensure monitors are functioning
- ❑ Issue the vibration exceedance result

The data collected will include the following:

- ❑ Measured vibration levels
- ❑ Distance from the construction activity to monitoring location
- ❑ Vibration type

Monitoring should be in compliance with all related regulations.

3.2 Incident/Exceedance Reporting

In case an exceedance occurs from construction activities, the Senior Project Management and any relevant personnel should be notified immediately. A report should be completed which contains the following:

- ❑ Identify the location of vibration exceedance
- ❑ The date, time and nature of the exceedance
- ❑ Purpose of the exceeded monitor and current vibration criteria
- ❑ Identify the likely cause of the exceedance
- ❑ Describe the response action that has been completed to date
- ❑ Describe the proposed measures to address the exceedance.

The contractor should implement mitigation measures for future excavation or any construction activities as necessary and provide updates on the effectiveness of the improvement. Response actions should be pre-determined prior to excavation, depending on the approach provided to protect elements. Processes and procedures should be in-place prior to completing any vibrations to identify issues and react in a quick manner in the event of an exceedance.

4.0 Proximity Study Requirement Responses

Based on the O-Train System Proximity Study Guidelines dated 2024, a Level 2 Confederation Line Proximity Study is considered to be required for the proposed development. A Level 2 Proximity Study is required where the proposed development is located within the City of Ottawa's Development Zone of Influence. The following Table 1, below, lists the applicable requirements for a Level 1 and Level 2 proximity study and our associated responses.

Table 1: List of Level 1 and Level 2 Proximity Study Requirements

Level 1 Projects	Response
A site plan of the development with the centreline or reference line of the Confederation Line structure and/or right-of-way located and the relevant distances between the Confederation Line and developer's structure shown clearly.	See Confederation Line Proximity Plan (Drawing No. PG4210-2 dated August 2024) presented in Appendix A.
Plan and cross-sections of the development locating the Confederation Line structure/right-of-way and founding elevations relative to the development, including any underground storage tanks and associated piping.	LRT Proximity Section A-A (Drawing No. PG4210-3) presented in Appendix A.
A geotechnical investigation report showing up-to-date geotechnical conditions at the site of the development. The geotechnical investigation shall be prepared in accordance with the Geotechnical Investigation and Reporting Guidelines for Development Applications in the City.	Refer to Geotechnical Investigation: Paterson Group Report PG4210-1 dated August 30, 2024 presented in Appendix B.
Structural, foundation, excavation and shoring drawings.	Structural, foundation, excavation, and shoring drawings will be provided once available for the proposed project.

Acknowledgment that the potential for noise, vibration, electro-magnetic interference and stray current from Confederation Line operations have been considered in the design of the project, and appropriate mitigation measures applied.	The potential for noise, vibration, electro-magnetic interference and stray current from Confederation Line operations have been considered in the design of the project and appropriate mitigation measures have been applied. Refer to the Environmental Noise Control and Vibration Study (Report No. PG4235-1 Revision 1 dated June 19, 2018) prepared by Paterson for this project, which is attached in Appendix C.
Level 2 Projects	**Response**
A structural analysis or calculations of the effects of loadings, including construction loading, on the Confederation Line structure, and demonstrating that the Confederation Line will not be adversely affected by the development, including solutions to mitigate any impact on the Confederation Line structure.	No building loads will be imposed on the proposed subject alignment of the Confederation Line due to the presence of sound bedrock at founding level of the proposed building, and the setback of the proposed Confederation Line, which is located a minimum of 24.4 m, away from the building foundation. Refer to Cross-Section A-A' (Drawing No. PG4210-3 dated August 2024).
Documentation showing that the excavation support system and permanent structure adjacent to the Confederation Line property are designated for at-rest earth pressures.	A temporary shoring system, if required for the proposed development, will be designed for at-rest earth pressures. Temporary shoring drawings, if required, will be provided once available.
Structural drawings, including foundation plans, sections and details, floor plans, column and wall schedules and loads on foundation for the development. The relationship of the development to the Confederation Line structure should be depicted in both plan and section.	Structural drawings will be provided once available. Refer to the Confederation Line Proximity Plan (Drawing No. PG4210-2 dated August 2024) and Cross-Section A-A' (Drawing No. PG4210-3 dated August 2024), which illustrate the relative depth and location of the proposed building to the proposed Confederation Line alignment.
Shoring design criteria and description of excavation and shoring method.	A temporary shoring system for the proposed development, if required, is anticipated to consist of soldier piles and lagging.

	However, given the relatively shallow bedrock present at this site, a temporary shoring system is not anticipated to be required.
Groundwater control plan, including the determination of the short-term (during construction) and long-term effects of dewatering on the Confederation Line structure, and provision of assurances that the influences of dewatering will have no impact on the Confederation Line structure.	Due to the relatively shallow bedrock depth in the vicinity of the subject site, it is anticipated that the proposed rail line will be bearing on sound bedrock. Therefore, should groundwater lowering occur, no negative impacts are expected for the Confederation Line.
Proposal to replace/repair waterproofing system of the affected Confederation Line structure, including the Confederation Line expansion joint.	There will be at least a 24.4 m offset between the proposed Stage 2 LRT rail line and the proposed building. Therefore, the replace / repair of the waterproofing system is not applicable.
Identification of utility installations proposed through or adjacent to Confederation Line property.	Utility plans will be forwarded once they are completed. Based on the distance of 24.4 m between the proposed building and the proposed Confederation Line rail alignment, no negative impacts to the Confederation Line are anticipated due to utilities associated with the proposed development.
Identification of the exhaust air quality and relationship of air in-take/discharge to the Confederation Line at-grade vent shaft openings and station entrance openings.	Detailed mechanical plans will be forwarded once they are completed. Based on the distance of 24.4 m between the proposed building and the proposed Confederation Line rail alignment, no negative impacts to the Confederation Line are anticipated due to utilities associated with the proposed development.
Proposal for a pre-construction condition survey of the Confederation Line structure, including a survey to confirm locations of existing walls and foundations;	A thorough pre-construction condition survey of the Confederation Line, and associated infrastructure will be completed prior to the start of construction at 342 Roosevelt Avenue.

Monitoring plan for movement of the shoring and Confederation Line structure prior to and during construction of the development, including an Action Protocol.	A monitoring plan for the movement of the temporary shoring system, if required adjacent of the Confederation Line, will be completed prior to construction and will be included with the temporary shoring drawing submission.

We trust that this information satisfies your immediate request.

Best Regards,

Paterson Group Inc.

Deepak k Rajendran, E.I.T.

Scott S. Dennis, P.Eng.

APPENDIX A

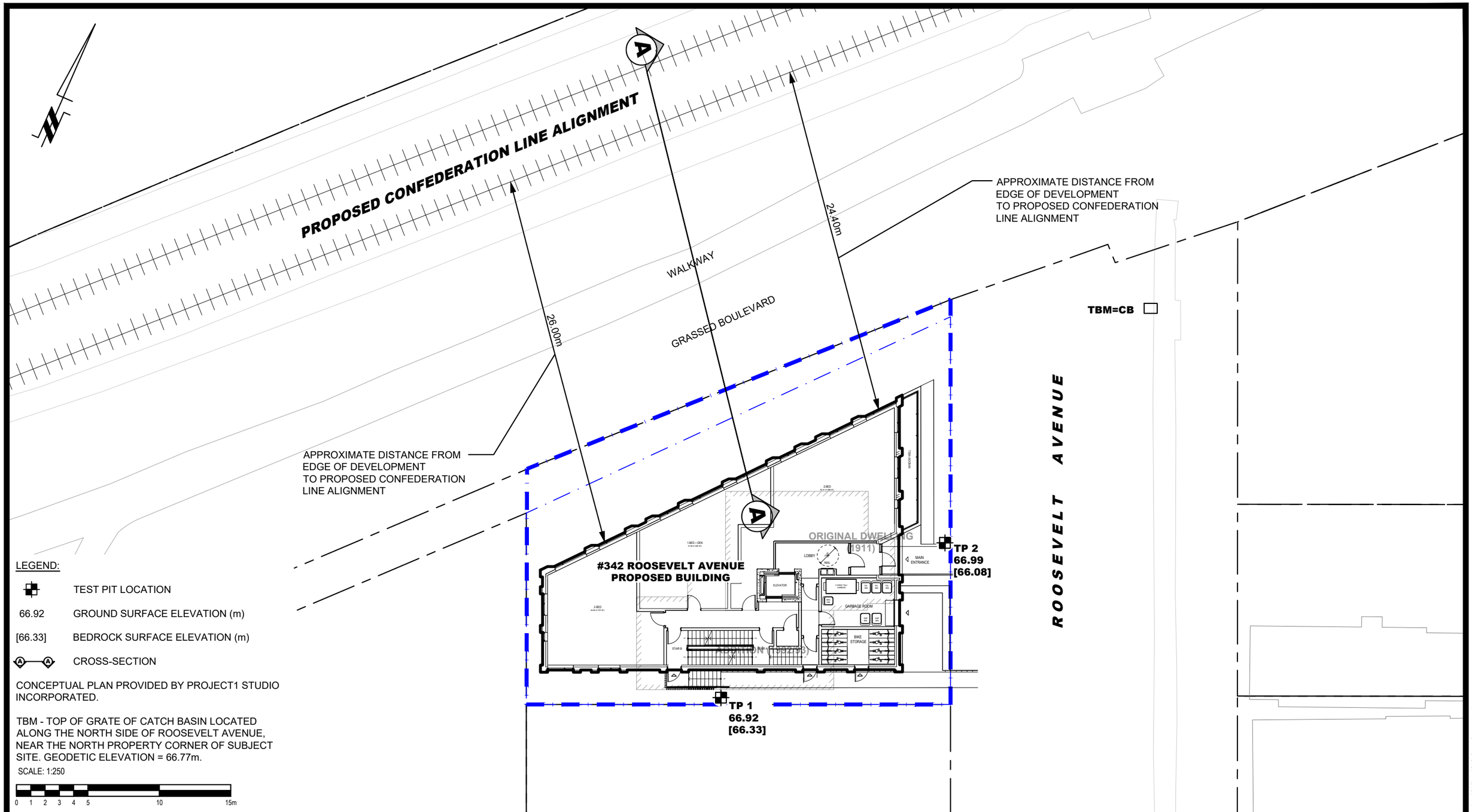
Confederation Line Proximity Plan

Confederation Line Cross Section A-A'

Construction Methodology and Impact Review

Topographic Plan of Survey by others

Relevant Architectural & Civil Drawings prepared by others



LEGEND:

- TEST PIT LOCATION
- 66.92 GROUND SURFACE ELEVATION (m)
- [66.33] BEDROCK SURFACE ELEVATION (m)
- CROSS-SECTION

CONCEPTUAL PLAN PROVIDED BY PROJECT1 STUDIO INCORPORATED.

TBM - TOP OF GRATE OF CATCH BASIN LOCATED ALONG THE NORTH SIDE OF ROOSEVELT AVENUE, NEAR THE NORTH PROPERTY CORNER OF SUBJECT SITE. GEODETIC ELEVATION = 66.77m.

SCALE: 1:250

0 1 2 3 4 5 10 15m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

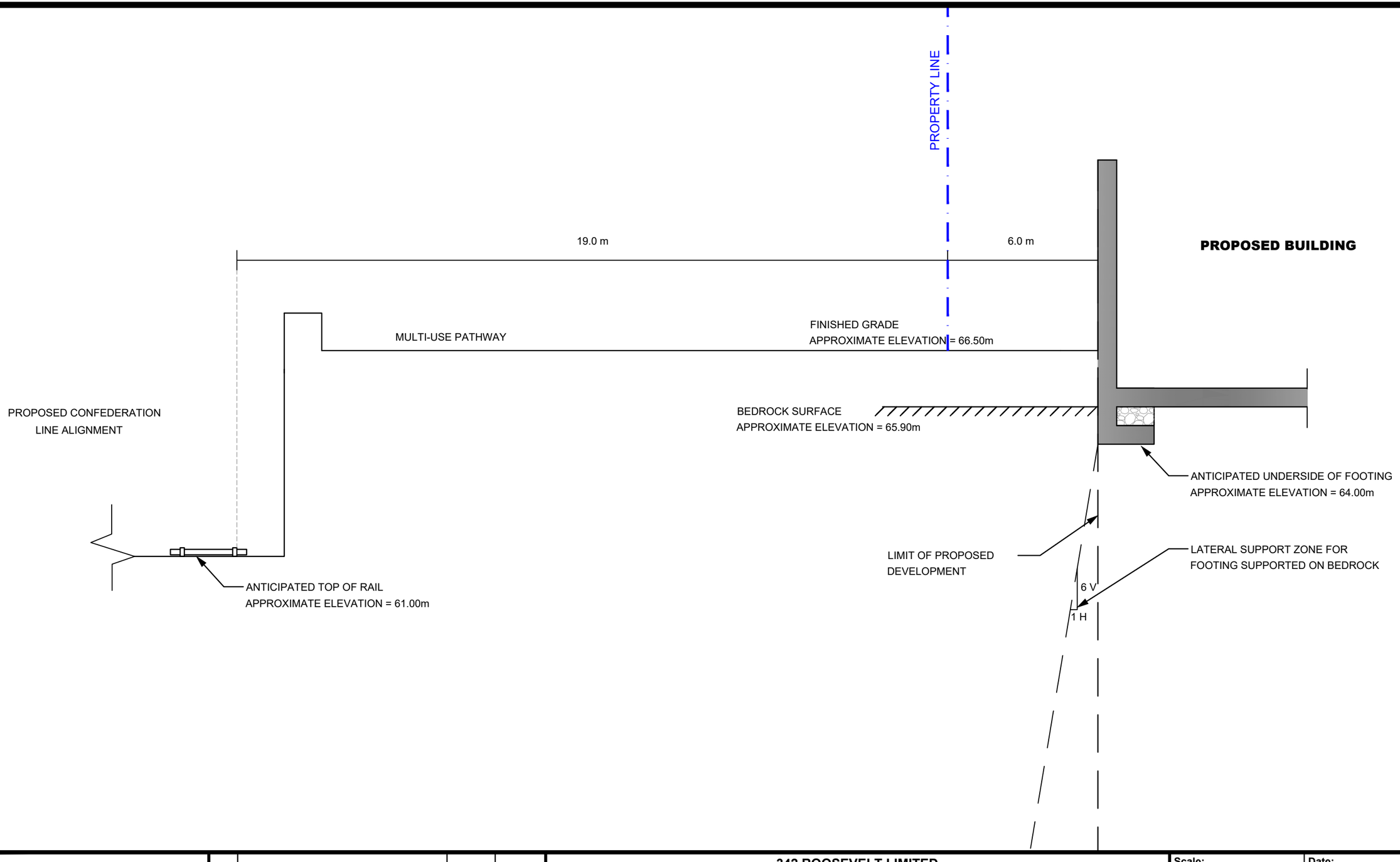
342 ROOSEVELT LIMITED
CONFEDERATION PROXIMITY ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
342 ROOSEVELT AVENUE
OTTAWA, ONTARIO

Title:
CONFEDERATION LINE PROXIMITY PLAN

Scale: 1:250	Date: 08/2024
Drawn by: GK	Report No.: PG4210-1
Checked by: DR	Dwg. No.: PG4210-2
Approved by: SD	Revision No.:

p:\autocad drawings\geotechnical\pg42xx\pg4210\pg4210-2 confederation line proximity plan.dwg

11x17



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342 ROOSEVELT LIMITED
CONFEDERATION PROXIMITY ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
342 ROOSEVELT AVENUE
OTTAWA, ONTARIO

Title:

CROSS SECTION A-A'

Scale: 1:100	Date: 08/2024
Drawn by: YA	Report No.: PG4210-1
Checked by: DR	Dwg. No.: PG4210-3
Approved by: SD	Revision No.:

11x17

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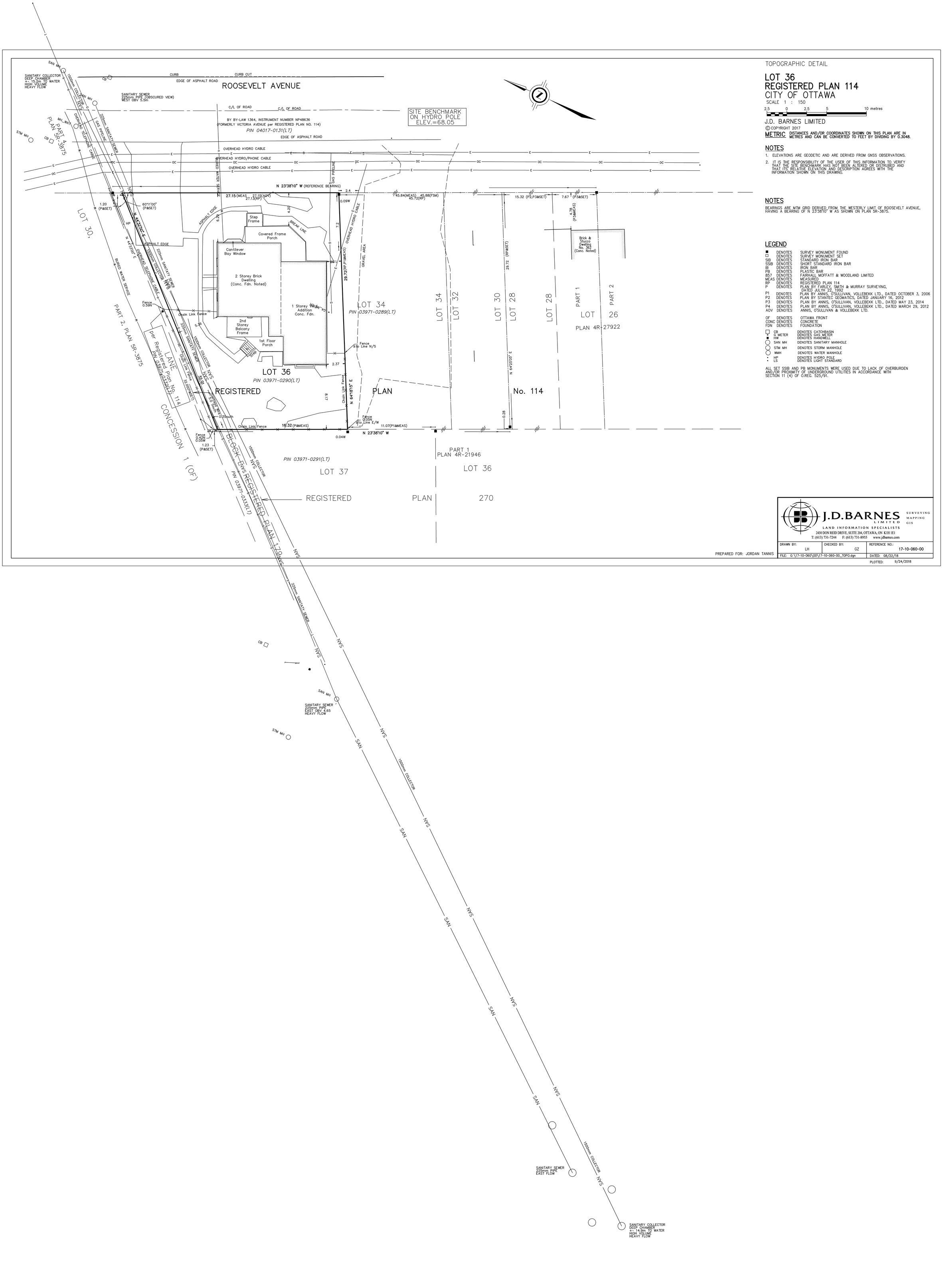
Construction Methodology and Impact Review		
Construction Item	**Potential Impact**	**Mitigation Program**
Item A - Installation of Temporary Shoring System - Where adequate space is not available for the overburden to be sloped, the overburden along the perimeter of the proposed building footprint will need to be shored in order to complete the construction of the underground parking levels. The shoring system is anticipated to consist of a soldier pile and lagging system.	Vibration issues during shoring system installation	Design of the temporary shoring system, if required , will take into consideration the presence of the proposed Confederation Line alignment and Dominion Station structure. Installation of the shoring system, if required, is not anticipated to have an adverse impact on the Confederation Line , nonetheless, a series of vibration monitoring devices are recommended to be installed to monitor vibrations. The vibration monitors would be remotely connected to permit real time monitoring and a vibration monitoring program would be implemented as detailed in Section 3.1 - Vibration Monitoring and Control Program (Paterson Group Report PG4210-2 dated August 30, 2024).
Item B - Bedrock Blasting and Removal Program - Blasting of the bedrock will be required for the proposed buildings and parking garage structure construction. It is expected that up to approximately 1 to 2 m of bedrock removal is required based on the current design concepts for the proposed development.	Structural damage of Confederation Line and Dominion Station due to vibrations from blasting program.	Bedrock removal will be done using hoe-ramming and not blasting, in order to minimize vibration levels. Nonetheless, a series of vibration monitoring devices are recommended to be installed along the LRT alignment to monitor vibrations. The vibration monitors would be remotely connected to permit real time monitoring and a vibration monitoring program would be implemented as detailed in Subsection 3.1 - Vibration Monitoring Program of Paterson Group Report (Paterson Group Report PG4210-2 dated August 30, 2024).
Item C - Construction of Footings and Foundation Walls - The proposed building will be slabe on grade construction, Therefore, the footings will be placed over a clean, surface sounded limestone bedrock bearing surface.	Building footing loading on adjacent Confederation Line and Dominion Station structure	Due to the distance between the proposed building and the Confederation Line and Dominion Station, the zone of influence from the proposed footings will not intersect the LRT structures. Furthermore, footings for the proposed building will extend approximately 1.5 to 2 m below existing ground surface, due to the approximate 20 m distance between the proposed building and LRT structures, the building excavation will not impact the lateral support zone of the Confederation Line or Dominion Station structure.



TOPOGRAPHIC DETAIL

LOT 36
REGISTERED PLAN 114
CITY OF OTTAWA

SCALE 1 : 150

2.5 0 2.5 5 10 metres

J.D. BARNES LIMITED

METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES

1. ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM GNSS OBSERVATIONS.
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE SITE BENCHMARK HAS NOT BEEN ALTERED OR DISTRUBED AND THAT ITS' RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.

NOTES

BEARINGS ARE MTM GRID DERIVED FROM THE WESTERLY LIMIT OF ROOSEVELT AVENUE, HAVING A BEARING OF N 23°38'10" W AS SHOWN ON PLAN 5R-3875.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT SET
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
PB	DENOTES	PLASTIC BAR
857	DENOTES	FAIRHALL MOFFATT & WOODLAND LIMITED
MEAS	DENOTES	MEASURED
RP	DENOTES	REGISTERED PLAN 114
P	DENOTES	PLAN BY FARLEY, SMITH & MURRAY SURVEYING, DATED JULYH 22, 1992
P1	DENOTES	PLAN BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD., DATED OCTOBER 3, 2006
P2	DENOTES	PLAN BY STANTEC GEOMATICS, DATED JANUARY 16, 2012
P3	DENOTES	PLAN BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD., DATED MAY 23, 2014
P4	DENOTES	PLAN BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD., DATED MARCH 29, 2012
AOV	DENOTES	ANNIS, O'SULLIVAN & VOLLEBEKK LTD.
OF	DENOTES	OTTAWA FRONT
CONC	DENOTES	CONCRETE
FDN	DENOTES	FOUNDATION
CB	DENOTES	CATCHBASIN
G	METER	DENOTES GAS METER
HW	DENOTES	HANDWELL
SAN MH	DENOTES	SANITARY MANHOLE
STM MH	DENOTES	STORM MANHOLE
WMH	DENOTES	WATER MANHOLE
HP	DENOTES	HYDRO POLE
LS	DENOTES	LIGHT STANDARD

ALL SET SSIB AND PB MONUMENTS WERE USED DUE TO LACK OF OVERBURDEN AND/OR PROXIMITY OF UNDERGROUND UTILITIES IN ACCORDANCE WITH SECTION 11 (4) OF O.REG. 525/91.

J.D.BARNES LIMITED
SURVEYING MAPPING GIS
LAND INFORMATION SPECIALISTS
2430 DON REID DRIVE, SUITE 204, OTTAWA, ON K1H 1E1
T: (613) 731-7244 F: (613) 731-8955 www.jdbarnes.com

DRAWN BY:	CHECKED BY:	REFERENCE NO.:
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PREPARED FOR: JORDAN TANNIS

PLOTTED: 9/24/2018

TRANSITWAY

PATHWAY

BURIED WATER SERVICE

SEWER LINE

Affected area
due to 4.5m setback
from Sewer Line

PROPERTY LINE

32.010

8.749

3.457

4.500

2.309

2.000

4.500

3.499

183.270 m²

PERGOLA

1.500

LOT AREA
646.70 sq.m.

BUILDIMG
FOOTPRINT
400.20 sq.m.

ROOF AREA
405 sq.m.

ROOFTOP
ACCESS &
MECHANICAL
30.00sq.m.

ROOFTOP AMENITY AREA
111.55 sq.m.

LAUNDRY ROOM AND 9 BICYCLE STORAGE
UNDER 18 BICYCLE PARKING AT GRADE
25.50 sq.m.

GUARDS

10.911

16.320

4.960

ELECTRICAL ROOM UNDER
GARBAGE ROOM @ GRADE LEVEL
15.00 sq.m.

SAN

MH_WAT

MH_STM

MH_SAN

CB_OPEN

CURB

ROOSEVELT AVENUE

27.150

342

EDGE OF ASPHALT ROAD

C/L OF ROAD

EDGE OF ASPHALT ROAD

CURB CUT

CONCORDE
MANAGEMENT | DEVELOPMENT

SITE PLAN - Scale 1:150

342 Roosevelt Avenue

December 18th 2018

ROBERTSON MARTIN
ARCHITECTS

TRANSITWAY

PATHWAY

N

BURIED WATER SERVICE

SEWER LINE

PROPERTY LINE

MH_WAT

MH_STM

MH_SAN

CB_OPEN

SAN

32.010

8.749

3.499

3.457

2.309

2.000

1.500

16.320

10.911

4.960

PERGOLA

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LAUNDRY ROOM AND 9 BICYCLE STORAGE UNDER 18 BICYCLE PARKING AT GRADE
25.50 sq.m.

GUARDS

ELECTRICAL ROOM UNDER GARBAGE ROOM @ GRADE LEVEL
15.00 sq.m.

27.150

342

EDGE OF ASPHALT ROAD

C/L OF ROAD

ROOSEVELT AVENUE

EDGE OF ASPHALT ROAD

CURB

CURB CUT

CONCORDE
MANAGEMENT | DEVELOPMENT

SITE PLAN - Scale 1:150

342 Roosevelt Avenue

September 4th 2018

ROBERTSON MARTIN
ARCHITECTS

UNIT COUNT

NAME	LVL 00	LVL 01	LVL 02	LVL 03	LVL 04	LVL 05	LVL 06	TOTAL COUNT	PERCENTAGE
1-BED	0	0	1	2	2	2	1	8	27%
1-BED + DEN	1	1	0	0	0	0	1	3	10%
2-BED	2	2	2	2	2	2	1	13	43%
STUDIO	0	0	2	1	1	1	1	6	20%
TOTAL	3	3	5	5	5	5	4	30	100%

AMENITY SCH. (COMMUNAL)

LEVEL	NAME	AREA	AREA (SF)
ENTRY LEVEL	AMENITY AREA	166.53 m²	1793 SF
TOTAL		166.53 m²	1793 SF

AMENITY SCH. (PRIVATE)

LEVEL	NAME	AREA	AREA (SF)
LEVEL 06	PVT BALCONY	5.21 m²	56 SF
LEVEL 06	PVT BALCONY	5.39 m²	58 SF
LEVEL 06	PVT BALCONY	5.39 m²	58 SF
LEVEL 06	PVT BALCONY	4.30 m²	46 SF
TOTAL		20.30 m²	218 SF

GROSS FLOOR AREA

LEVEL	AREA	AREA (SF)
LEVEL 00	302.15 m²	3252.36 SF
LEVEL 01	320.69 m²	3451.84 SF
LEVEL 02	323.61 m²	3483.27 SF
LEVEL 03	314.56 m²	3385.85 SF
LEVEL 04	314.56 m²	3385.85 SF
LEVEL 05	314.56 m²	3385.85 SF
LEVEL 06	278.16 m²	2994.05 SF
TOTAL	2168.27 m²	23339.08 SF

GFL INCL. BALCONIES (CITY OF OTTAWA)

LEVEL	AREA	AREA (SF)
LEVEL 01	320.69 m²	3451.84 SF
LEVEL 02	323.61 m²	3483.27 SF
LEVEL 03	314.56 m²	3385.85 SF
LEVEL 04	314.56 m²	3385.85 SF
LEVEL 05	314.56 m²	3385.85 SF
LEVEL 06	298.45 m²	3212.52 SF
TOTAL	1886.41 m²	20305.19 SF

RENTABLE AREA (RESIDENTIAL)

LEVEL	AREA	AREA (SF)
LEVEL 00	208.36 m²	2243 SF
LEVEL 01	210.24 m²	2263 SF
LEVEL 02	279.96 m²	3013 SF
LEVEL 03	271.77 m²	2925 SF
LEVEL 04	271.40 m²	2921 SF
LEVEL 05	271.40 m²	2921 SF
LEVEL 06	235.39 m²	2534 SF
TOTAL	1748.52 m²	18821 SF

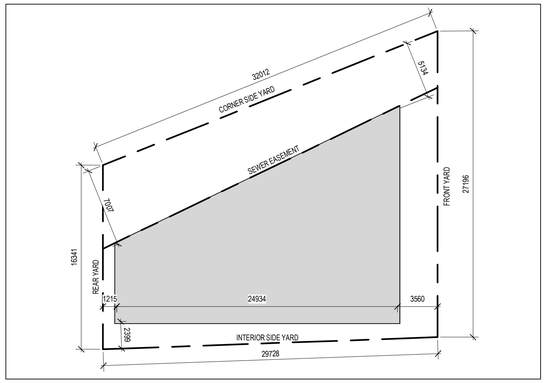
SITE PLAN NOTES

S1 SOFT LANDSCAPING
S2 INTERLOCKING STONE PAVERS
S3 EXISTING STRUCTURE TO BE DEMOLISHED
S4 EXISTING CHAINLINK FENCE
S5 CONCRETE CURB
S6 DEPRESSED CURB

SKETCH SHOWING SEWER EASEMENT
REQUIREMENTS
342 ROOSEVENT AVENUE
CITY OF OTTAWA

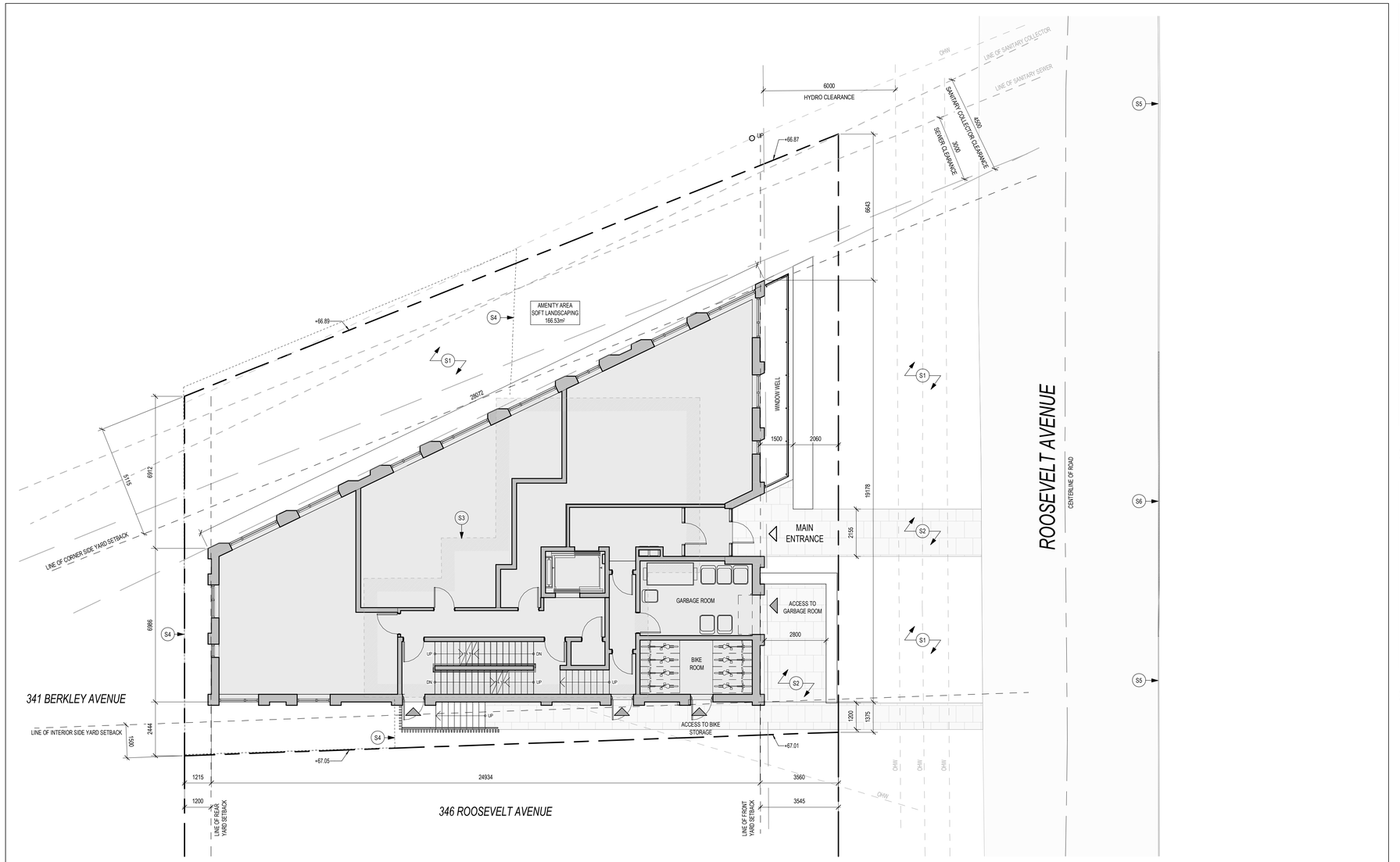
J.D BARNES LTD. 2024

6 SP-01 SURVEY INFO
SCALE: NTS



5 SP-01 SITE PLAN - SETBACKS
SCALE: 1 : 250

2 SP-01 LOCATION PLAN
SCALE: NTS



1 SP-01 SITE PLAN
SCALE: 1 : 100

Site Statistics

Current Zoning Designation:	R5B[1195] H(19)
Lot Width:	27.20m
Total Lot Area:	646.7m²
Average Existing Grade:	66.955m
Gross Floor Area:	2168.27m²
Building Area	320.69m²
Floor Space Index:	3.35

Proposed Development - 6 Storey Mid-Rise Apartment Building

No. of units 30 Units

Zoning Mechanism	Required	Provided
Minimum Lot Width *164A*	22.5m	27.20m
Minimum Lot Area *164A*	675m²	646.7m²
Min. Front Yard Setback *164A*	3.0m	3.545m
Corner Side Yard Setback *164A*	3.0m	5.115m
Min. Interior Side Yard Setback *164B*	1.5m	1.5m
Min. Rear Yard Setback *164B*	7.48m *(25% of the lot depth but need not exceed 7.5 m)*	1.2m
Maximum Building Height *164B*	19.0m	19.795m
Parking Space Rates (Residents) *101 (Sch. 1A - Area X)*	9 Spaces *0 spaces for first 12 units - Section 101(3)(e) 0.5 spaces / unit thereafter - Table 101(R11)*	0 Spaces
Minimum Visitor Parking Rates *102 (Sch. 1A - Area X)*	2 Spaces *0 spaces for first 12 units - Section 102(3) 0.1 spaces / unit thereafter - Table 102*	0 Spaces
Bicycle Parking Rates (Residents) *Table 111A (Sch. 1 - Area X)*	15 Spaces *0.5 spaces / unit [111A(b)(i)]*	16 Spaces
Landscaped Area *163 (9)*	109.01m² *(minimum 30% of lot area)*	309.76m²
Total Amenity Area *Table 137(4)(II)*	180m² *6m² / unit for 30 units*	186.62m²
Communal Amenity Area *Table 137(4)(III)*	90m² *Min. 50% of Total Amenity Area*	166.53m²

3 SP-01 SITE PLAN STATISTICS
SCALE: NTS

SITE PLAN SYMBOLS LEGEND

- BUILDING ENTRANCE
- BUILDING EXIT
- BICYCLE PARKING
- PROPERTY LINE
- SETBACK LINE
- OHW — OVERHEAD WIRES
- INTERLOCKING STONE PAVERS
- EXISTING TRAFFIC SIGNAL POST
- FDC — FIRE DEPARTMENT CONNECTION
- FH — FIRE HYDRANT
- NEW STREET LIGHT
- STREET LIGHT TO BE REMOVED
- EXISTING STREET LIGHT TO REMAIN
- UP — EXISTING UTILITY POLE TO REMAIN
- UP — UTILITY POLE TO BE REMOVED/RELOCATED

4 SP-01 SITE PLAN SYMBOLS
SCALE: NTS

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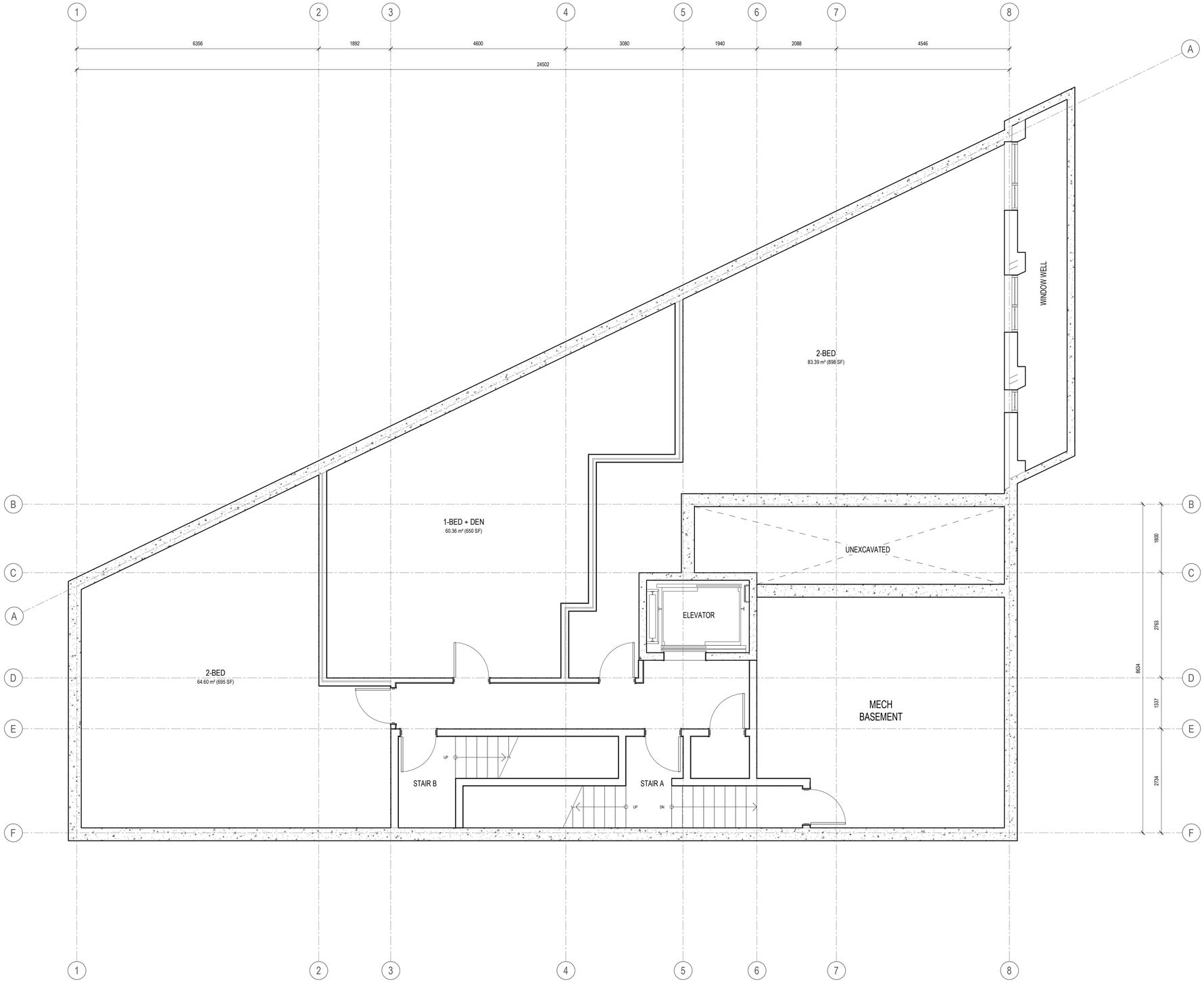
2405	NOTED	NL	RMK

SITE PLAN

SP-01



1 A100 FLOOR PLAN LEVEL 00 & MECH. BASEMENT
SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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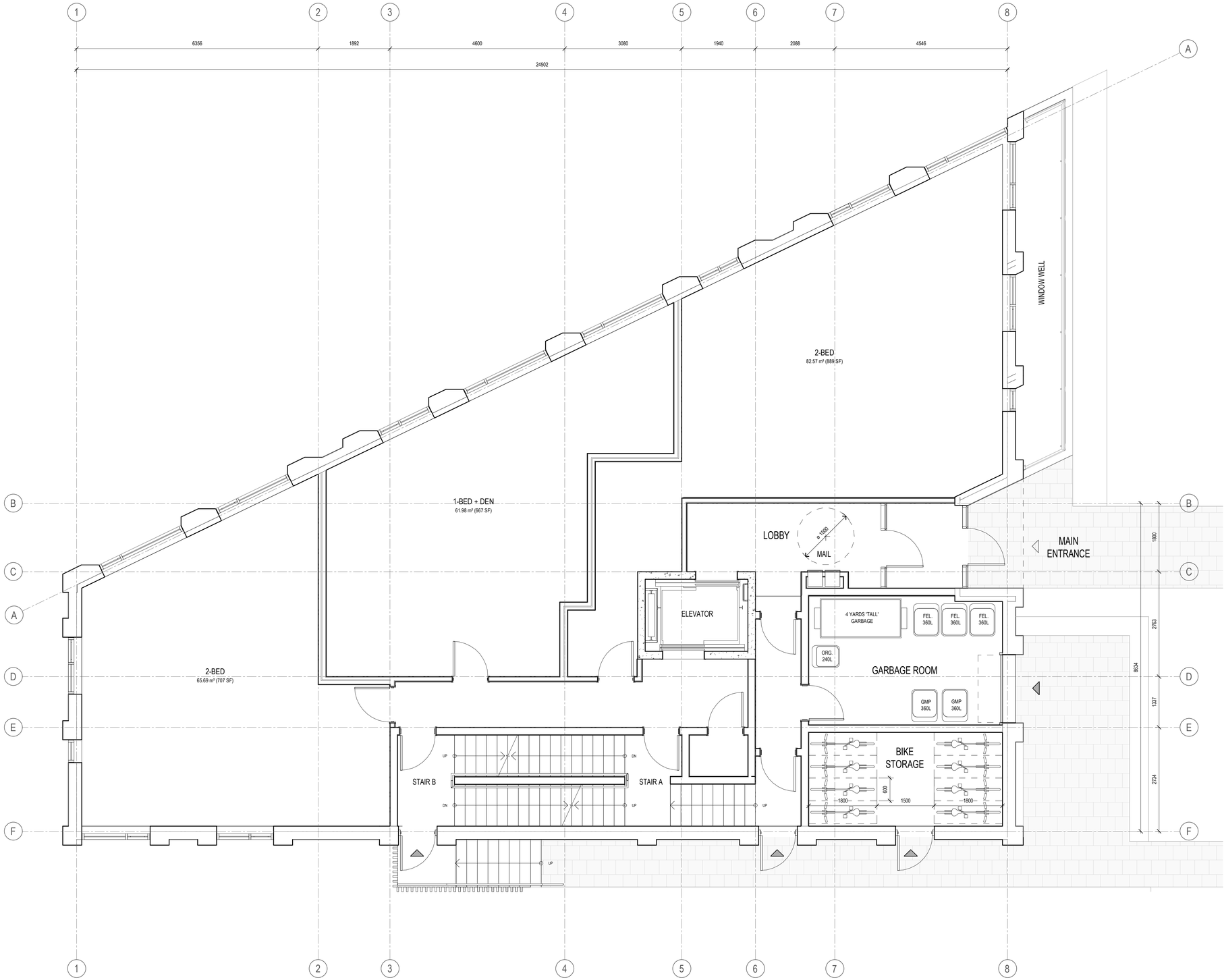
FLOOR PLAN LEVEL 00 & MECH. BASEMENT

A100



1 A101 FLOOR PLAN ENTRY LEVEL & LEVEL 01
SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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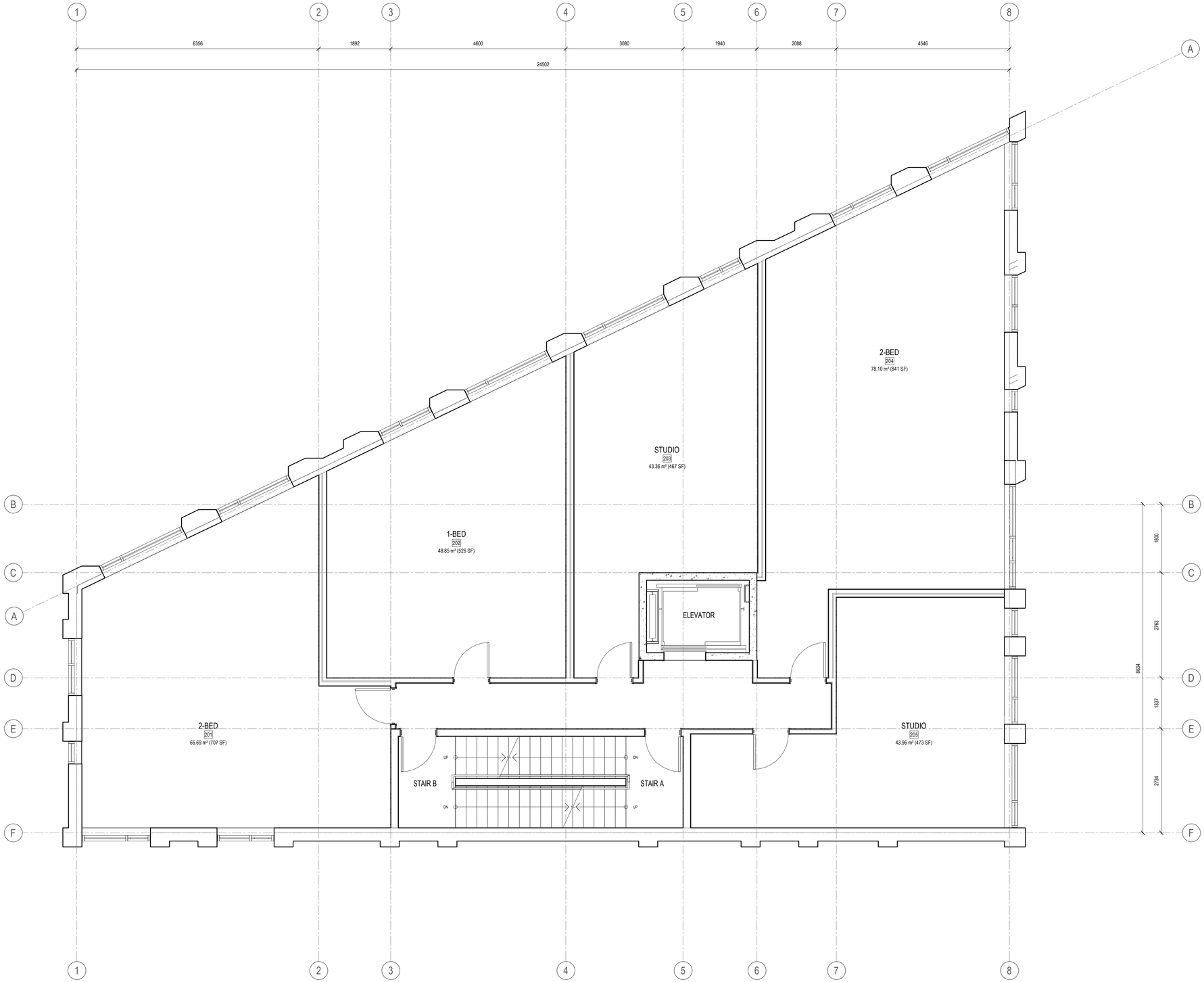
FLOOR PLAN ENTRY LEVEL & LEVEL 01

A101



1 FLOOR PLAN LEVEL 02
A102 SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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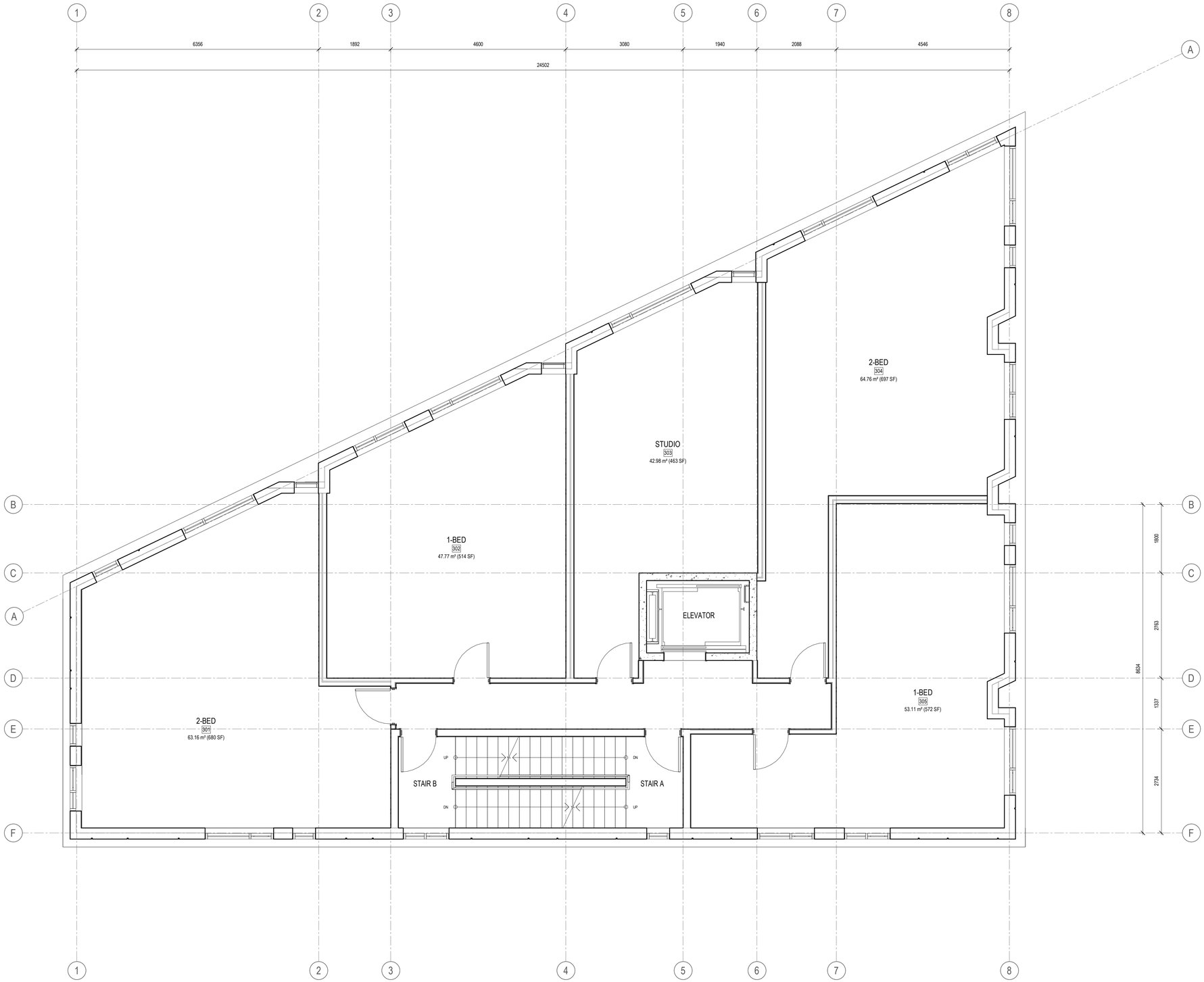
FLOOR PLAN LEVEL 02

A102



1 FLOOR PLAN LEVEL 03
A103 SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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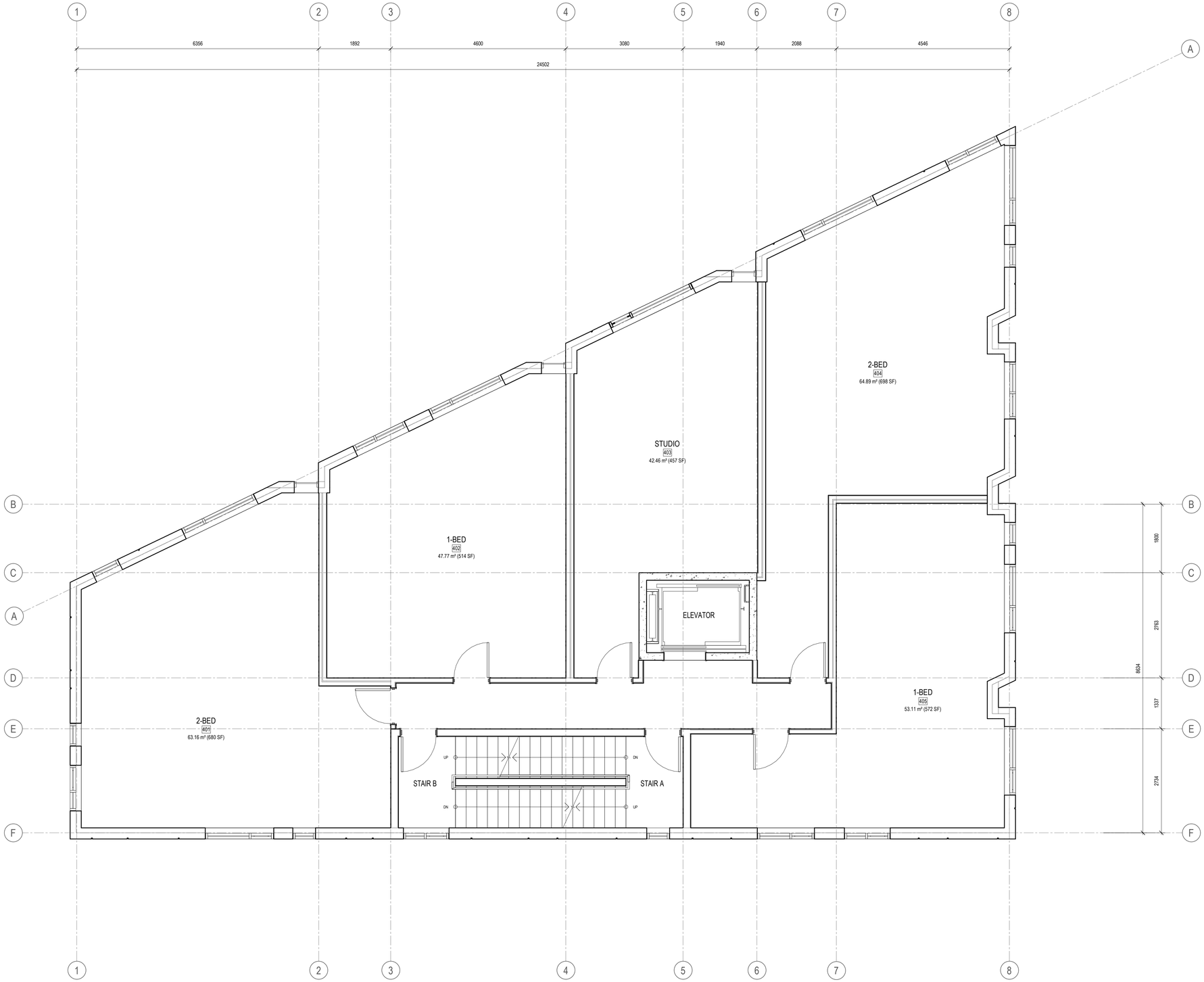
FLOOR PLAN LEVEL 03

A103



1 A104 FLOOR PLAN LEVEL 04
SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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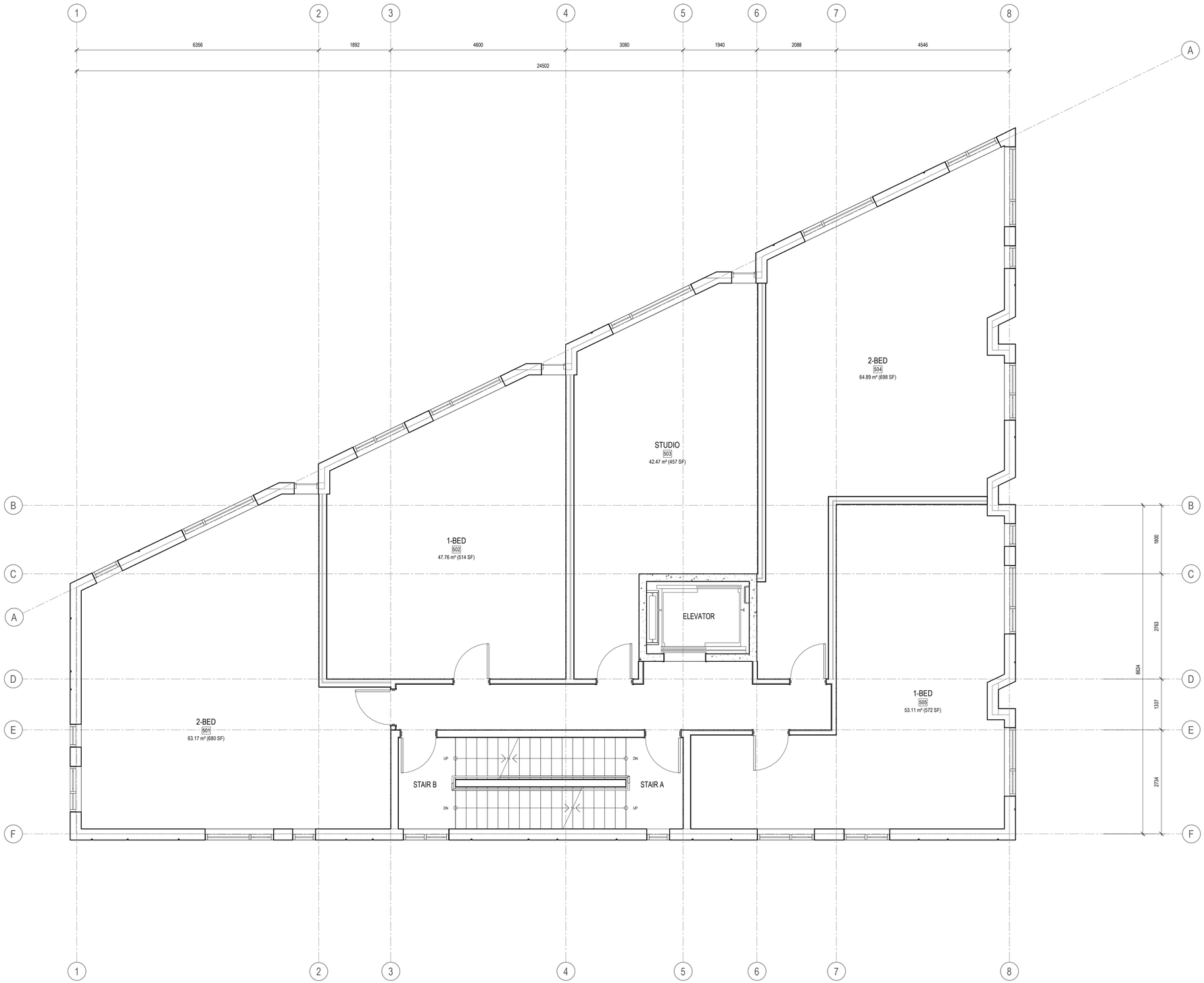
FLOOR PLAN LEVEL 04

A104



1 A105 FLOOR PLAN LEVEL 05
SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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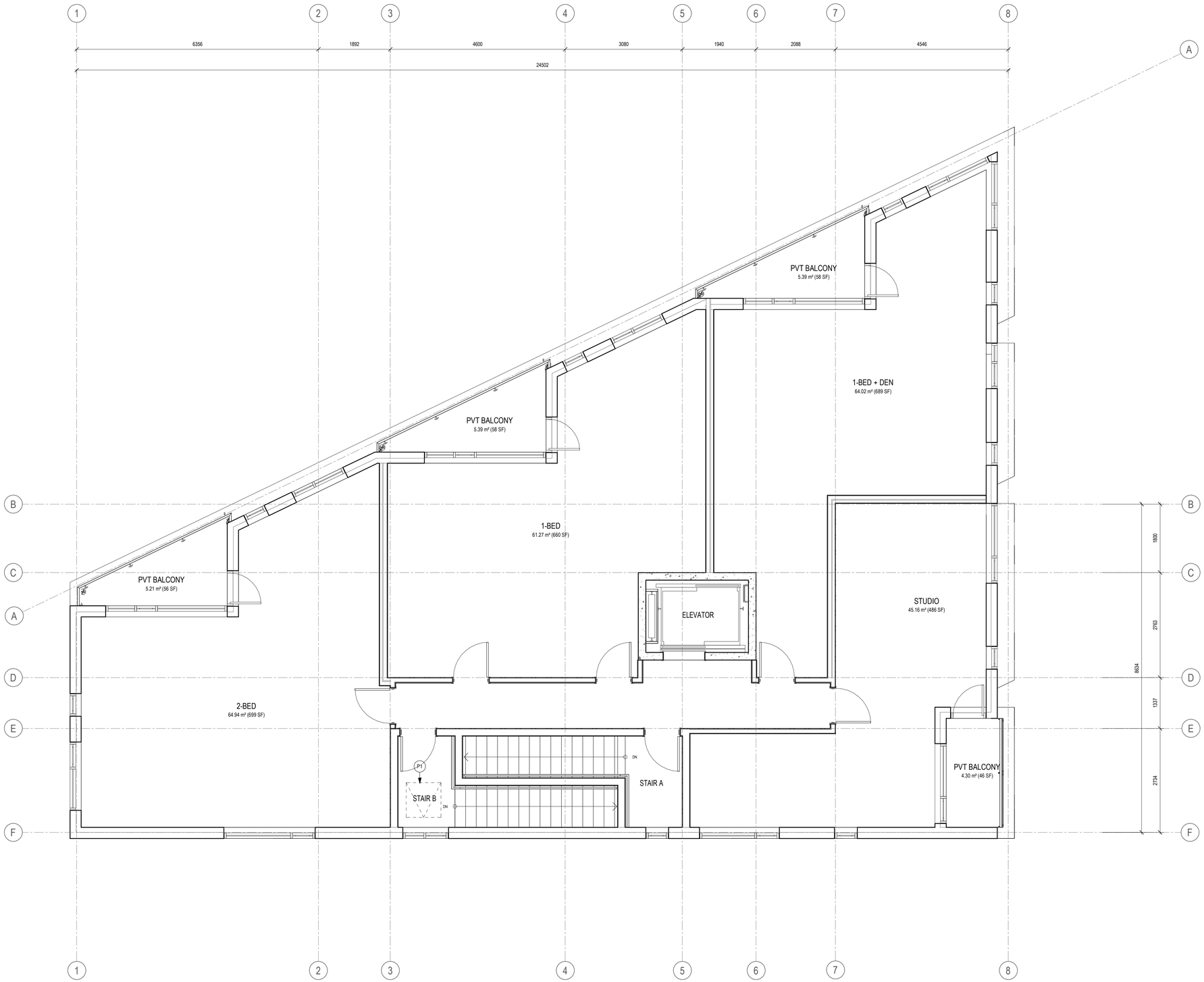
FLOOR PLAN LEVEL 05

A105



1 FLOOR PLAN LEVEL 06
A106 SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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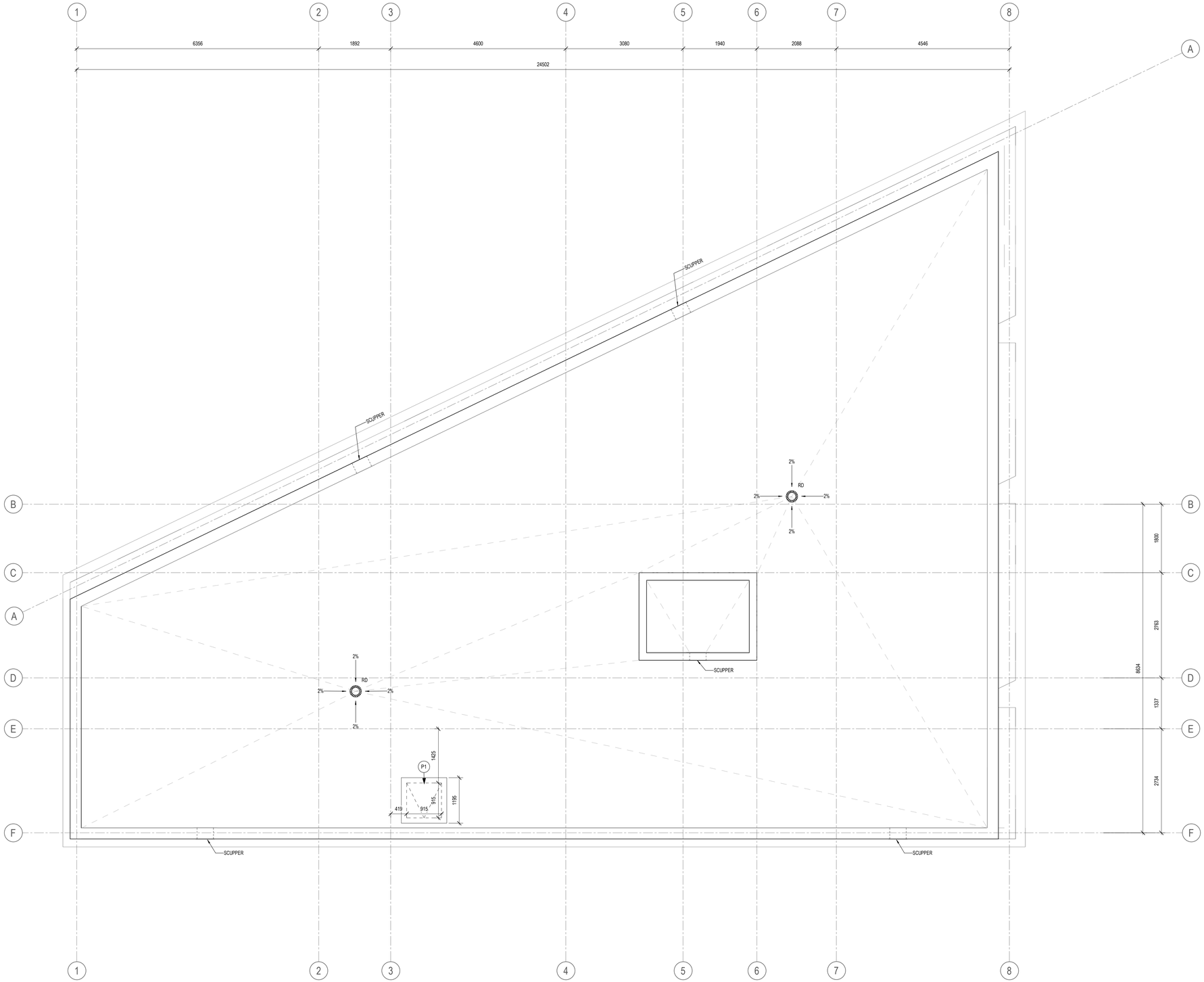
FLOOR PLAN LEVEL 06

A106



1 A107 ROOF PLAN
SCALE: 1 : 50

FLOOR/ROOF PLAN NOTES

P1 ROOF ACCESS HATCH

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ROOF PLAN

A107

1 EAST ELEVATION
A201 SCALE: 1 : 50

CLADDING LEGEND:

- AL-1 — ALUMINUM PANEL BLACK
- AL-2 — ALUMINUM PANEL DARK GREY
- BR-1 — BRICK MASONRY BLACK
- GL-1 — ALUMINUM AND GLASS RAILING

CLADDING LEGEND
SCALE: 1 : 100

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2405	NOTED	NL	RMK

EAST ELEVATION

A201

1 NORTH ELEVATION
A202 SCALE: 1 : 50

CLADDING LEGEND:

- AL-1 — ALUMINUM PANEL BLACK
- AL-2 — ALUMINUM PANEL DARK GREY
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CLADDING LEGEND
SCALE: 1 : 100

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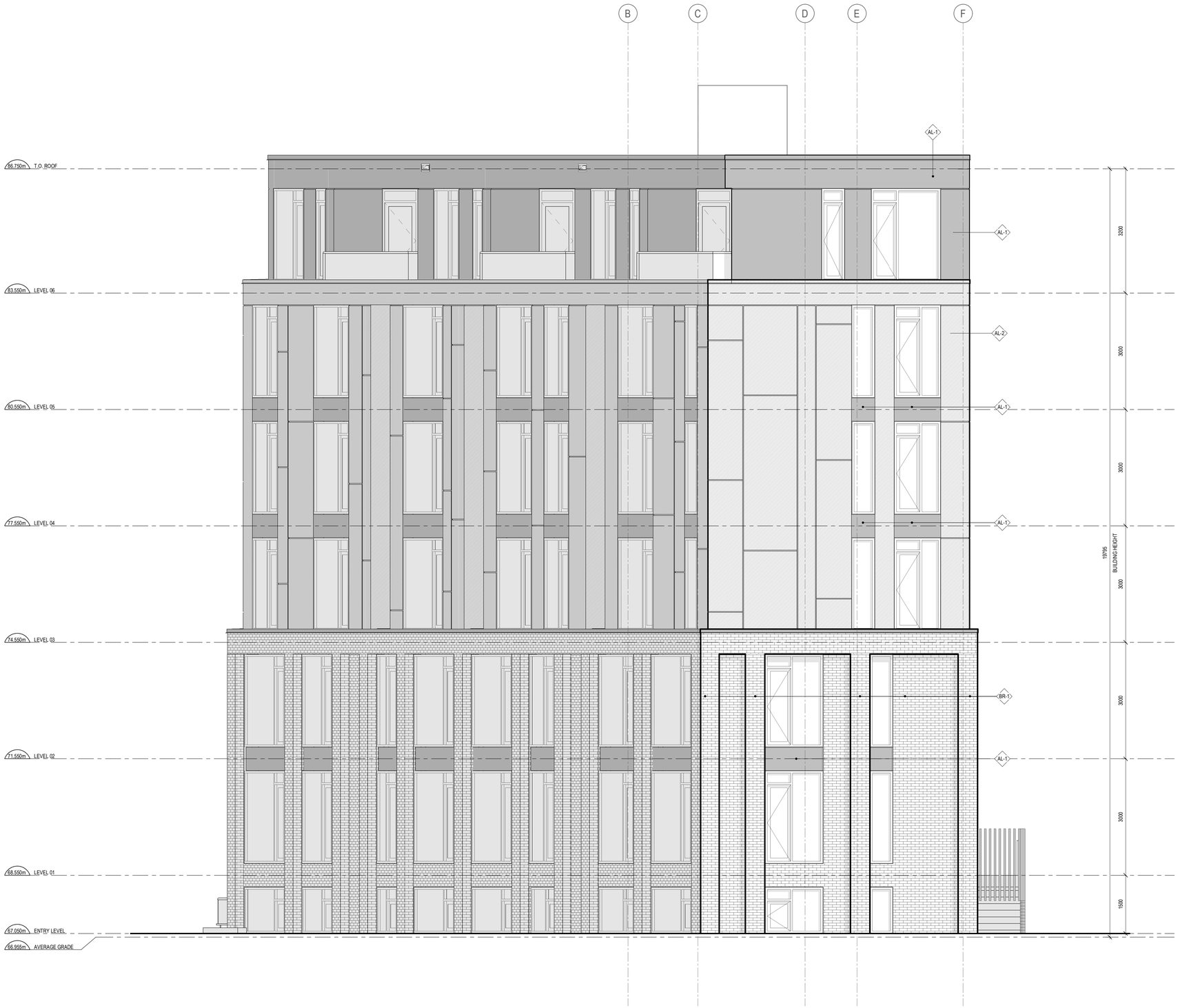
NORTH ELEVATION

A202



1 A203 WEST ELEVATION
SCALE: 1 : 50

CLADDING LEGEND:

- AL-1 — ALUMINUM PANEL BLACK
- AL-2 — ALUMINUM PANEL DARK GREY
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CLADDING LEGEND
SCALE: 1 : 100

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WEST ELEVATION

A203

1 SOUTH ELEVATION
A204 SCALE: 1 : 50

CLADDING LEGEND:

- AL-1 — ALUMINUM PANEL BLACK
- AL-2 — ALUMINUM PANEL DARK GREY
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CLADDING LEGEND
SCALE: 1 : 100

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SOUTH ELEVATION

A204

APPENDIX B

Geotechnical Investigation:

Paterson Group Report PG4210-1 Revision 1 dated March 11, 2025

PATERSON GROUP

Geotechnical Investigation

Proposed Residential Building

342 Roosevelt Avenue
Ottawa, Ontario

Prepared for 342 Roosevelt Limited

Report PG4210-1 Rev. 1 dated March 17, 2025

Table of Contents

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by 342 Roosevelt Limited to conduct a geotechnical investigation for a proposed residential building to be located at 342 Roosevelt Avenue in the City of Ottawa, Ontario. (refer to Figure 1 - Key Plan in Appendix 2 of this report for the general site location).

The objectives of the geotechnical investigation were to:

- ❑ Determine the subsoil and groundwater conditions at this site by means of boreholes.
- ❑ Provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

The proposed development is understood to consist of a 6.5-storey residential building with 26 units and one basement level, which is surrounded by walkways and a landscaped area. The proposed building is expected to be municipally serviced.

Demolition of the existing structure located on-site will be required as part of the subject development.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The fieldwork for the current investigation was conducted on July 19, 2017, and consisted of excavating 2 test pits to a maximum depth of 0.9 m. The test pits were excavated using a mini-excavator supplied by the client.

The test pits were reviewed in the field by Paterson personnel under the direction of a senior engineer from the geotechnical division. The test pit procedure consisted of reviewing the excavation, and sampling and testing the overburden at selected locations.

The test pits were placed in a manner to provide general coverage of the property taking into consideration existing site features and underground services. The approximate locations of the test pits are shown on Drawing PG4210-1 - Test Hole Location Plan attached to the present report.

Sampling and In Situ Testing

Grab samples (G) were recovered from the side walls of the test pits. The depths at which the grab samples were recovered from the test pits are shown as G on the Soil Profile and Test Data sheets presented in Appendix 1.

All samples were visually inspected and initially classified on site. The grab samples were placed in sealed plastic bags and transported to our laboratory for further examination and classification.

Groundwater

Where present, the depth at which groundwater was encountered at the completion of test pit excavations was noted in the field.

3.2 Field Survey

The test pit locations, and the ground surface elevation at each test pit location, were surveyed by Paterson using a GPS unit with respect to a geodetic datum. The locations of the test pits, and ground surface elevation at each test pit location, are presented on Drawing PG4210-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Review

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the sample. The results are presented in Appendix 1 and are discussed further in Section 6.7.

4.0 Observations

4.1 Surface Conditions

The subject site is currently occupied by a 2-storey residential dwelling with an associated driveway, landscaped areas and mature trees. The ground surface at the subject property is relatively flat and generally at-grade with Roosevelt Avenue. The site is surrounded by the LRT Confederation Line to the north, residential dwellings to the south west, and Roosevelt Avenue to the east.

The West Nepean Collector sewer line extends through the northern portion of the site. Further, an existing 1200 m diameter watermain is located approximately 3 m from the northern limit of the site, and has an invert at approximate geodetic elevation 64 m.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the test pit locations consisted of topsoil with rootlets overlying a brown silty sand to silty clay fill mixed with topsoil, gravel and cobbles. Glacial till was encountered in test pits TP 2, consisting of brown silty sand to silty clay with trace gravel, cobbles and boulders.

Practical refusal to excavation was encountered on the bedrock surface at approximate depths of 0.6 m and 0.9 m below ground surface in test pits TP 1 and TP 2, respectively. Refer to the Soil Profile and Test Data sheets attached for specific details of the soil profile encountered at the test pit locations.

Bedrock

Based on available geological mapping, the local bedrock consists of limestone with some shaly partings from the Ottawa formation. The overburden drift thickness is expected between ground surface and 1 m depth.

4.3 Groundwater

Groundwater observations were made in the open test pit upon completion of excavation. All test pits were dry upon the completion of the field program, and the groundwater is considered to be located at some depth within the bedrock. However, it should be noted that groundwater levels are subject to seasonal fluctuations, therefore, the groundwater level could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. The proposed residential building is recommended to be founded on conventional spread footings placed on a bearing surface consisting of clean, surface sounded bedrock.

Bedrock removal will be required to complete the foundation construction. The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil, asphalt, and fill, containing deleterious or organic materials or construction debris, should be stripped from under any building, paved areas, pipe bedding and other settlement sensitive structures. Care should be taken to not disturb adequate bearing surfaces during site preparation activities.

Fill Placement

Where required, engineered fill placed for grading beneath the proposed building footprint, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site. The fill should be placed in maximum lift thickness of 300 mm and compacted with suitable compaction equipment. Fill placed beneath the building should be compacted to a minimum of 98% of the Standard Proctor Maximum Dry Density (SPMDD).

Non-specified existing fill along with site-excavated soil could be placed as general landscaping fill where surface settlement is of minor concern. The existing materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If the existing materials are to be placed to increase the subgrade level for areas to be paved, the non-specified existing fill should be compacted in 300 mm lifts and compacted to a minimum density of 95% of the respective SPMDD.

Bedrock Removal

Due to the proximity of the West Nepean Collector sewer line and 1200 mm diameter watermain located near the northern site boundary, bedrock should be completed by line drilling and hoe-ramming.

Prior to proceeding with bedrock removal, the effects on the existing services, buildings and other structures should be addressed. A pre-blast or pre-construction survey located in proximity of the bedrock removal operations should be conducted prior to commencing construction. The extent of the survey should be sufficient to respond to any inquiries/claims related to the bedrock removal operations.

As a general guideline, peak particle velocity (measured at the structures) should not exceed 50 mm/s during the blasting program to reduce the risks of damage to the existing structures.

Vibration Considerations

Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels, as much as possible, should be incorporated in the construction operations to maintain a cooperative environment with the residents.

Two parameters determine the recommended vibration limit: the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people. A preconstruction survey is recommended to minimize the risks of claims during or following the construction of the proposed building.

5.3 Foundation Design

Bearing Resistance Values

Footings placed on a clean, surface sounded limestone bedrock bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **500 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **1500 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

A clean, surface sounded bedrock bearing surface consists of one from which all topsoil, soils, looks rock and any other deleterious materials have been removed prior to the placement of concrete for footings.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a sound bedrock bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1H:6V (or flatter) passes only through sound bedrock or a material of the same or higher capacity as the bedrock, such as concrete. A weathered bedrock bearing medium will require a lateral support zone of 1H:1V (or flatter).

Settlement

Footings bearing on an acceptable bedrock bearing surface and designed for the bearing resistance values provided herein will be subjected to negligible potential post-construction total and differential settlements.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C** for foundations constructed at the subject site. A higher site classification such as Class A or B can be provided if a site-specific shear wave velocity testing is completed. Refer to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements. The soils underlying the subject site are not susceptible to liquefaction.

5.5 Slab on Grade Construction

With the removal of all topsoil and fill containing significant amounts of deleterious or organic materials, the bedrock is considered to be an acceptable subgrade on which backfill for basement slab construction.

It is recommended that the upper 200 mm of sub-floor fill consist of 19 mm clear crushed stone. In consideration of the anticipated groundwater conditions, an underslab drainage system, consisting of lines of perforated drainage pipe subdrains connected to a positive outlet, should be provided in the clear crushed stone under the lower basement floor of the proposed building. This is discussed further in Section 6.1.

5.6 Basement Wall

There are several combinations of backfill materials and retained soils that could be applicable for the basement walls of the proposed building. However, the conditions can be well-represented by assuming the retained soil consists of a material with an angle of internal friction of 30 degrees and a drained unit weight of 20 kN/m^3.

Lateral Earth Pressures

The static horizontal earth pressure (p_o) can be calculated using a triangular earth pressure distribution equal to $K_o \cdot \gamma \cdot H$ where:

K_o = at-rest earth pressure coefficient of the applicable retained material
γ = unit weight of fill of the applicable retained material (kN/m^3)
H = height of the wall (m)

An additional pressure having a magnitude equal to $K_o \cdot q$ and acting on the entire height of the wall should be added to the above diagram for any surcharge loading, q (kPa), that may be placed at ground surface adjacent to the wall. The surcharge pressure will only be applicable for static analyses and should not be used in conjunction with the seismic loading case.

Actual earth pressures could be higher than the “at-rest” case if care is not exercised during the compaction of the backfill materials to maintain a minimum separation of 0.3 m from the walls with the compaction equipment.

Seismic Earth Pressures

The total seismic force (P_{AE}) includes both the earth force component (P_o) and the seismic component (ΔP_{AE}).

The seismic earth force (ΔP_{AE}) can be calculated using $0.375 \cdot a \cdot H^2/g$ where:

$a_c = (1.45-a_{max}/g)a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H= height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the Ottawa area is 0.32g according to OBC 2012. Note that the vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions can be calculated using $P_o = 0.5\ K_o \cdot \gamma \cdot H^2$, where K = 0.5 for the soil conditions noted above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2012.

6.0 Design and Construction Precautions

6.1 Foundation Backfill

Perimeter Drainage

A perimeter foundation drainage system is recommended to be provided for the proposed structure. The system should consist of a 100 mm or 150 mm diameter perforated and corrugated plastic pipe, which is surrounded on all sides by 150 mm of 19 mm clear crushed stone and placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Underslab Drainage System

Underslab drainage will be required to control water infiltration below the basement slab. For preliminary design purposes, it is recommended that 100 or 150 mm perforated pipes be placed at approximate 6 m centres underlying the basement floor. The spacing of the underslab drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

Foundation Backfill

Backfill against the exterior sides of the foundation walls should consist of free-draining, non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and are not recommended for placement as backfill against the foundation walls, unless placed in conjunction with a drainage geocomposite board, such as Miradrain G100N or Delta Drain 6000. The drainage geocomposite should be connected to the perimeter foundation drainage system. Otherwise, imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should be placed for foundation backfill.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover, or an equivalent thickness of soil cover and foundation insulation, should be provided.

Exterior unheated footings, such as isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

However, foundations which are founded directly on clean, surface-sounded bedrock with no cracks or fissures, and which is approved by Paterson at the time of construction, is not considered frost susceptible and does not require soil cover.

Where the bedrock is considered frost susceptible, foundation insulation will need to be provided or the frost susceptible bedrock will need to be removed and replaced with lean concrete (minimum 17 MPa 28-day strength).

6.3 Excavation Side Slopes

Temporary Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes in soil and above the groundwater level, extending to a maximum depth of 3 m, should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides. Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time.

Bedrock Stabilization

Excavation side slopes in sound bedrock can be carried out using vertical side walls. A minimum 1 m horizontal ledge should be left between the bottom of the overburden excavation and the top of the bedrock surface to provide an area to allow for potential sloughing or to provide a stable base for the overburden shoring system.

Horizontal rock anchors may be required at specific locations to prevent pop-outs of the bedrock, especially in areas where bedrock fractures are conducive to the failure of the bedrock surface.

The requirement for temporary chainlink fencing, shotcrete, and/or rock bolts should be evaluated during the excavation operations and should be discussed with the structural engineer during the design stage of the project.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent material specifications and standard detail drawings from the department of public works and services, infrastructure services branch of the City of Ottawa.

A minimum of 150 mm of OPSS Granular A should be placed for bedding of private sewer or water pipes when placed on a soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the obvert of the pipe, should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts and compacted to 98% of the SPMDD.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) and above the cover material, should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD. All cobbles larger than 200 mm in their longest direction should be segregated from re-use as trench backfill.

6.5 Groundwater Control

It is anticipated that groundwater infiltration into the excavation should be low to moderate and controllable using open sumps. The contractor should be prepared to direct water away from all subgrades, regardless of the source, to prevent disturbance to the founding medium.

Groundwater Control for Building Construction

For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water

Taking and Discharge Plan to be prepared by a Qualified Persons as stipulated under O.Reg. 63/16.

Impacts on Neighbouring Properties

Given the shallow bedrock present at, and in the vicinity of, the subject site, the neighbouring structures are expected to be founded on bedrock. Therefore, no issues are expected with respect to groundwater lowering that would cause damage to adjacent structures surrounding the proposed development.

6.6 Winter Construction

If winter construction is considered for this project, precautions should be provided for frost protection. The subsurface soil conditions mainly consist of frost susceptible materials. In presence of water and freezing conditions ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the installation of straw, propane heaters and tarpaulins or other suitable means. The excavation base should be insulated from subzero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be completed in a manner to avoid the introduction of frozen materials, snow or ice into the trenches. Where excavations are constructed in proximity of existing structures precaution to adversely affecting the existing structure due to the freezing conditions should be provided.

6.7 Corrosion Potential and Sulphate

The results of the analytical testing show that the sulphate content is less than 0.1%. This result indicates that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and pH of the sample indicates that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of an aggressive to very aggressive corrosive environment.

7.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon request, following the completion of a satisfactory material testing and observation program by geotechnical consultant.

All excess soils, with the exception of engineered crushed stone fill, generated by construction activities that will be transported on-site or off-site should be handled as per ***Ontario Regulation 406/19: On-Site and Excess Soil Management***.

8.0 Statement of Limitations

The recommendations provided herein are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test pit locations, Paterson requests immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than 342 Roosevelt Limited. or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

Deepak K Rajendran, E.I.T

Scott S. Dennis, P.Eng.

Report Distribution:

❑ 342 Roosevelt Limited (e-mail copy)
❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
342 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin. Geodetic elevation = 66.77m.

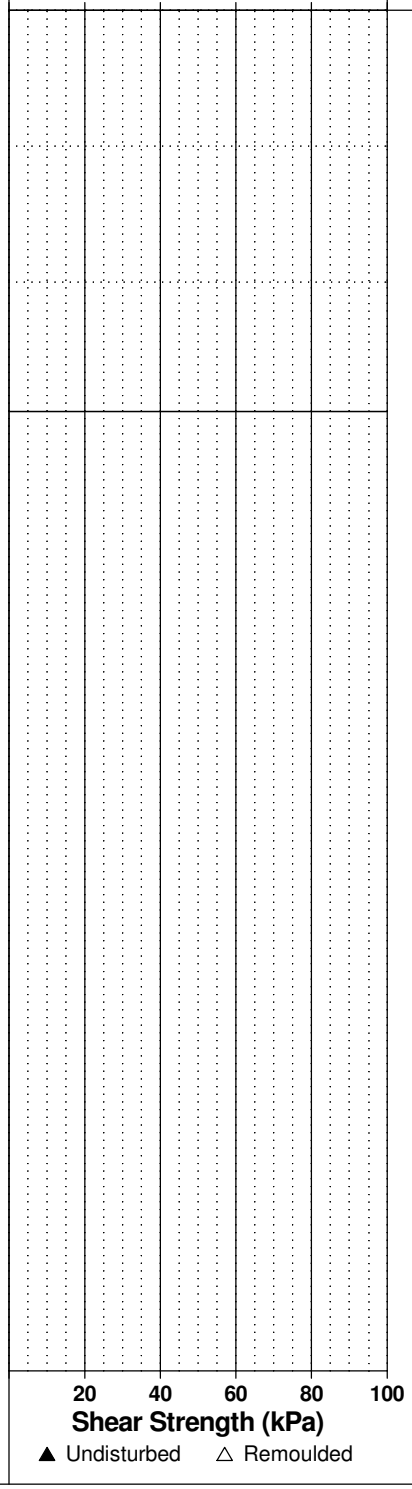
FILE NO. PG4210

REMARKS

HOLE NO. TP 1

BORINGS BY Excavator **DATE** July 19, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	66.92	20 40 60 80	
TOPSOIL									
0.17									
FILL: Brown silty clay, trace sand, gravel, cobbles and construction debris		G	1						
0.59									
End of Test Pit TP terminated on bedrock surface at 0.59m depth (TP dry upon completion)									



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
342 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin. Geodetic elevation = 66.77m.

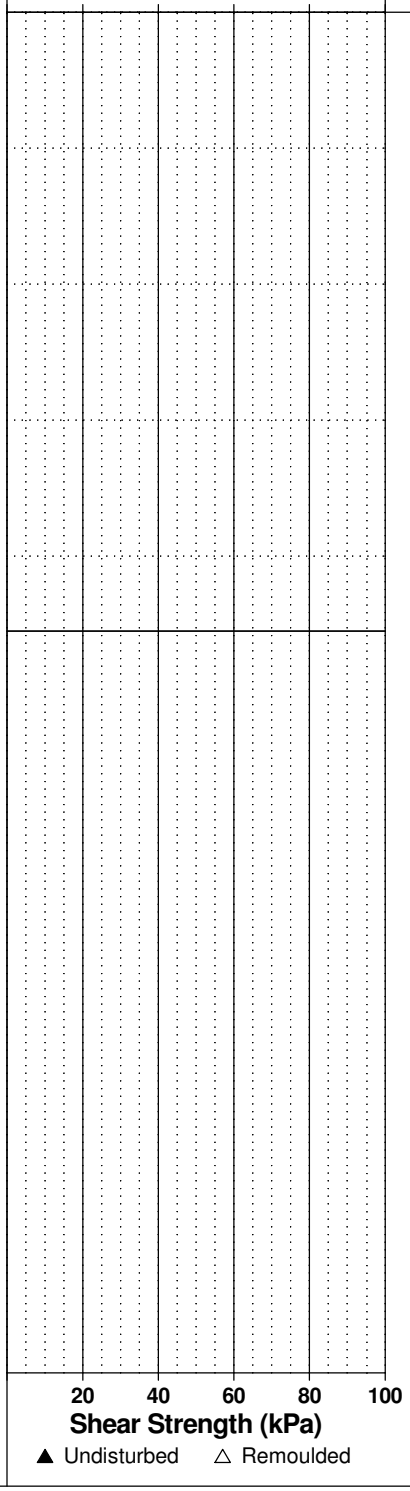
FILE NO. PG4210

REMARKS

HOLE NO. TP 2

BORINGS BY Excavator **DATE** July 19, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	66.99		
TOPSOIL		G	1						
0.13									
FILL: Brown silty sand, trace gravel, cobbles, organics and construction debris		G	2						
0.49									
GLACIAL TILL: Brown silty sand to silty clay, trace gravel, cobbles, boulders and organics		G	3						
0.91		G	4						
End of Test Pit									
TP terminated on bedrock surface at 0.91m depth									
(TP dry upon completion)									



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

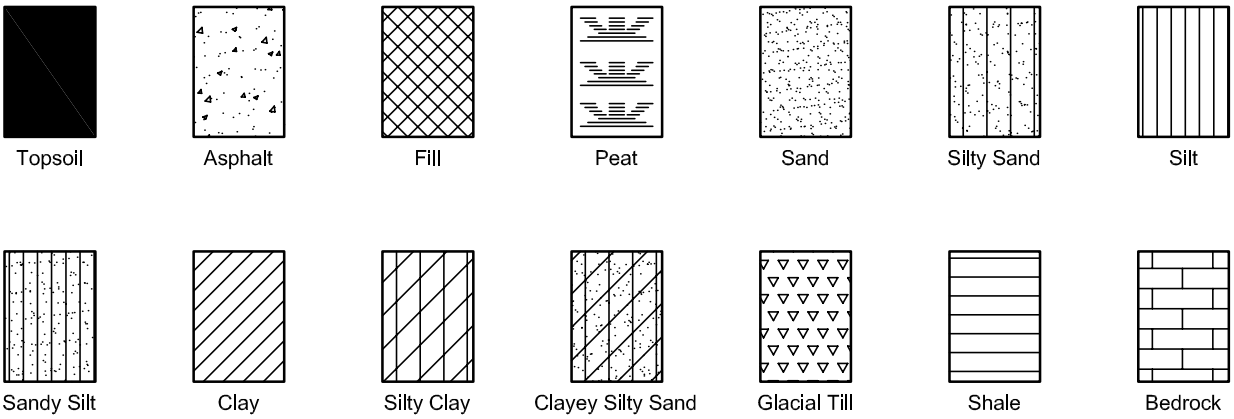
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

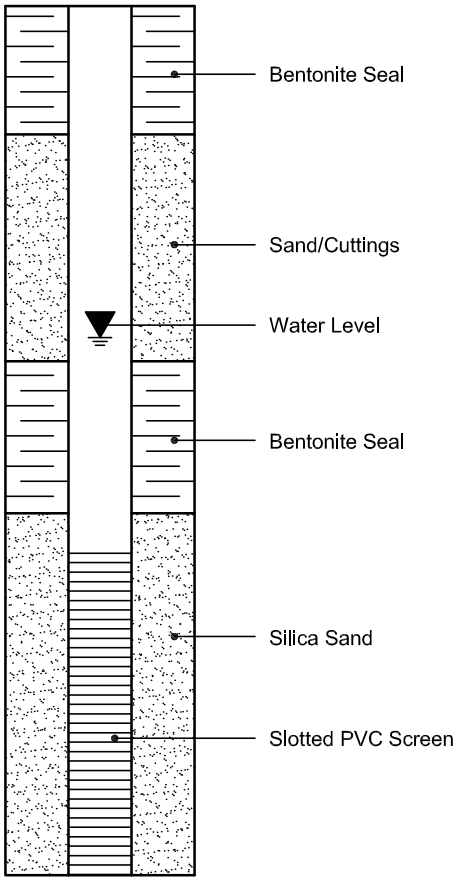
SYMBOLS AND TERMS (continued)

STRATA PLOT

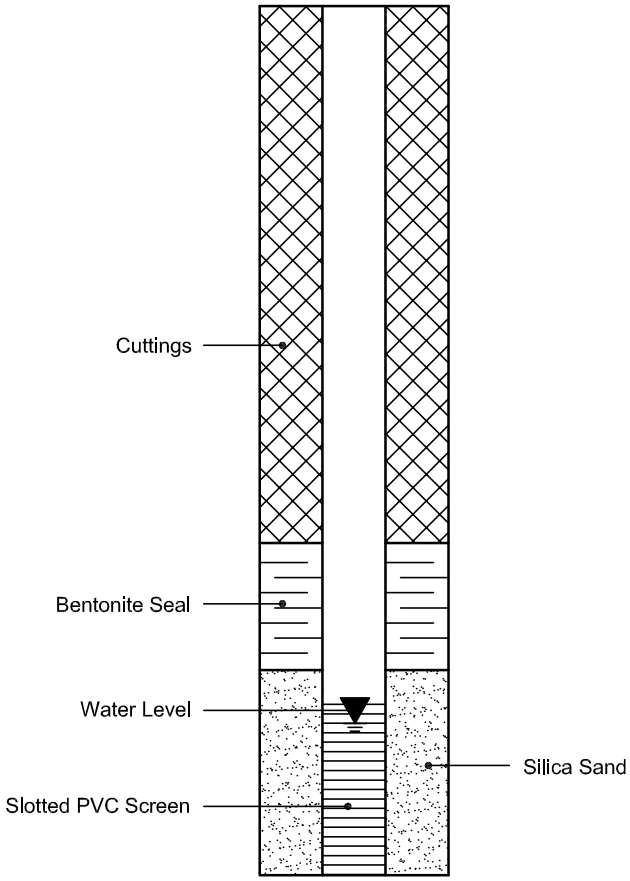


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 20656

Report Date: 27-Jul-2017

Order Date: 21-Jul-2017

Project Description: PG4210

	Client ID:	TP2-G3	-	-	-
	Sample Date:	19-Jul-17	-	-	-
	Sample ID:	1729564-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	84.1	-	-	-
General Inorganics					
pH	0.05 pH Units	7.27	-	-	-
Resistivity	0.10 Ohm.m	63.8	-	-	-
Anions					
Chloride	5 ug/g dry	<5	-	-	-
Sulphate	5 ug/g dry	5	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG4210-1 - TEST HOLE LOCATION PLAN

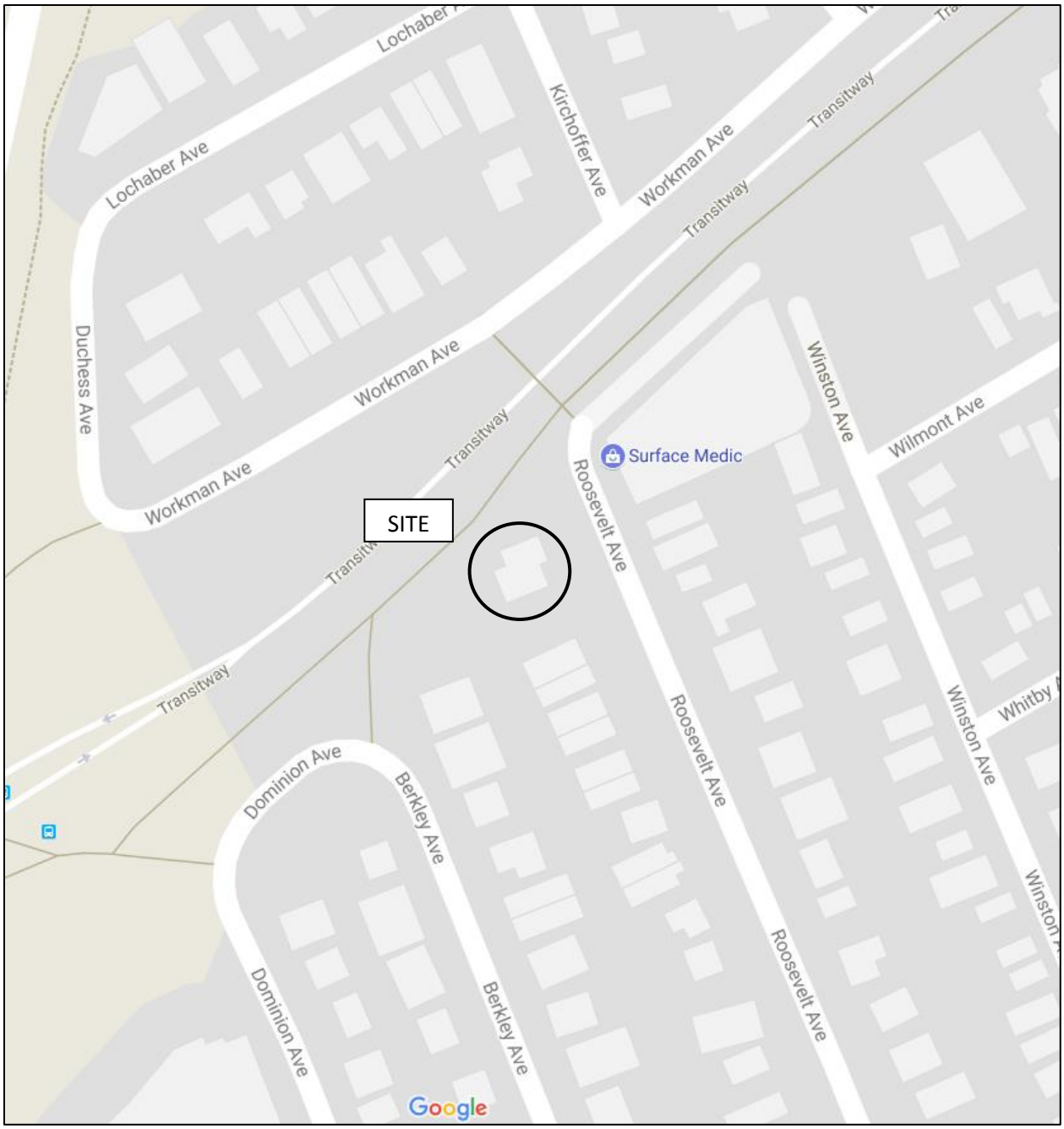
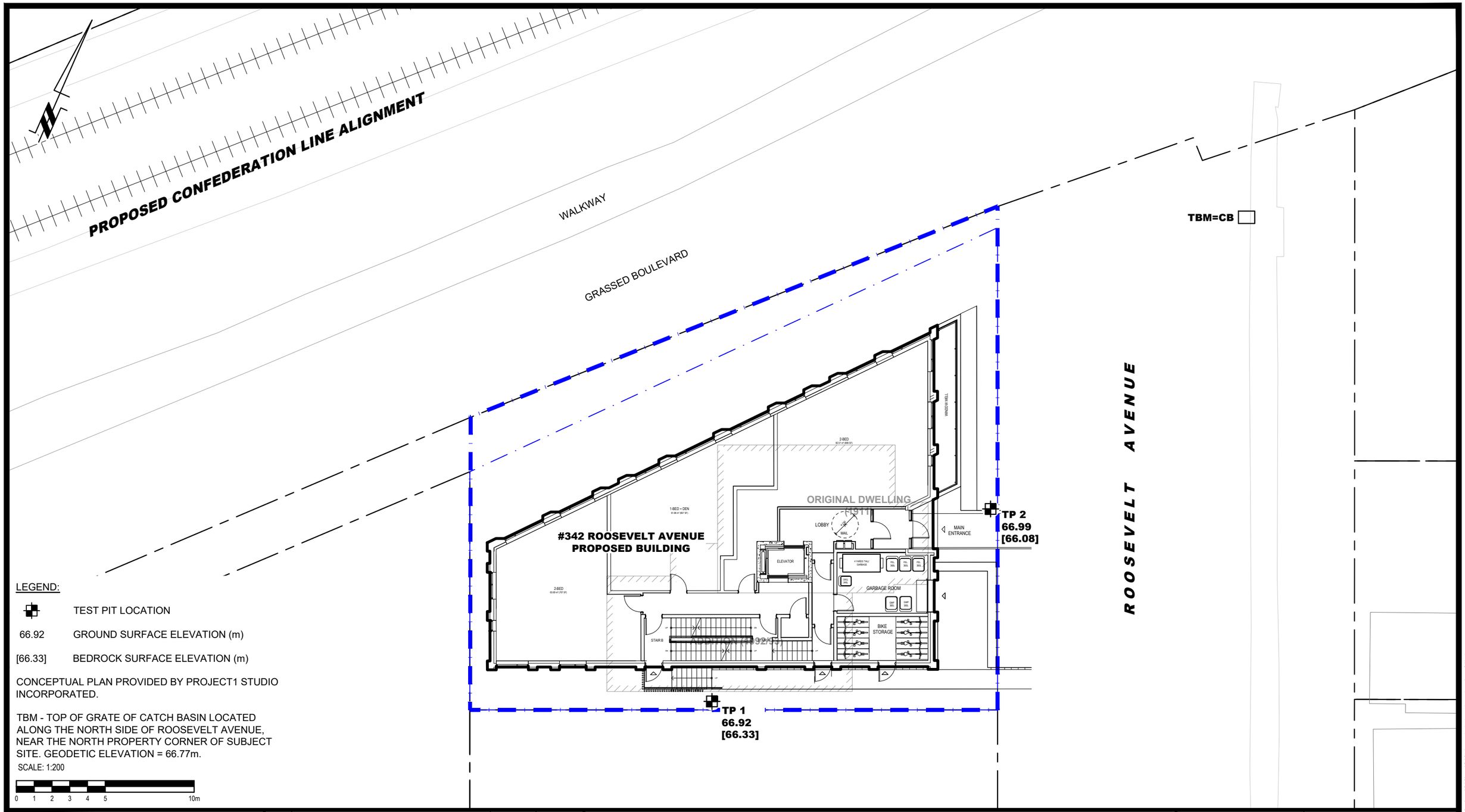


FIGURE 1

KEY PLAN



LEGEND:

TEST PIT LOCATION

66.92 GROUND SURFACE ELEVATION (m)

[66.33] BEDROCK SURFACE ELEVATION (m)

CONCEPTUAL PLAN PROVIDED BY PROJECT1 STUDIO INCORPORATED.

TBM - TOP OF GRATE OF CATCH BASIN LOCATED ALONG THE NORTH SIDE OF ROOSEVELT AVENUE, NEAR THE NORTH PROPERTY CORNER OF SUBJECT SITE. GEODETIC ELEVATION = 66.77m.

SCALE: 1:200

0 1 2 3 4 5 10m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	UPDATED CONCEPTUAL PLAN	22/08/2024	KS

CONCORDE MANAGEMENT DEVELOPMENT
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
342 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:200	Date: 07/2017
Drawn by: RCG	Report No.: PG4210-1
Checked by: NC	Dwg. No.: PG4210-1
Approved by: DJG	Revision No.: 1

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APPENDIX C

Environmental Noise Control Study :

Paterson Group Report PG4235-1 Revision 1 Dated June 19, 2018

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Environmental Noise Control And Vibration Study

Proposed Residential Building
342 Roosevelt Avenue - Ottawa

Prepared For

342 Roosevelt Limited

June 19, 2018

Report: PG4235-1 Revision 1

Table of Contents Page

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by 342 Roosevelt Limited to conduct an environmental noise control and vibration study for the proposed residential building to be located at 342 Roosevelt Avenue, in the City of Ottawa (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objective of the current study was to:

- ❏ Determine the primary noise sources impacting the site and compare the projected sound levels to guidelines set out by the Ministry of Environment and Climate Change (MOECC) and the City of Ottawa.
- ❏ Review the projected noise levels and offer recommendations regarding warning classes or alternative sound barriers.
- ❏ Review the potential of excessive vibrations caused by the existing transitway.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes acoustical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

This study has been conducted according to the City of Ottawa's document - Engineering Noise Control Guidelines (ENCG), dated January 2016, and the Ontario Ministry of the Environment Guideline NPC-300. The document - Transit Noise and Vibration Impact Assessment, composed by The Department of Transportation of the United States of America, dated May 2006, was also followed for the vibrational analysis.

2.0 Background

It is understood that the proposed development will consist of a 2-3 storey, residential building with a basement level. It is noted that there were no dedicated outdoor living area (OLA) for this proposed development. However, there is an open back yard, adjacent to the transitway, that will be utilized as an outdoor living area, and therefore is included in the noise assessment study.

3.0 Methodology and Noise Assessment Criteria

The City of Ottawa outlines three (3) sources of environmental noise that must be analyzed separately:

- Surface Transportation Noise
- Stationary Noise
  - new noise-sensitive development applications (noise receptors) in proximity to existing or approved stationary sources of noise, and
  - new stationary sources of noise (noise generating) in proximity to existing or approved noise-sensitive developments
- Aircraft noise

Surface Transportation Noise

The City of Ottawa's Official Plan, in addition to the ENCG dictate that the following conditions must be satisfied to classify as a surface transportation noise source for a subject site:

- Within 100 m of the right-of-way of an existing or proposed arterial, collector or major collector road; a light rail transit corridor; bus rapid transit, or transit priority corridor
- Within 250 m of the right-of-way for an existing or proposed highway or secondary rail line
- Within 300 m from the right of way of a proposed or existing rail corridor or a secondary main railway line
- Within 500 m of an existing 400 series provincial highway, freeway or principle main railway line.

The NPC-300 outlines the limitations of the stationary and environmental noise levels in relation to the location of the receptors. These can be found in the following tables:

Table 1 - Sound Level Limits for Outdoor Living Areas

Time Period	Required $L_{eq(16)}$ (dBA)
16-hour, 7:00-23:00	55

- Standards taken from Table 2.2a; Sound Level Limit for Outdoor Living Areas - Road and Rail

Table 2 - Sound Level Limits for Indoor Living Area			
Type of Space	**Time Period**	**Required L_{eq} (dBA)**	
		Road	**Rail**
Living/Dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc	7:00-23:00	45	40
Theaters, place of worship, libraries, individual or semi-private offices, conference rooms, reading rooms	23:00-7:00	45	40
Sleeping quarters	7:00-23:00	45	40
	23:00-7:00	40	35
❑ Standards taken from Table 2.2b; Sound Level Limit for Indoor Living Areas - Road and Rail			

If the sound level limits are exceeded at the window panes for the indoor living areas, the following Warning Clauses may be referenced:

Table 3 - Warning Clauses for Sound Level Exceedances	
Warning Clause	**Description**
Warning Clause Type A	"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."
Warning Clause Type B	"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."
Warning Clause Type C	"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
Warning Clause Type D	"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
❑ Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines - NPC-300	

Stationary Noise

Stationary noise sources include sources or facilities that are fixed or mobile and can cause a combination of sound and vibration levels emitted beyond the property line. These sources may include commercial air conditioner units, generators and fans. Facilities that may contribute to stationary noise may include car washes, snow disposal sites, transit stations and manufacturing facilities.

The impact of stationary noise sources is directly related to the location of the subject site within the urban environment. The proposed development at 342 Roosevelt Avenue can be classified as Class 1 by provincial guidelines and outlined in the ENGC, meaning "an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as 'urban hum.' Within the City Class 1 areas generally include all of the urban area as well as lands in proximity to Employment Lands and the 416/417 corridor."

Table 4 - Guidelines for Stationary Noise - Class 1

Time of Day	Outdoor Point of Reception	Pane of Window
7:00-19:00	50	50
19:00-23:00	50	50
23:00-7:00	-	45

❑ Standards taken from Table 3.2a; Guidelines for Stationary Noise - Steady and Varying Sound

Aircraft/Airport Noise

Aircraft noise is distinct, as it is typically low frequency for longer durations. The sound level may also differ between different types of aircraft. Due to the location of the subject site, an analysis aircraft/airport noise is not required.

4.0 Methodology and Vibration Assessment Criteria

Due to the presence of the future Confederation Line and the existing Transitway, a ground vibration and ground-borne noise review was also performed for this development.

Effects of the Transitway on the Proposed Development

Vibration is the oscillation from a defined position, such as wheels on a road or rail system, causing the building to shake an d rumbling sounds to be heard. The effects of this vibration include shaking of items on shelves or hangings on walls, or the low rumble sounds that may emanate through the walls and floors.

The methods of defining the vibrations has its own challenges, based on the type of vibration experienced. Due to the nature of the oscillatory motion of the vibration, there is no net movement of the vibration element, and therefore motion descriptors are zero. However, there are two (2) main methods of defining the magnitude of the overall vibration. The main method utilized in construction activities is the peak particle velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration signal and is often used when monitoring blasting vibrations and is ideal for evaluating the potential of building damage.

However, human responses require a different method of analysis as the human body requires time to respond to vibration signals. The average vibration amplitude would be an applicable method of reporting the ground-borne vibrations that humans would respond to. Therefore, the root mean square (RMS) amplitude, typically calculated over a 1 second interval, is utilized for the analysis. The RMS value is always less than the PPV.

General factors that could affect the magnitude of the created vibrations include, but are not limited to, whether the light rail is above grade or below grade, speed, vehicle suspension, wheel and track condition, track support system, depth of system and soil conditions. It should be noted that vibrations that travel through the bedrock surface should be minimal, but can travel a further distance.

With respect to the Transitway, the combination of the rubber tires and the suspension system of the bus will provide vibration isolation, and therefore, the buses will cause limited ground-borne noise or vibration concerns. The majority of the noise disturbance associated with the Transitway is considered air-borne noise, and will be discussed in the noise attenuation portion of the report.

It is anticipated that both the construction of the Confederation Line in addition to the day to day operational frequency of the Confederation line will create vibrations that may be experienced within 342 Roosevelt Avenue. Vibrations caused by the operation of the Confederation Line could propagate through the bedrock surface, and extend to the building foundation at 342 Roosevelt Avenue, which in turn could extend the vibration through the remainder of the building.

The City of Ottawa has not defined limits as to the amount of vibration caused by the Confederation Line would be acceptable. In a document released to the Council on December 4, 2012, titled "Design, Build, Finance and Maintenance of Ottawa Light Rail Transit (OLRT) Project", submitted by Nancy Schepers, it states that:

> "That assessment has established a noise and vibration standard that will protect all buildings including highly sensitive receptors like the CBC building on Queen Street and the National Arts Centre on Elgin Street.
>
> Noise levels in these sensitive receptors will be baselined and RTG will work with the institutions to meet performance specifications and coordinate construction activities to minimize impacts on their institution's operations.
>
> Following the assessment, RTG will develop specific noise and vibration mitigation measures as part of the project's final design and will maintain the light rail system to ensure that the mitigation measures remain effective in the future during normal operations.
>
> While some construction-related noise will be unavoidable as the Confederation Line is being built, RTG's construction methods and mitigation strategies will minimize disruption to the best extent possible."

The Federal Transit Administration's Transit Noise and Vibration Impact Assessment Report: FTA-VA-90-1003-06 was utilized as the standard for vibration standards caused by light rail and the Transitway. Upon review of these documents, the following standards were obtained and are applicable to this analysis.

The criteria for the environmental impact from vibrations are based on the RMS vibration levels for repeated events. The proposed development would be classified as a Vibration Category 2 - Residential. This includes all locations where people would sleep. The following table outlines the limits for ground-borne vibrations.

Table 5 - Ground-Borne Vibration (GBV) Impact Criteria for General Assessment			
Land Use Category	**GBV Impact Levels (VdB re 1 micro-inch/sec)**		
	Frequent Events	**Occasional Events**	**Infrequent Events**
Category 2	72 VdB	75 VdB	80 VdB

Notes:

- ❑ Frequent events is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
- ❑ Occasional events is define as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
- ❑ Infrequent events is defined as fewer tan 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

The DOT - Transit Noise and Vibration Impact Assessment defines a screening distance around a potential vibration source where additional studies may be required. For a bus transit zone, with a development consisting of a Category 2 building, a screening zone of 15 m (50') was provided. The proposed development is outside of this influence zone.

The Confederation Line, however, is classified as a light rail transit. According to the aforementioned documentation, the description of a light rail transit would be that “the ground-borne vibration characteristics of light rail systems are very similar to those of rapid transit systems. Because the speeds of light rail systems are usually lower, the typical vibration levels usually are lower.” For a source of light rail transit within a category 2 classification, the screening distance for vibration assessment is 45 m (150'). The proposed development will be within this radius.

5.0 Analysis

5.1 Surface Transporation Noise Attenuation Study

The proposed development is bordered to the west by a vacant lot, followed by Berkley Avenue and Dominion Avenue. A vacant (parking) lot followed by low-rise residential development is located to the south. Roosevelt Avenue followed by low-rise industrial and residential buildings are located to the east. City of Ottawa owned property, consisting of a walking path followed by the bus Transityway extend to the north. Workman Avenue is located north of the Transitway.

There are no collectors, major collectors, arterial roadways within 100 m of the proposed development. However, the Transitway is located within the 100 m buffer zone, and therefore will be the only road noise source analyzed for the development.

It is understood that the Ottawa Light Rail Transit (OLRT) is proposing that the Transitway be removed and the Confederation Line will be located along the Transitway, north of the proposed development. It is understood that, at this time, the exact location and details of this proposed transit line are not known, and will not be finalized until 2018. For the issuance of this noise and vibration study, it is assumed that the Confederation Line will be located where the existing Transitway is presently, and at the same elevation.

Noise source locations are presented on Paterson Drawing PG4235-1 - Site Plan, located in Appendix 1. It should be noted that since the two identified noise sources will not be encountered at the same time, two separate analysis is being completed.

There are no aircraft noise sources within the influence area. The neighbouring transit station could be a source of stationary noise. This transit station should be analsyzed further once it is determined what equipment will be placed.

The noise levels from road traffic are designated by the City of Ottawa, taking into consideration the right-of-way width and the implied roadway class. It is understood that these values represent the maximum allowable capacity of the proposed roadways. The parameters to be used for sound level predictions can be found on the following table.

Table 6 - Traffic and Road Parameters						
Road	**Implied Roadway**	**AADT (Veh/day)**	**Posted Speed (km/h)**	**Day/Night Split %**	**Medium Truck %**	**Heavy Truck %**
Transitway	Transitway	1320	80	92/8	5	90
❑ Data obtained by counting the number of buses at the transit stop						

The projected noise levels from the Confederation Line were provided by the City of Ottawa, taking into consideration the number of trips, the speed of the light rail and the type of engine. This information was provided to Paterson in an e-mail correspondence and is summarized below.

Table 7 - Light Rail Parameters				
Light Rail Line	**Engine Type**	**Maximum Speed (km/hr)**	**Number of Trips**	**Length of Train**
Confederation Line	Electric	80	488	2

There were several reception points that were considered in our analysis of the proposed multi-storey building. Reception points were selected at the bedroom windows along the different building elevations that are exposed to the identified noise sources. For this analysis, a reception point was taken at the centre of the window pane, at several different floor levels. Reception points are noted on Drawing PG4235-2 - Receptor Locations, presented in Appendix 1.

Table 10 - Summary of Reception Points and Geometry, presented in Appendix 1, provides a summary of the points of reception and their geometry with respect to the noise sources.

The analysis was completed using STAMSON version 5.04, a computer program which uses the road and rail traffic noise prediction methods using ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environment Analysis Method), publications from the Ontario Ministry of Environment and Energy.

5.2 Stationary Noise Attenuation Study

As stated in the ENCG, the stationary noise study is to be completed separately from the surface transportation noise and the aircraft/airport noise. It is understood that the proposed building will contain roof top mechanical units that may be beyond acceptable levels for the residents of the proposed and neighbouring buildings. Details of the roof top units were not known at the time of writing this report, and therefore conservative values were selected for this analysis.

Predictive noise analysis was completed using Predictor - LimA version 11.21. Predictor-LimA is a state-of-the-art environmental noise modeling software using International Standards Organization (ISO) standard 9613 parts 1 and 2.

A standard "unit", with typical power levels specified within Predictor-LimA was utilized for the analysis. The following table outlines the equipment sound power levels in decibels (dBA) that was used in the analysis.

Table 8 - Equipment Sound Power Levels (dBA)

Description	Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	Total
Unit	44.7	53.9	62.8	65.2	72.6	71.3	61.6	4.8	75.87

For the analysis, it is assumed that the terrain is relatively flat. A hard, reflective surface was utilized for the proposed development and the neighbouring roads.

Several reception points were selected for the analysis. These reception points included the rear yard of 345 Berkley Avenue, 350 Roosevelt Avenue in addition to the OLA Reception Point 2 and the outdoor living area located on the rooftop of the proposed development. A chart outlining the values will be found in subsection 6.0. Additionally, contours were completed for a 4 m height above the ground surface for a visual representation. It should be noted that no meteorological corrections were performed for the analysis.

5.3 Vibration Assessment

At the time of the study, the design details of the Confederation Line are not known. Therefore, all analysis will need to be completed on a projected data basis (i.e. no direct monitoring of the existing conditions). The following assumptions were used for the completion of this study.

- ❑ the Confederation Line will be constructed at a minimum, of 15 m horizontally from the proposed building perimeter (measured from the proposed building to the centre of the rail line).
- ❑ The vertical distance is not applicable as both structures will be founded within the bedrock, at similar elevations.

The following figure is a base curve for ground surface vibration levels, assuming the equipment is in good condition and speeds of 80 km/hr (50 mph) are not exceeded. Due to the nature of the Confederation Line, this table is applicable for the proposed development.

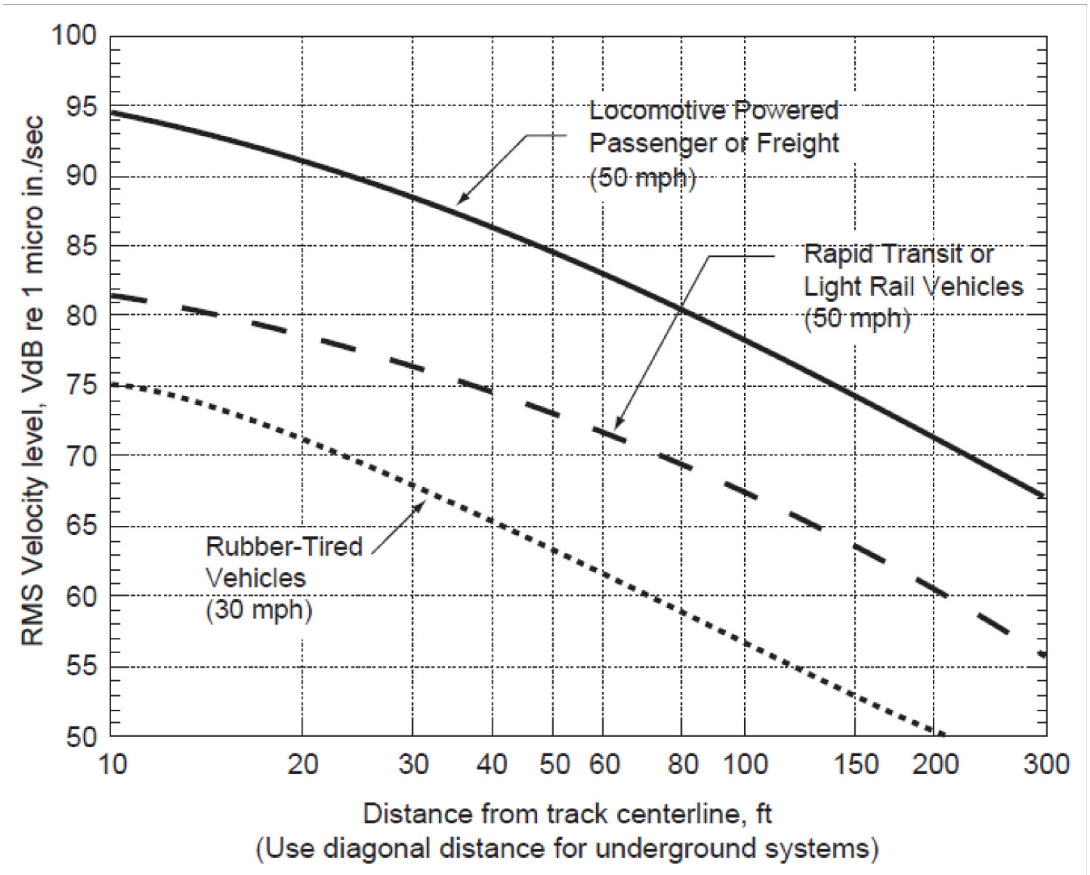

Figure 1 - Generalized Ground Surface Vibration Curve

6.0 Results

6.1 Noise Attenuation Results

The primary descriptors are the 16-hour daytime and the 8-hour night time equivalent sound levels, $L_{eq(16)}$ and the $L_{eq(8)}$ for City roads.

The proposed traffic noise levels were analyzed at all reception points. The results of the STAMSON software can be located in Appendix 2, and the summary of the results can be noted in Table 8a and 8b.

Table 9a - Proposed Noise Levels - Transitway

Reception Point	Description	Outdoor Living Area (dBA)	Daytime at Facade $L_{EQ(16)}$ (dBA)	Nighttime at Facade $L_{eq(8)}$ (dBA)
REC 1-1	Northern Elevation, 1st floor	--	51.45	43.32
REC 1-3	Northern Elevation, 3rd floor	--	57.42	49.29
REC 2-0	Outdoor Living Area	52.46	--	--

Table 9b - Proposed Noise Levels - Confederation Line

Reception Point	Description	Outdoor Living Area (dBA)	Daytime at Facade $L_{EQ(16)}$ (dBA)	Nighttime at Facade $L_{eq(8)}$ (dBA)
REC 1-1	Northern Elevation, 1st floor	--	59.85	52.25
REC 1-3	Northern Elevation, 3rd floor	--	61.12	53.52
REC 2-0	Outdoor Living Area	60.08	--	--

Table 10 - Proposed Noise Levels - Stationary Noise		
Reception Point	**Description**	**Outdoor Living Area (dBA)**
OLA - 1	342 Roosevelt Avenue	32.9
OLA - 2	345 Berkley Avenue	18
OLA - 3	350 Roosevelt Avenue	18.5
OLA - 4	342 Roosevelt Avenue - Roof Top Patio	49.9

6.2 Vibration Assessment Results

Based on Figure 1, for a Category 2 structure, the Confederation Line would need to be a minimum distance of 18 m away from the proposed building (measured from the centre of the track to the building perimeter) in order to keep the RMS velocity level below 72 V dB. As calculated, at the closest proximity to the proposed building, the Confederation Line will be 25 m. At 25 m, the RMS velocity will be 69 VdB.

7.0 Discussion and Recommendations - Noise Attenuation

7.1 Outdoor Living Areas

One (1) location of the back yard was analyzed as an outdoor living area. It should be noted that this point was analyzed without consideration of any noise mitigation.

Presently, the Transitway is in existence adjacent to the subject property. The outdoor living area had a noise level of 52.46 dBA. Once the Confederation Line is constructed, the outdoor living area noise level will increase to 60.08 dBA. The Confederation Line scenario is above the threshold limit of 55 dBA as specified in the aforementioned standards.

It is understood that a fence will be constructed along the northern property line. This fence will be constructed with wood or another solid material that will allow no air gaps or spaces. The fence is to be 1.8 m high. Provided the fence panels are interlocking ensuring no space between them, the noise level at the backyard will become 54.70 dBA for the Confederation Line scenario, which is below the 55 dBA threshold.

7.2 Indoor Living Areas and Ventilation

The results of the STAMSON modelling indicates that the maximum $L_{eq(16)}$ will be 61.12 dBA. This value is below 65 dBA and therefore **no additional noise attenuation recommendations are required**. However, a warning clause will be required and is identified below:

Table 10 - Summary of Warning Clauses

Elevation	Floor	Applicable Warning Clause	Additional Considerations
North	All	Warning Clause Type C	All units must be equipped with a central air conditioning system, reducing the need to open windows.

7.3 Noise Control Measures for Building Adjacent to a Proposed Rail Line

The MOECC states that the first row of dwellings that are to be constructed within 100 m of a rail line are to have the exterior walls adjacent to the rail line to be built to a minimum of brick veneer or masonry equivalent.

8.0 Discussion and Recommendations - Vibration Assessment

Since specifics are not known for the proposed Confederation Line, the analysis was completed using known industry standards. These are considered a conservative approach and would be a 'worst case' scenario.

Based on the standard information provided on Figure 1,the vibrations should be below the threshold. However, it should be noted that this measurement is based on theoretical values as the Confederation Line is not yet operational. There are several factors that could lower the proposed vibration:

- ❏ The true alignment of the Confederation Line. If the alignment of the Confederation Line is further than 18 m from the edge of the building, than the RMS value should be below the 72 VdB threshhold.
- ❏ Figure 1 is based on light rail transit travelling at speeds of 80 km/hr (50 mph). Upon discussion with the City of Ottawa, it is anticipated that the light transit will be traveling at speeds between 45-60 km/hr. This lowering of the speed will cause a reduction in the magnitude of the vibrations caused.
- ❏ The true founding conditions of both the proposed building and the Confederation Line. It has been studied that foundations on bedrock (both for the proposed building and the Confederation Line) will dampen the vibration effects, causing a lower overall RMS value at the proposed building. However, the true dampening will need to be measured in the field once the Confederation Line has been constructed.
- ❏ The City of Ottawa has stated that they will take several mitigation factors during construction in order to reduce the amount of vibrations caused by the Confederation Line. Once again, the true dampening will need to be measured in the field once the Confederation Line has been constructed.

Therefore, there will be no excessive vibrations on the proposed development as caused by the Confederation Line.

9.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Our recommendations should be reviewed when the project drawings and specifications are complete.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than 342 Roosevelt Avenue or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Stephanie A. Boisvenue, P.Eng.

David J. Gilbert, P.Eng.

Report Distribution:

- ❑ Mr. Jordan Tannis (3 copies)
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APPENDIX 1

TABLE 12 - SUMMARY OF RECEPTION POINTS AND GEOMETRY

DRAWING PG4235-1 - SITE PLAN

DRAWING PG4235-1A - SITE GEOMETRY - REC 1-1 AND REC 1-3

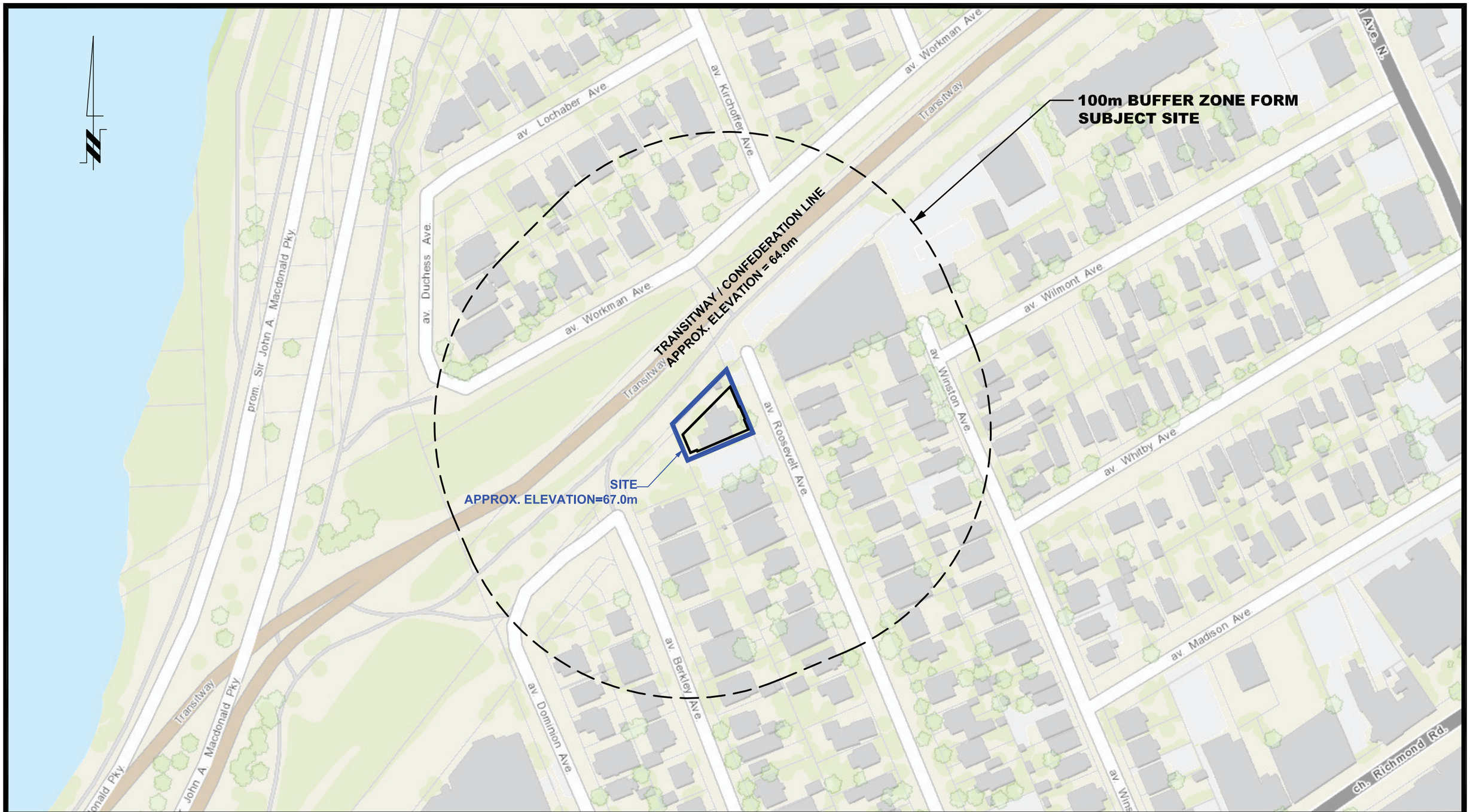
DRAWING PG4235-1B - SITE GEOMETRY - REC 2

DRAWING PG4235-2 - RECEPTOR LOCATIONS

FIGURE 1 - DETAILED SECTION

Table 12 - Summary of Reception Points and Geometry
342 Roosevelt Avenue

Point of Reception	Location	Leq Day (dBA)	Transitway						Proposed Confederate Line					
			Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Barrier Height (m)	Distance (m)	Horizontal (m)	Vertical (m)	Total (m)	Local Angle (degree)	Barrier Height (m)	Distance (m)
REC 1-1	Northern Elevation, 1st floor	51.45	24.5	1.5	24.54588	-71,79	3	20	25	1.5	25.04496	-71,79	3	20
REC 1-3	Northern Elevation, 3rd Floor	57.42	24.5	10.5	26.65521	-71,79	3	20	25	10.5	27.115494	-71,79	3	20
REC 2	Outdoor Area	52.46	23	1.5	23.04886	-71, 80	3	15	20	1.5	20.056171	-71, 80	3	15



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342 ROOSEVELT LIMITED

NOISE AND VIBRATION STUDY
342 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:1500	Date: 08/2017
Drawn by: MPG	Report No.: PG4235-1
Checked by: SB	Dwg. No.: PG4235-1
Approved by: DJG	Revision No.: 0

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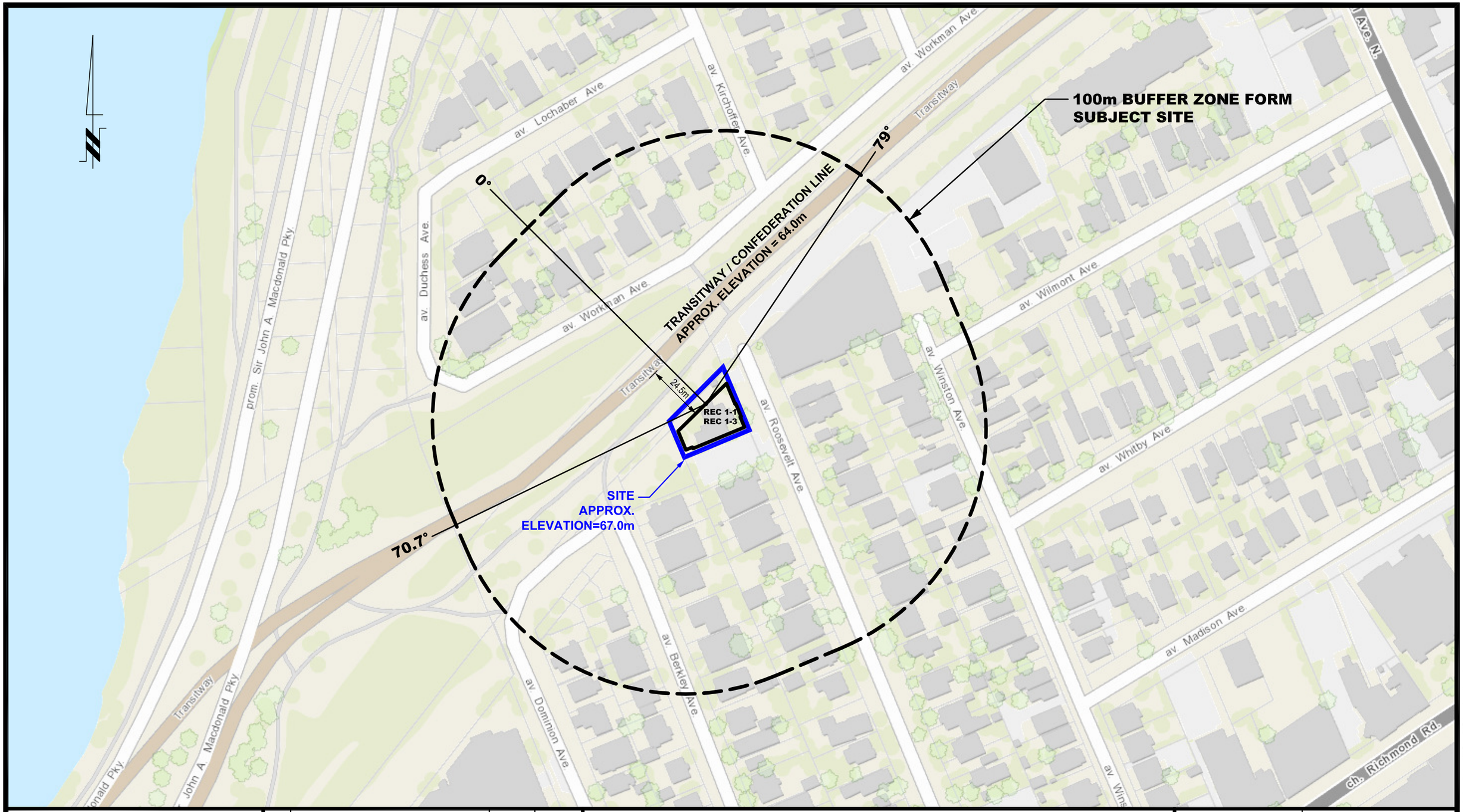

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0			

342 ROOSEVELT LIMITED

NOISE AND VIBRATION STUDY
342 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 1-1 & REC 1-3

Scale: 1:1500	Date: 08/2017
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Checked by: SB	Dwg. No.: PG4235-1A
Approved by: DJG	Revision No.: 0

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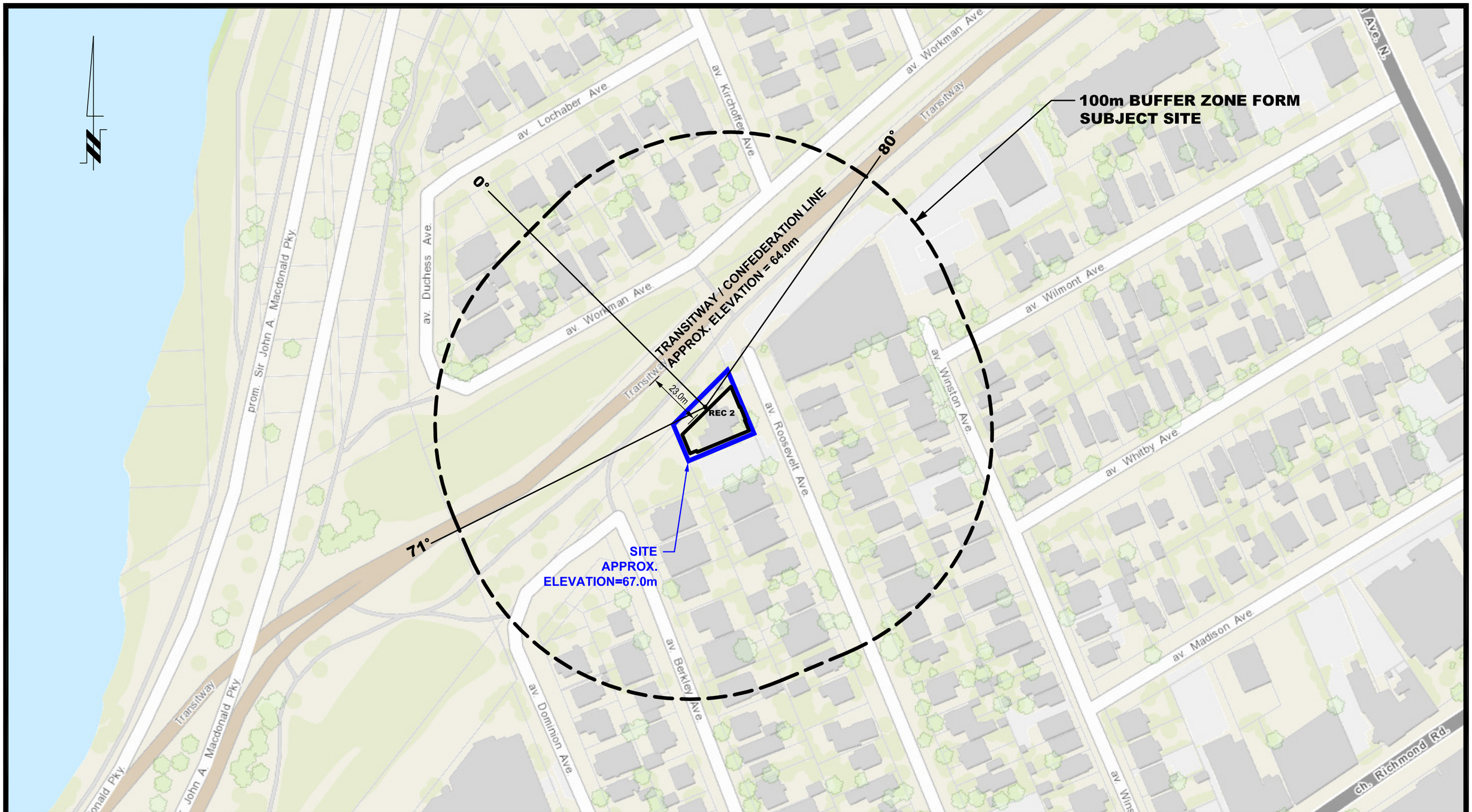

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342 ROOSEVELT LIMITED

NOISE AND VIBRATION STUDY
342 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

SITE GEOMETRY - REC 2

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Approved by: DJG	Revision No.: 0

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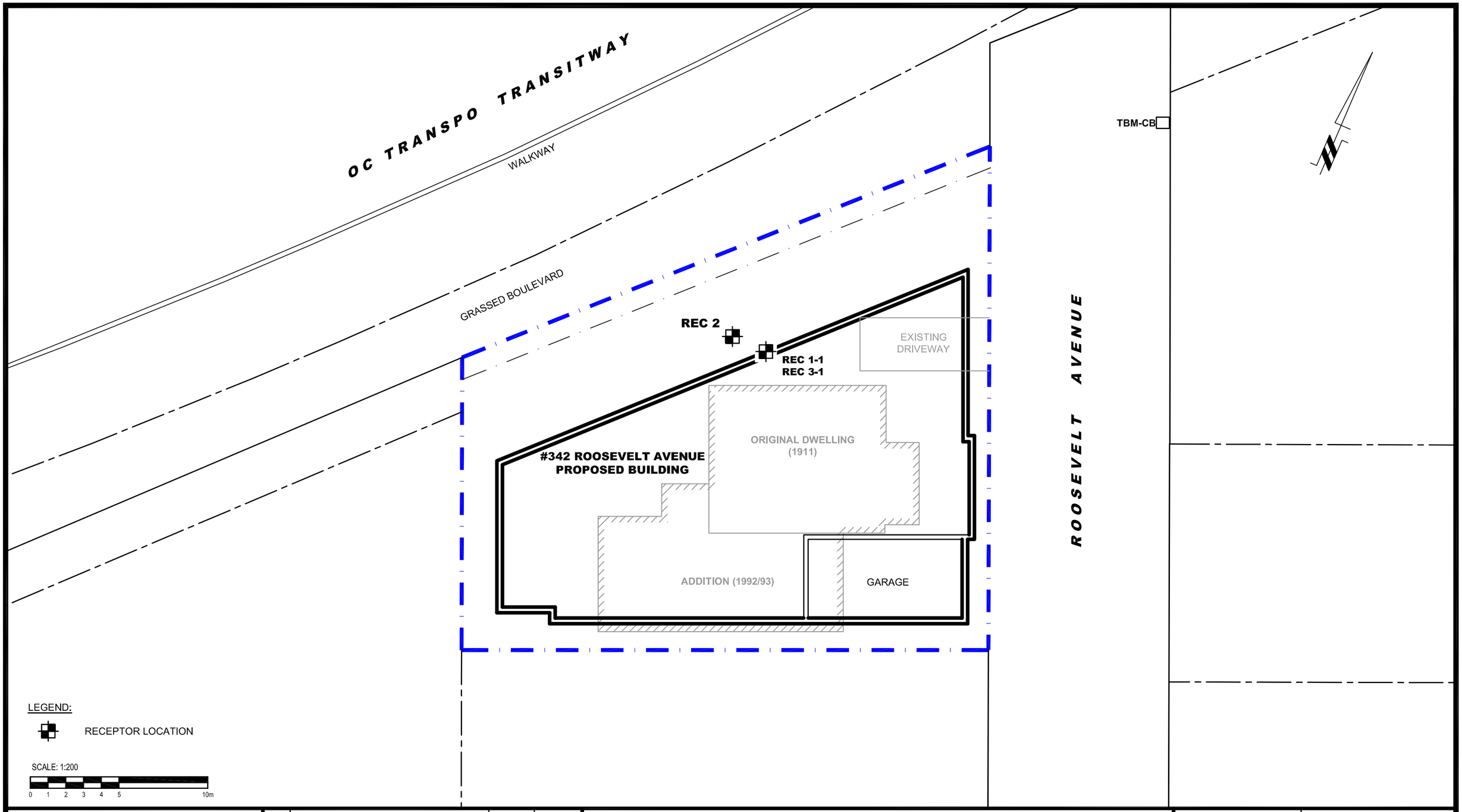

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MR. JORDAN TANNIS c/o ROOSEVELT LIMITED

NOISE AND VIBRATION STUDY
342 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

RECEPTOR LOCATION PLAN

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Approved by: DJG	Revision No.: 0

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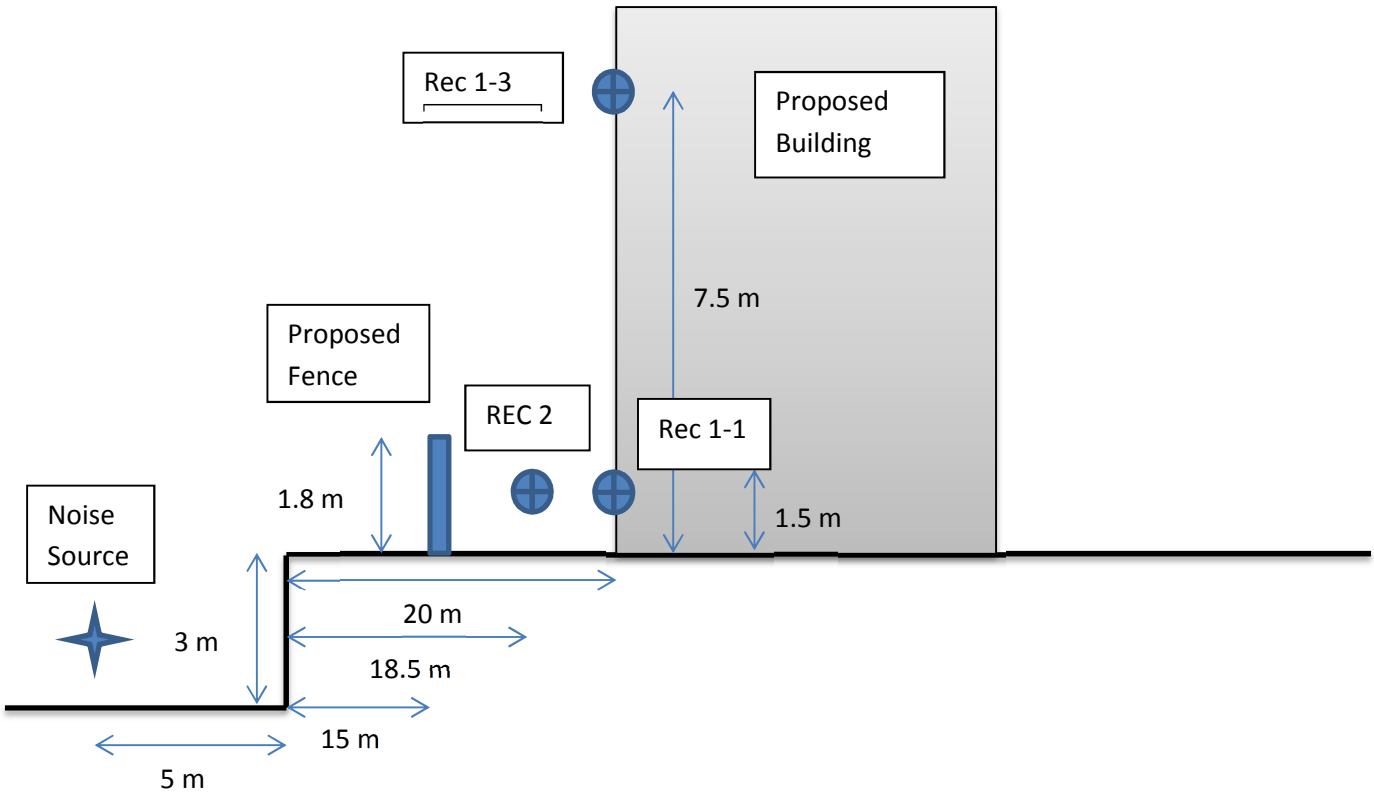


FIGURE 1

DETAILED SECTION

Not to Scale

APPENDIX 2

STAMSON RESULTS

PREDICTOR LIMA RESULTS

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 12:32:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec11.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-1 - Transitway

RT/Custom data, segment # 1: Transitway (day/night)
---
1 - Bus:
Traffic volume : 1300/100 veh/TimePeriod
Speed : 80 km/h

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

Angle1 Angle2 : -71.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.50 / 24.50 m
Receiver height : 1.50 / 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -71.00 deg Angle2 : 79.00 deg
Barrier height : 3.00 m
Elevation : 3.00 m
Barrier receiver distance : 20.00 / 20.00 m
Source elevation : 0.00 m
Receiver elevation : 3.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

♀
Results segment # 1: Transitway (day)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	1.50	1.23	1.23

RT/Custom (0.00 + 51.45 + 0.00) = 51.45 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.42	67.74	-3.03	-1.41	0.00	0.00	-11.85	51.45

Segment Leq : 51.45 dBA

Total Leq All Segments: 51.45 dBA

♀
Results segment # 1: Transitway (night)

Source height = 0.50 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m)	Height (m)	Height (m)	Barrier Top (m)
0.50	1.50	1.23	1.23

RT/Custom (0.00 + 43.32 + 0.00) = 43.32 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.42	59.61	-3.03	-1.41	0.00	0.00	-11.85	43.32

Segment Leq : 43.32 dBA

Total Leq All Segments: 43.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.45
(NIGHT): 43.32

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 13:40:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec13.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-3 - Transitway

RT/Custom data, segment # 1: Transitway (day/night)
---
1 - Bus:
Traffic volume : 1300/100 veh/TimePeriod
Speed : 80 km/h

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

Angle1 Angle2 : -71.00 deg 79.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.50 / 24.50 m
Receiver height : 7.50 / 7.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -71.00 deg Angle2 : 79.00 deg
Barrier height : 3.00 m
Elevation : 3.00 m
Barrier receiver distance : 20.00 / 20.00 m
Source elevation : 0.00 m
Receiver elevation : 3.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

♀
Results segment # 1: Transitway (day)

Source height = 0.50 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

0.50 ! 7.50 ! 2.34 ! 2.34

RT/Custom (0.00 + 57.42 + 0.00) = 57.42 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-71 79 0.24 67.74 -2.64 -1.16 0.00 0.00 -6.52 57.42

Segment Leq : 57.42 dBA

Total Leq All Segments: 57.42 dBA

♀
Results segment # 1: Transitway (night)

Source height = 0.50 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m)	Height (m)	Height (m)	Barrier Top (m)
0.50	7.50	2.34	2.34

RT/Custom (0.00 + 49.29 + 0.00) = 49.29 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.24	59.61	-2.64	-1.16	0.00	0.00	-6.52	49.29

Segment Leq : 49.29 dBA

Total Leq All Segments: 49.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.42
(NIGHT): 49.29

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 13:44:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec20.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2 - Transitway

RT/Custom data, segment # 1: Transitway (day/night)
---
1 - Bus:
Traffic volume : 1300/100 veh/TimePeriod
Speed : 80 km/h

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

Angle1 Angle2 : -71.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.50 / 23.50 m
Receiver height : 1.50 / 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -71.00 deg Angle2 : 80.00 deg
Barrier height : 3.00 m
Elevation : 3.00 m
Barrier receiver distance : 18.50 / 18.50 m
Source elevation : 0.00 m
Receiver elevation : 3.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

♀
Results segment # 1: Transitway (day)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	1.50	1.35	1.35

RT/Custom (0.00 + 52.46 + 0.00) = 52.46 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.42	67.74	-2.77	-1.40	0.00	0.00	-11.12	52.46

Segment Leq : 52.46 dBA

Total Leq All Segments: 52.46 dBA

♀
Results segment # 1: Transitway (night)

Source height = 0.50 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m)	Height (m)	Height (m)	Barrier Top (m)
0.50	1.50	1.35	1.35

RT/Custom (0.00 + 44.33 + 0.00) = 44.33 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.42	59.61	-2.77	-1.40	0.00	0.00	-11.12	44.33

Segment Leq : 44.33 dBA

Total Leq All Segments: 44.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.46
(NIGHT): 44.33

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 13:39:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec11a.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-1 - Confederation Line

Rail data, segment # 1: OLRT (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. OLRT	449.0/39.0	80.0	1.0	1.0	Elec	Yes

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

Angle1 Angle2	-71.00 deg	79.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	24.50 / 24.50	m
Receiver height	1.50 / 1.50	m
Topography	4	(Elevated; with barrier)
No Whistle		
Barrier angle1	-71.00 deg	Angle2 : 79.00 deg
Barrier height	3.00 m	
Elevation	3.00 m	
Barrier receiver distance	20.00 / 20.00	m
Source elevation	0.00 m	
Receiver elevation	3.00 m	
Barrier elevation	0.00 m	
Reference angle	0.00	

♀
Results segment # 1: OLRT (day)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	4.09	4.09
0.50	1.50	1.23	1.23

LOCOMOTIVE (0.00 + 59.56 + 0.00) = 59.56 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.31	64.26	-2.80	-1.27	0.00	0.00	-0.14	60.05*
-71	79	0.50	64.26	-3.19	-1.51	0.00	0.00	0.00	59.56

* Bright Zone !

WHEEL (0.00 + 47.98 + 0.00) = 47.98 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.42	64.27	-3.03	-1.41	0.00	0.00	-11.85	47.98

Segment Leq : 59.85 dBA

Total Leq All Segments: 59.85 dBA

Results segment # 1: OLRT (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	4.09	4.09
0.50	1.50	1.23	1.23

LOCOMOTIVE (0.00 + 51.96 + 0.00) = 51.96 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.31	56.66	-2.80	-1.27	0.00	0.00	-0.14	52.45*
-71	79	0.50	56.66	-3.19	-1.51	0.00	0.00	0.00	51.96

 * Bright Zone !

WHEEL (0.00 + 40.38 + 0.00) = 40.38 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.42	56.67	-3.03	-1.41	0.00	0.00	-11.85	40.38

Segment Leq : 52.25 dBA

Total Leq All Segments: 52.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.85
(NIGHT): 52.25

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 13:40:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec13a.te Time Period: Day/Night 16/8 hours
Description: Reception Point 1-3 - Confederation Line

Rail data, segment # 1: OLRT (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. OLRT	449.0/39.0	80.0	1.0	1.0	Elec	Yes

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

Angle1 Angle2	-71.00 deg	79.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	24.50 / 24.50	m
Receiver height	7.50 / 7.50	m
Topography	4	(Elevated; with barrier)
No Whistle		
Barrier angle1	-71.00 deg	Angle2 : 79.00 deg
Barrier height	3.00 m	
Elevation	3.00 m	
Barrier receiver distance	20.00 / 20.00	m
Source elevation	0.00 m	
Receiver elevation	3.00 m	
Barrier elevation	0.00 m	
Reference angle	0.00	

♀
Results segment # 1: OLRT (day)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	7.50	5.19	5.19
0.50	7.50	2.34	2.34

LOCOMOTIVE (0.00 + 60.19 + 0.00) = 60.19 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.14	64.26	-2.42	-1.00	0.00	0.00	0.00	60.84*
-71	79	0.31	64.26	-2.80	-1.27	0.00	0.00	0.00	60.19

* Bright Zone !

WHEEL (0.00 + 53.95 + 0.00) = 53.95 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.24	64.27	-2.64	-1.16	0.00	0.00	-6.52	53.95

Segment Leq : 61.12 dBA

Total Leq All Segments: 61.12 dBA

♀
Results segment # 1: OLRT (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	7.50	5.19	5.19
0.50	7.50	2.34	2.34

LOCOMOTIVE (0.00 + 52.59 + 0.00) = 52.59 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.14	56.66	-2.42	-1.00	0.00	0.00	0.00	53.24*
-71	79	0.31	56.66	-2.80	-1.27	0.00	0.00	0.00	52.59

* Bright Zone !

WHEEL (0.00 + 46.35 + 0.00) = 46.35 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	79	0.24	56.67	-2.64	-1.16	0.00	0.00	-6.52	46.35

Segment Leq : 53.52 dBA

Total Leq All Segments: 53.52 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 61.12
(NIGHT): 53.52
♀
♀

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 13:45:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec20a.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2 - Confederation Line

Rail data, segment # 1: OLRT (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. OLRT	449.0/39.0	80.0	1.0	1.0	Elec	Yes

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

Angle1 Angle2	-71.00 deg	80.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	23.50 / 23.50	m
Receiver height	1.50 / 1.50	m
Topography	4	(Elevated; with barrier)
No Whistle		
Barrier angle1	-71.00 deg	Angle2 : 80.00 deg
Barrier height	3.00 m	
Elevation	3.00 m	
Barrier receiver distance	20.00 / 20.00	m
Source elevation	0.00 m	
Receiver elevation	3.00 m	
Barrier elevation	0.00 m	
Reference angle	0.00	

♀
Results segment # 1: OLRT (day)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	4.07	4.07
0.50	1.50	1.10	1.10

LOCOMOTIVE (0.00 + 59.85 + 0.00) = 59.85 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.31	64.26	-2.56	-1.25	0.00	0.00	-0.09	60.36*
-71	80	0.50	64.26	-2.91	-1.50	0.00	0.00	0.00	59.85

* Bright Zone !

WHEEL (0.00 + 47.12 + 0.00) = 47.12 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.42	64.27	-2.77	-1.40	0.00	0.00	-12.99	47.12

Segment Leq : 60.08 dBA

Total Leq All Segments: 60.08 dBA

♀
Results segment # 1: OLRT (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	4.07	4.07
0.50	1.50	1.10	1.10

LOCOMOTIVE (0.00 + 52.25 + 0.00) = 52.25 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.31	56.66	-2.56	-1.25	0.00	0.00	-0.09	52.76*
-71	80	0.50	56.66	-2.91	-1.50	0.00	0.00	0.00	52.25

* Bright Zone !

WHEEL (0.00 + 39.51 + 0.00) = 39.51 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.42	56.67	-2.77	-1.40	0.00	0.00	-12.99	39.51

Segment Leq : 52.48 dBA

Total Leq All Segments: 52.48 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 60.08
(NIGHT): 52.48
♀
♀

STAMSON 5.0 NORMAL REPORT Date: 19-06-2018 13:46:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rec20af.te Time Period: Day/Night 16/8 hours
Description: Reception Point 2 - Confederation Line with fence

Rail data, segment # 1: OLRT (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. OLRT	449.0/39.0	80.0	1.0	1.0	Elec	Yes

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

Angle1 Angle2	-71.00 deg	80.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	23.50 / 23.50	m
Receiver height	1.50 / 1.50	m
Topography	4	(Elevated; with barrier)
No Whistle		
Barrier angle1	-71.00 deg	Angle2 : 80.00 deg
Barrier height	2.00 m	
Elevation	3.00 m	
Barrier receiver distance	1.80 / 1.80	m
Source elevation	0.00 m	
Receiver elevation	3.00 m	
Barrier elevation	3.00 m	
Reference angle	0.00	

♀
Results segment # 1: OLRT (day)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	1.46	4.46
0.50	1.50	1.19	4.19

LOCOMOTIVE (0.00 + 52.70 + 0.00) = 52.70 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.38	64.26	-2.68	-1.33	0.00	0.00	-7.55	52.70

WHEEL (0.00 + 50.37 + 0.00) = 50.37 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.48	64.27	-2.89	-1.48	0.00	0.00	-9.54	50.37

Segment Leq : 54.70 dBA

Total Leq All Segments: 54.70 dBA

♀
Results segment # 1: OLRT (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	1.46	4.46
0.50	1.50	1.19	4.19

LOCOMOTIVE (0.00 + 45.09 + 0.00) = 45.09 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.38	56.66	-2.68	-1.33	0.00	0.00	-7.55	45.09

WHEEL (0.00 + 42.76 + 0.00) = 42.76 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	80	0.48	56.67	-2.89	-1.48	0.00	0.00	-9.54	42.76

Segment Leq : 47.09 dBA

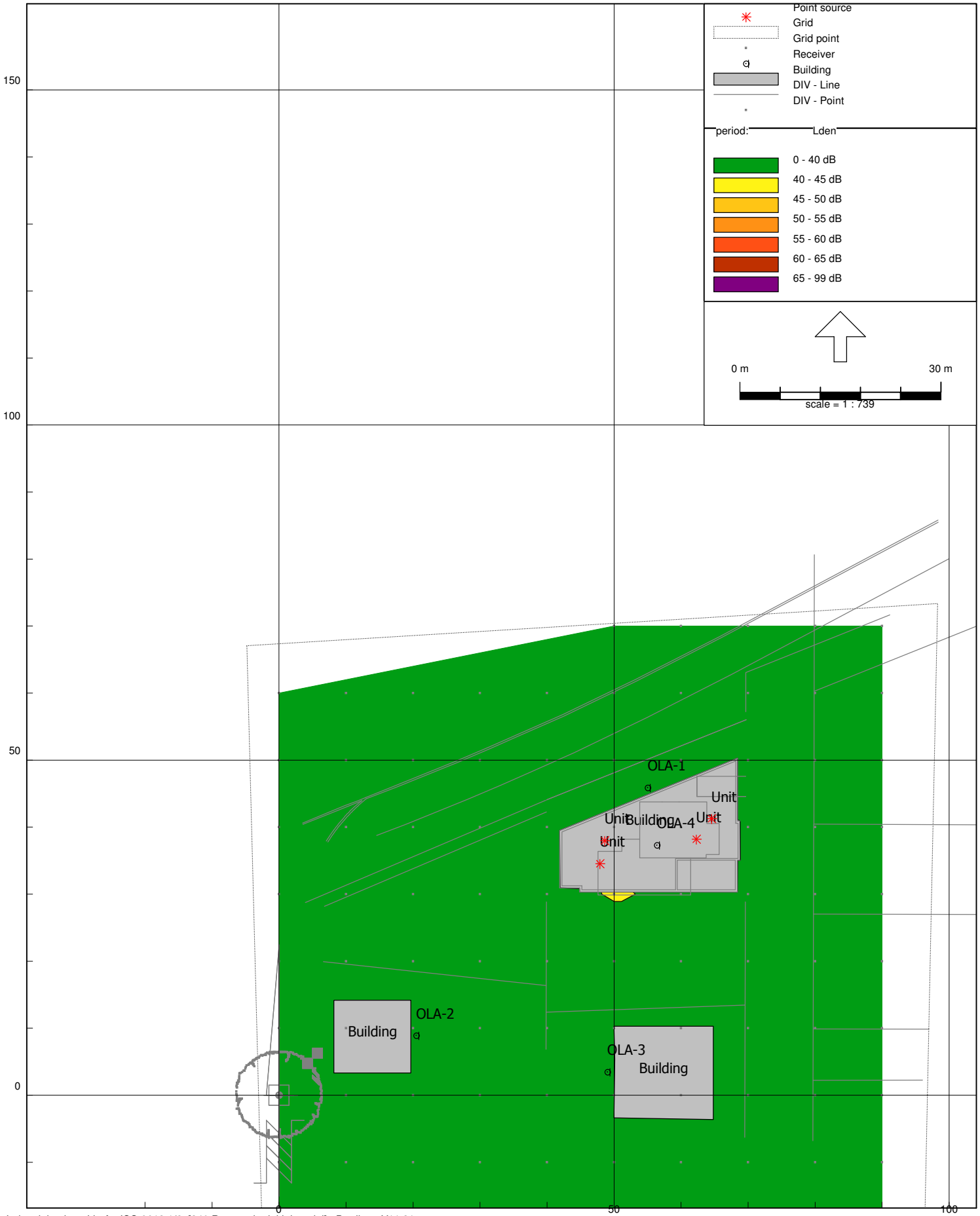
Total Leq All Segments: 47.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.70
(NIGHT): 47.09

Report: Table of Results
Model: initial model
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Height	Day	Night	Lden
OLA-1_A	342 Roosevelt Avenue	1.50	32.9	32.9	39.3
OLA-2_A	345 Berkley Avenue	1.50	18.0	18.0	24.4
OLA-3_A	350 Roosevelt Avenue	1.50	18.5	18.5	24.9
OLA-4_A	Roof Top Patio	1.50	49.9	49.9	56.3

All shown dB values are A-weighted


Point source
Grid
Grid point
Receiver
Building
DIV - Line
DIV - Point
period:
Lden
0 - 40 dB
40 - 45 dB
45 - 50 dB
50 - 55 dB
55 - 60 dB
60 - 65 dB
65 - 99 dB
0 m
30 m
scale = 1 : 739
150
100
50
0
0
50
100
OLA-1
OLA-2
OLA-3
OLA-4
Building
Building
Building
Unit
Unit
Unit
Unit

APPENDIX 3

CORRESPONDENCE

TABLE FOR THE CALCULATION OF BUS TRAFFIC

Stephanie Boisvenue

From: Wu, John <John.Wu@ottawa.ca>
Sent: August-22-17 2:45 PM
To: Stephanie Boisvenue
Subject: RE: Traffic Data for Transitway

Hi, Stephanie:

I agree with the approach method to be used for the transit noise study for the subject project.

Thanks.

John

From: Stephanie Boisvenue [mailto:SBoisvenue@Patersongroup.ca]
Sent: Tuesday, August 22, 2017 2:42 PM
To: Wu, John <John.Wu@ottawa.ca>
Subject: Traffic Data for Transitway

John,

Thank you for taking the time to discuss the noise and vibration study that is to be completed for 342 Roosevelt Avenue.

As I mentioned, the projected light rail traffic was provided by Mr. Mike Schmidt, and that information will be used for the analysis. However, upon discussions with several people within the City of Ottawa, OC Transpo and the OLRT, I have been unable to obtain any existing or proposed traffic data for the bus and vehicle traffic along the Transitway.

It is understood that the Transitway will be removed in the next 3-4 years and the OLRT will be replacing the line with the Confederation Line. Therefore, the bus traffic on the Transitway will be present for the next couple of years, but should not change significantly between now and the construction of the Confederation Line.

Therefore, it is understood that it would be acceptable for an approximate bus count, based on existing transit schedules, be used for this analysis. This analysis will take into consideration all busses that are currently scheduled to cross in front of 342 Roosevelt Avenue, and increase the value by 10% to account for any busses that are not on the schedule (i.e. dead head busses), emergency vehicles or other Transitway vehicles.

Please confirm that these assumptions are correct.

Best regards,

Stephanie Boisvenue, P.Eng.

patersongroup
solution oriented engineering

tel:613.226-7381 ext. 219
154 Colonnade Road South

Ottawa, Ontario
K2E 7J5

Buses Per Day on Transit Way (Based on a weekday bus schedule at Dominion Bus Station)
as of August 22, 2017

Route Number	Destination	Direction	Buses/Day
61	St-Laurent	E	78
61	Terry Fox & Stittsville	W	70
62	Stittsville & Terry Fox	E	30
62	St-Laurent	W	37
63	Briarbrook via Innovation	E	24
64	Morgan's Grant via Innovation	W	23
66	Kanata	E	12
66	Tunny's Pasture	W	21
87	Baseline	E	50
87	Greenboro	W	53
91	Baseline	E	88
91	Orleans & Trim	W	62
94	Millennium	E	67
94	Riverview	W	60
95	Barrhaven Centre	E	146
95	Orleans & Trim	W	130
97	Airport / Aeroport	E	97
97	Bells Corners	W	85
164	Hope Side & Terry Fox	W	2
252	Mackenzie King	E	14
256	Mackenzie King	E	10
261	Mackenzie King	E	5
262	Mackenzie King	E	11
263	Mackenzie King	E	5
282	Mackenzie King	E	9
282	Pinecrest	W	8
283	Mackenzie King	E	4
TOTAL Buses/Day			**1201**

Figure 2 - Buses passing by on the transit way based on a weekday schedule available on the OC Transpo website for Dominion Station.

APPENDIX D

Proximity Assessment Report

Paterson Group Memo PG4210-MEMO.03 dated August 30, 2024

PATERSON GROUP

memorandum

re: **Proximity Assessment**
Proposed Residential Development
342 Roosevelt Avenue – Ottawa, Ontario

to: 342 Roosevelt Limited – **Mr. Jordan Tannis** – jt@concorde-properties.ca

date: March 17, 2025

file: PG4210-MEMO.03 Revision 1

Further to your request and authorization, Paterson Group (Paterson) prepared the current letter report to summarize construction issues which could occur due to the proximity of the proposed development with respect to the subject alignment of the LRT Confederation Line, and associated infrastructure located approximately 15 m north of the site boundary.

1.0 Background Information

Based on current plans, it is understood that the proposed development will consist of 6.5-storey residential building with 26 units, one basement level and an approximate footprint of 302 m^2. The subject site is currently occupied by a 2-storey residential dwelling with an associated driveway, landscaped areas and mature trees. The ground surface at the subject property is relatively flat and generally at grade with Roosevelt Avenue. The property is surrounded by the LRT Confederation Line to the north and west, residential dwellings to the south and Roosevelt Avenue to the east.

The site is situated at an elevation of approximately 67 m, with the Confederation Line LRT located about 18 m to the north and Dominion Station at 80 m to the west.

2.0 Subsurface Conditions

Based on existing geotechnical information, the subsurface conditions in the immediate area of the subject site and subject LRT Confederation Line alignment consist of the following:

- Existing surface grade is at an elevation of approximately 67 m in the location of the proposed building, where as the rail for the LRT Confederation Line is located in a recessed transitway at approximate geodetic elevation 61 m.
- The overburden thickness is approximately 0.6 to 0.9 m.
- Bedrock surface elevation is at an approximate geodetic elevation of 66 to 66.3 m.
- The bedrock underlying the site consists of limestone.

LRT Confederation Line Location

Available information indicates that the LRT Confederation Line is located approximately 18 m from the north property line of the subject site. A pathway is located between the subject site and the proposed Confederation Line alignment. The ground surface at the LRT alignment is located at approximate geodetic elevation 61 m, while the foundation elevation of the proposed residential building will rise above the LRT alignment to an approximate elevation of 66 meters.

The proposed Dominion Station is to be located approximately 80 m to the west of the subject site.

3.0 Construction Precautions and Recommendations

Influence of Proposed Development on LRT Confederation Line

Based on existing soils information and building design details, the footings of the proposed building will be founded on good quality bedrock. Lateral loads due to the building footings will be transferred directly into the bedrock well within a conservative 6V:1H zone of influence from the outside face of footing. Therefore, due to the shallow depth of the proposed building, and the distance between the proposed building and the Confederation Line alignment, the proposed building will not apply additional loading to the Confederation Line structures.

Further, based on GeoOttawa maps, the proposed building is located at least 24 m from the LRT Confederation Line railway. At this distance, no lateral loads from the building will be transferred to the LRT, ensuring the stability and integrity of the Confederation Line.

Excavation and Temporary Shoring

The overburden along the perimeter of the proposed building footprint will need to be sloped or shored in order to complete the construction of the underground levels. Bedrock removal is also anticipated, which will be completed by line drilling and/or hoe ramming. The hoe ramming will be carried out by a contractor specializing in bedrock removal. If required, it is anticipated that the temporary shoring system will consist of a soldier pile and lagging system designed for at-rest earth pressures, using a pressure coefficient of $K_0 = 0.5$.

The geotechnical engineer will review the stability of the rock face underlying the overburden. Following the review of the rock face, the geotechnical engineer will determine if rock reinforcement is required, and if so, the extent to which rock reinforcement is required. This determination will include consideration for the LRT confederation Line and Dominion Station structure.

A seismograph would be installed on the adjacent LRT Confederation Lines rail to monitor vibrations during the bedrock removal program.

Pre-Construction Survey

As part of the proposed construction project, a pre-construction survey will be required for the LRT Confederation Line and Dominion Station. Any existing structures in the immediate area of the proposed building will also undergo a preconstruction survey as per standard construction practices, where bedrock blasting will be required.

Groundwater Control

Groundwater observations during the geotechnical investigation indicated groundwater levels at approximately 4 to 6 m below the existing ground surface. Due to the presence of shallow bedrock at the site and in the general area, adverse effects related to ground surface settlement due to dewatering are expected to be negligible. The current groundwater level is fully within the bedrock unit, therefore, any depressurization of the groundwater table within the bedrock will have no adverse effects to surrounding structures including the Confederation Line

4.0 Conclusions and Recommendations

Based on the currently available information for the subject alignment of the proposed building and the existing subsurface information, the proposed building will not negatively impact the LRT confederation Line and Dominion Station. It should be noted that the information submitted as part of the current Proximity Study will be supplemented with construction plans issued for construction, dewatering and discharge plans, and field monitoring program as described in the application conditions.

We trust that this information satisfies your immediate request.

Best Regards,

Paterson Group Inc.

Deepak K Rajendran, E.I.T

Scott S. Dennis P.Eng.