

 **10 Aspen Springs Drive**

**Environmental Vibration Assessment
Bowmanville, ON**

SLR Project No: 241.30367.00000

May 2022

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ENVIRONMENTAL VIBRATION ASSESSMENT
10 Aspen Springs Drive
Bowmanville, Ontario
SLR Project No: 241.30367.00000

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May 3, 2022

This document has been prepared by SLR Canada. The material and data in this report were prepared under the supervision and direction of the undersigned.

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1. INTRODUCTION

SLR Consulting (SLR) was retained by Sunray Group to conduct an environmental vibration assessment for the proposed mixed-use development (the Project) at 10 Aspen Springs Drive, Bowmanville, Ontario. This report is in support of the Official Plan Amendment (OPA) and Zoning Bylaw Amendment (ZBA) applications for the development.

The focus on this assessment is to evaluate railway vibration impacts from the CPR Belleville Subdivision, accounting for freight rail traffic in proximity to the Project. Environmental noise impacts have been assessed and a report provided under a separate cover.

1.1 NATURE OF THE SURROUNDINGS

The proposed development site is bounded by the following:

- Land zoned as residential, with the CPR Belleville Subdivision and agricultural/commercial lands beyond, to the north;
- Bowmanville Avenue, with low density residential dwellings beyond to the east;
- Aspen Springs Drive, with low density residential dwellings beyond to the south; and
- Land zoned for residential uses with low rise condominium/townhouse developments to the west.

A context plan is shown in **Figure 1**.

Note, based on the Transport Project Assessment Process (TPAP) Environment Assessment Study for Oshawa to Bowmanville Rail Service Expansion (AECOM, February 2011), the future Bowmanville GO Station may in the future be located north of the proposed development along the existing CPR Belleville Subdivision, west of Bowmanville Avenue.

Measurements of freight trains only were taken in this assessment, as there is no existing GO Train traffic; however, vibration impacts from freight trains will be higher than future GO traffic, as the trains are significantly heavier. Thus, if the criteria are met for freight trains, they will also be met for future GO Train traffic.

1.2 DESCRIPTION OF PROPOSED DEVELOPMENT

The Project is located at 10 Aspen Springs Drive, Bowmanville, at the northeast corner of the intersection of Aspen Springs Drive and Bowmanville Avenue/Martin Road. The site is zoned commercial (C6-12) based on Clarington Zoning By-Law 84-63 and is currently vacant. The proposed development will have one (1) two-tower mixed-use building with 4-storey podium, containing residential and commercial uses, and one (1) mid-rise residential building.

The two-tower mixed use building (Building 1) will be located along the east side of the site, adjacent to Bowmanville Avenue. It will have a four-storey podium structure with ground floor commercial spaces, and 67 residential uses above (i.e., no residential units on the ground floor). The two Building 1 towers, Tower A (north) and Tower B (south), will be 25 storeys in height, with 209 residential units planned per tower. Three levels of underground parking/storage will be provided. The northwest corner of Building 1 will be located approximately 92 m from the CPR Belleville Subdivision rail track, and the northwest corner of the underground parking structure approximately 70 m from the rail track.

The mid-rise residential building will be located at the southwest portion of the site, along Aspen Springs Drive. It will be 9 storeys in height, with a rooftop common amenity space planned atop the building. Three

levels of underground parking/storage will be provided, part of the common underground parking structure shared with Building 1. The northwest corner of Building 2 will be approximately 165 m from the CPR Belleville Subdivision rail track.

A copy of the site plan and relevant floor plans are included for reference in **Appendix A**.

2. VIBRATION ASSESSMENT

2.1 INDUSTRIAL (STATIONARY) SOURCES

There are no existing or proposed significant industrial vibration sources within 75 m of the Project site, such as large stamping presses or forges. Under applicable MECP guidelines, a detailed vibration assessment is not required. Adverse impacts from industrial vibration are not anticipated, and further study is not required.

2.2 TRANSPORTATION SOURCES

The CPR Belleville Subdivision is a rail source of vibration located northwest of the Project. Ground-borne vibration due to freight rail traffic along this railway is the focus of this assessment.

There is no specific MECP guideline with respect to railway vibration for land use approvals. Both CPR and Metrolinx/GO Transit have published their own criteria, and both require that vibration impact assessments be conducted to ensure that adverse vibration impacts do not occur. The Federation of Canadian Municipalities and the Railway Association of Canada (FCM/RAC) document entitled *Guidelines for New Development in Proximity to Railway Operations* is also applicable for rail vibration and used as a reference tool of best practices for rail-adjacent development. Both CPR and Metrolinx/GO endorse the FCM/RAC guidelines.

Both CPR and Metrolinx/GO require the following:

- Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec Root Mean Square (RMS) between 4 Hz and 200 Hz.
- The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second.
- If determined to be in excess, isolation measures will be required to ensure vibration levels in living areas do not exceed 0.14 mm/sec RMS at residential units within the development.

2.2.1 VIBRATION MEASUREMENT PROGRAM

Measurements of ground-induced vibration due to freight rail traffic along the CPR Belleville Subdivision were made at the Project site. Measurements were conducted from April 27th to April 28th, 2022, during which five (5) train pass by events were recorded.

The measurements were conducted at two (2) locations within the property boundary. Measurement Location 1 was set back 68 m from the rail line, which approximates the setback distance to the northwest corner of the property to where the underground parking structure will extend. Measurement Location 2 was setback approximately 128 m from the rail tracks, which is in the middle of the Building 1 ground floor footprint. The vibration measurement locations are shown in **Figure 2**.

Vibration velocity amplitudes were collected with Syscom MR3000C units at a sample rate of 1024 Hz.

2.2.2 VIBRATION MEASUREMENT DATA PROCESSING

Collected vibration data were reviewed and post-processed using MATLAB to compute overall RMS vertical vibration levels.

The measured data were post-processed per the FCM/RAC guideline to compute the 1-second sliding window RMS amplitudes of the vibration velocity in units of mm/s. Measured vibration levels were interpolated between Measurement Location 1 and 2, to the setback distance of 92 m where the closest portion of Building 1 will be situated with respect to the CPR Belleville Subdivision rail track.

Coupling losses/attenuation due to the proposed Building 1 structure were applied to the vibration levels 92 m from the rail track. Vibration levels are attenuated as they travel from the soil and enter building structures, due to coupling losses between the soil and building foundation. In general, the larger (more massive) the structure, the greater the coupling losses, and correspondingly the lower the vibration levels in the structure. The U.S. Federal Transit Administration (“FTA”) *Transit Noise and Vibration Impact Assessment Manual*, which is a widely used reference in rail vibration assessment (including for heavy freight rail systems), provides a method for assessing the impacts of building structures on interior vibration levels, where impacts (if any) could be experienced. The adjustments are in units of VdB.

In this assessment, the vibration levels at a setback distance of 92 m were adjusted using the method outlined in the FTA manual to account for what vibration levels would be experienced at the closest residential vibration-sensitive point of reception. For the Project, this is 2nd floor residential dwellings at the northwest corner of the Building 1 podium structure. The adjustments applied to the measured vibration levels are summarized as follows:

| | | |
|--|---------------|-----------------------|
| Foundation Coupling, Large Building on Piles | -10 VdB | FTA Manual Table 6-12 |
| Floor-to-Floor Attenuation, 2 Floors Above Grade | -2 VdB | FTA Manual Table 6-13 |
| Resonance amplification, centre of span | +6 VdB | FTA Manual Table 6-13 |
| TOTAL ADJUSTMENT | -6 VdB | |

2.2.3 VIBRATION MEASUREMENT RESULTS

Table 1 summarizes vibration levels for the five (5) train pass-by events recorded over the monitoring period.

Table 1: Measured and Predicted Ground-Borne Rail Vibration Levels

| Train Pass-By Event | Date and Time of Event | RMS Vibration Level (mm/s) ^{[1],[2]} | | | Criteria RMS Velocity (mm/s) | Meets Guideline Limits? (Y/N) |
|---------------------|--------------------------|---|--|---|------------------------------|-------------------------------|
| | | Measurement Location 1 (Setback = 68 m) | Measurement Location 2 (Setback = 128 m) | Closest Building 1 Footprint (Setback = 92 m) | | |
| 1 | April 27, 2022, 11:30 AM | 0.118 | --- ^[3] | 0.090 | 0.14 | Y |
| 2 | April 27, 2022, 3:44 PM | 0.114 | 0.045 | 0.086 | | Y |
| 3 | April 28, 2022, 12:22 AM | 0.149 | 0.047 | 0.108 | | Y |
| 4 | April 28, 2022, 2:53 AM | 0.131 | 0.047 | 0.098 | | Y |
| 5 | April 28, 2022, 4:46 AM | 0.094 | 0.066 | 0.083 | | Y |

- Notes:**
- [1] Values have been adjusted for coupling losses/attenuation as outlined in Section 2.2.2.
 - [2] Measured values are root-mean-square vibration velocity.
 - [3] The SYSCOM at Measurement Location 2 was not set up in time for the first train pass-by event.

The RMS vibration levels are below the 0.14 mm/s RMS threshold in the vibration guidelines at the nearest vibration-sensitive point of reception in Building 1. Based on the current building design and setback distance, vibration isolation/mitigation measures are not required for the Project. Building 2 is set back significantly further than Building 1; therefore, mitigation measures are also not required for Building 2.

Based on the measured vibration levels from CPR freight trains presented in this assessment, and lower expected ground-borne vibration generated by commuter GO Trains, adverse vibration impacts from train pass-by events through the future Bowmanville GO Station are not anticipated.

3. CONCLUSIONS

The potential for rail-induced vibration impacts on the proposed development have been assessed. Based on the results of this assessment, adverse vibration impacts from existing CPR freight traffic along the CPR Belleville Subdivision and future potential GO Train traffic through the Bowmanville GO Station are not expected.

4. REFERENCES

Canadian Pacific Railways (CP), 2002, *Guidelines For The Environmental Protection Of New Residential Development Adjacent To Railways*

GO Transit / Metrolinx, 2010, *Principal Main Line Requirements For New Development*

International Organization for Standardization, (ISO, 1989), ISO 2631-2: 2003 (1989) *Evaluation of human exposure to whole-body vibration — Part 2: Continuous and shock-induced vibrations in buildings (1 to 80 Hz)*

Railway Association of Canada/ Federation of Canadian Municipalities (RAC/ FCM), 2013, *Guidelines for New Development in Proximity to Railway Operations*

U.S. Federal Transit Administration (FTA, 2018), *Transit Noise and Vibration Impact Assessment Manual*

5. STATEMENT OF LIMITATIONS

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

This report has been prepared in a manner generally accepted by professional consulting principles and practices for the same locality and under similar conditions. No other representations or warranties, expressed or implied, are made.

Opinions and recommendations contained in this report are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames and project parameters as outlined in the Scope of Work and agreement between SLR and the Client. The data reported, findings, observations and conclusions expressed are limited by the Scope of Work. SLR is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SLR does not warranty the accuracy of information provided by third party sources.

 **FIGURES****Environmental Vibration Assessment**

10 Aspen Springs Drive

Bowmanville, ON

SLR Project No.: 241.30367.00000



SUNRAY GROUP

10 ASPEN SPRINGS DRIVE, BOWMANVILLE

CONTEXT PLAN

True North



Scale: 1:5000 METRES

Date: May 3, 2022

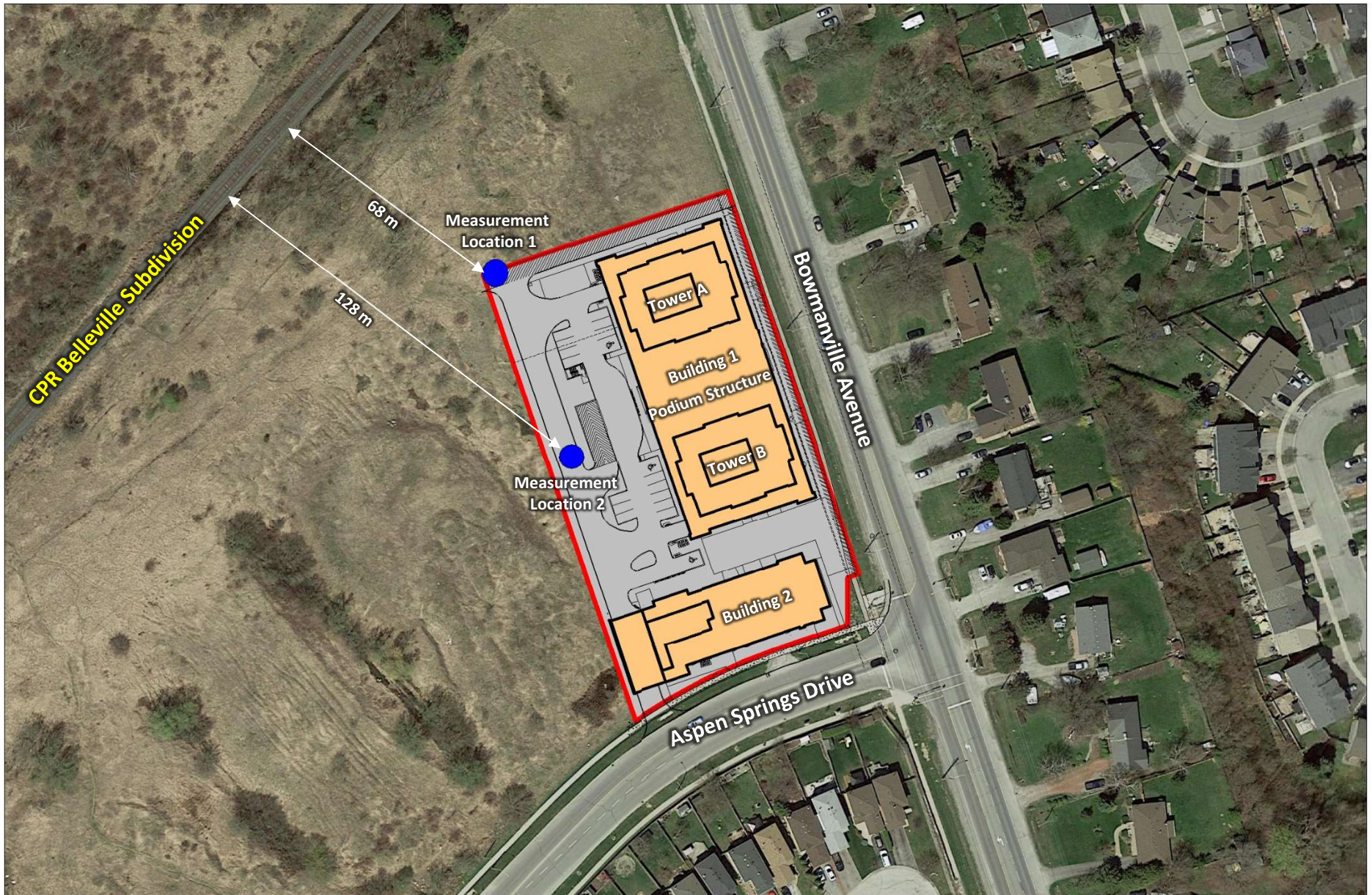
Rev 1.0

Project No. 241.30367.00000

Figure No.

1





SUNRAY GROUP

10 ASPEN SPRINGS DRIVE, BOWMANVILLE

VIBRATION MEASUREMENT LOCATIONS

True North



Scale: 1:1500 METRES

Date: May 3, 2022

Rev 1.0

Project No. 241.30367.00000

Figure No.

2



 **Appendix A**

Development Drawings

Environmental Vibration Assessment

10 Aspen Springs Drive

Bowmanville, ON

SLR Project No.: 241.30367.00000

Project Name: **ASP-3**

Site No: **22.03.10**

Project No: **21-019**

Drawn By: **M.A**

Checked By: **X.Z**

Approved By: **EM**

Date: **22.03.10**

Drawing No: **ASP-3**

Drawn Date: **01**

| No. | Date | Description | By |
|-----|----------|-------------|----|
| 1 | 22.03.10 | Issue for | EM |
| 2 | 22.03.10 | Issue for | EM |

WORK IN PROGRESS

MATAJ ARCHITECTS INCORPORATED

16 ASPEN SPRINGS DR, BOWMANVILLE, ON L1C 4W7

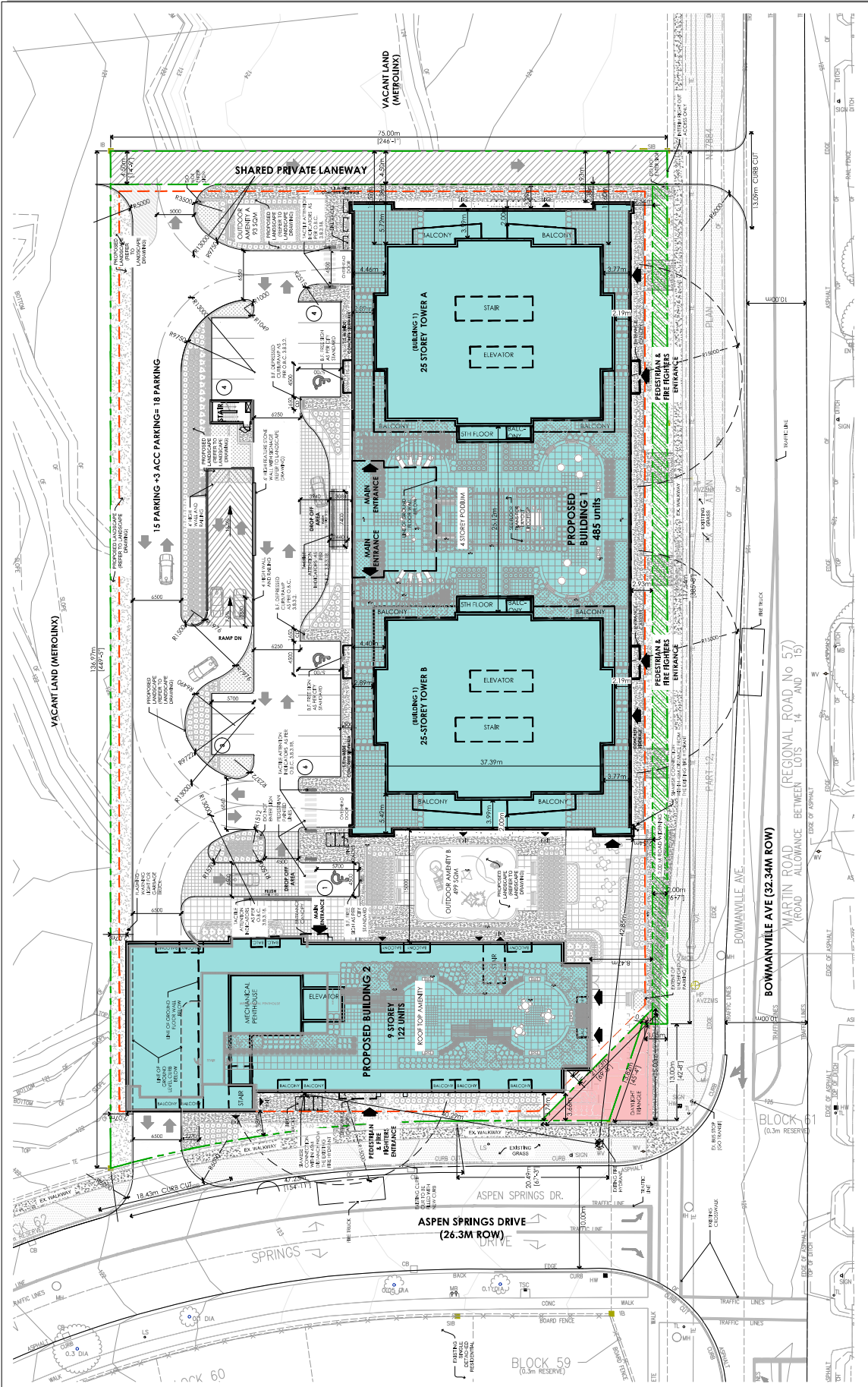
WORK IN PROGRESS

MATAJ ARCHITECTS INCORPORATED

16 ASPEN SPRINGS DR, BOWMANVILLE, ON L1C 4W7

ASP-3

Drawn Date: **01**



| PROFFERY LINE | OTHER ACCESS POINTS | ROOF BB (REFER TO MECHANICAL DWGS) | WALL MOUNTED LIGHT FIXTURE |
|---------------|---------------------|------------------------------------|----------------------------|
| | | | |
| | | | |
| | | | |
| | | | |

PROFFERY LINE

EXTENT OF UNDERGROUND PARKING

CURB RAMP AS PER OSC 38.3.2

PRINCIPLE ENTRANCE

ROOF BB (REFER TO MECHANICAL DWGS)

MAIN DOWN WITH HYDRO TRANSFORMER W/ STEEL

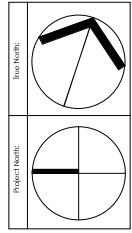
STRUCTURAL LIGHT FIXTURE ON CONCRETE BASE (REFER TO ELECTRICAL)

DOUBLE GLAZED LIGHT FIXTURE ON CONCRETE BASE (REFER TO ELECTRICAL DWGS)

WALL MOUNTED LIGHT FIXTURE (REFER TO ELECTRICAL DWGS)

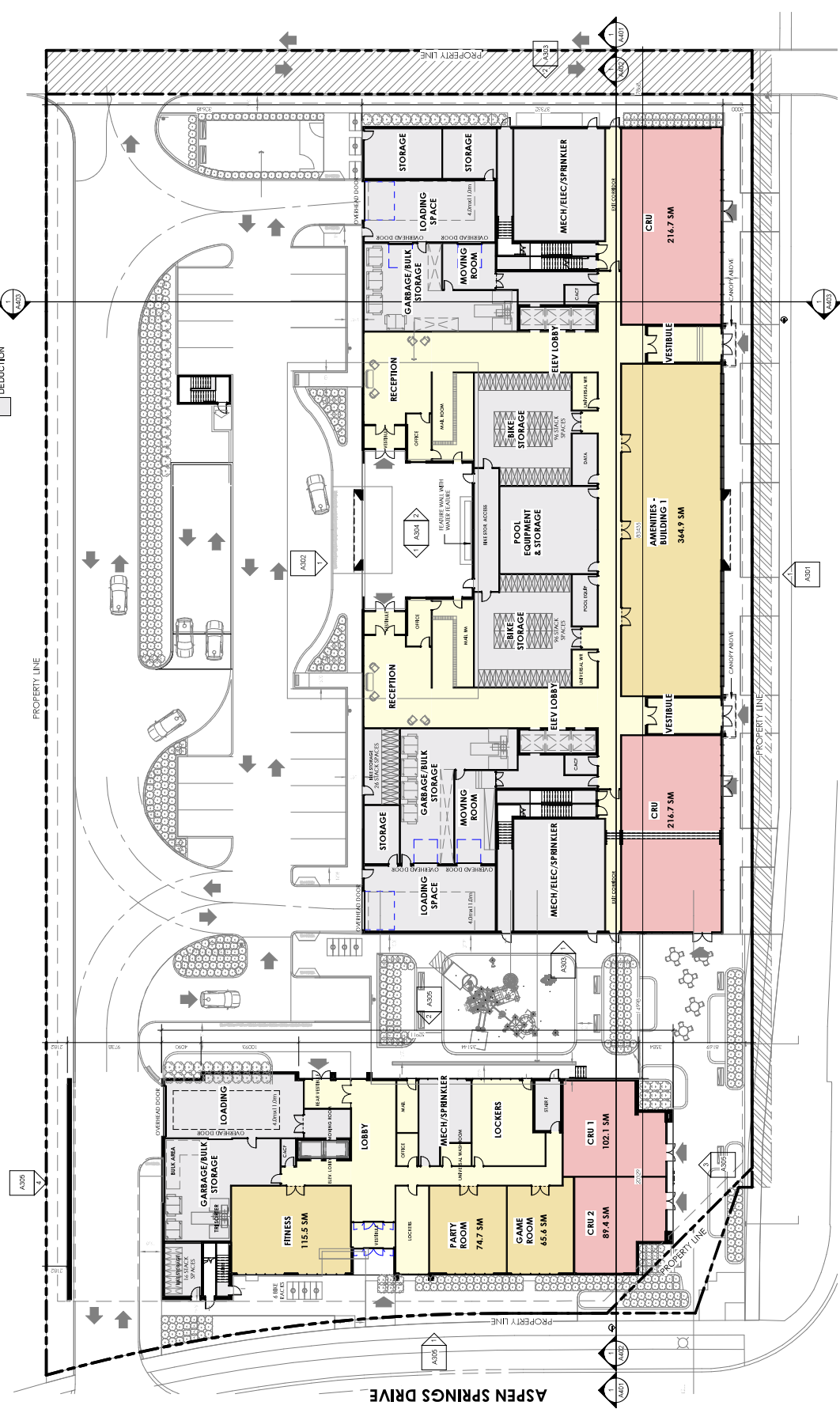
LANDSCAPED AREA

DAY LIGHT REFLECTOR



GFA COLOR LEGEND

| | | | |
|---------|------------|---------------|-----------|
| AMENITY | COMMERCIAL | COMMON SPACES | DEDUCTION |
|---------|------------|---------------|-----------|



BOWMANVILLE AVENUE

SPA FILE NO. -

| REV | DESCRIPTION | DATE | REV. DATE |
|-----|-------------|------|-----------|
| 1 | PROCESS SET | | |

WORK IN PROGRESS

MATAJ ARCHITECTS INCORPORATED

4111 Knapwood Street, Suite 200
Bowmanville, Ontario L0R 1A0
Tel: 905.327.1515 Fax: 905.327.1516

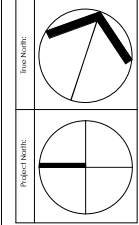
BOWMANVILLE

10 ASPEN SPRINGS DR.,
BOWMANVILLE ONT L0C 4W7

OVERALL GROUND FLOOR PLAN

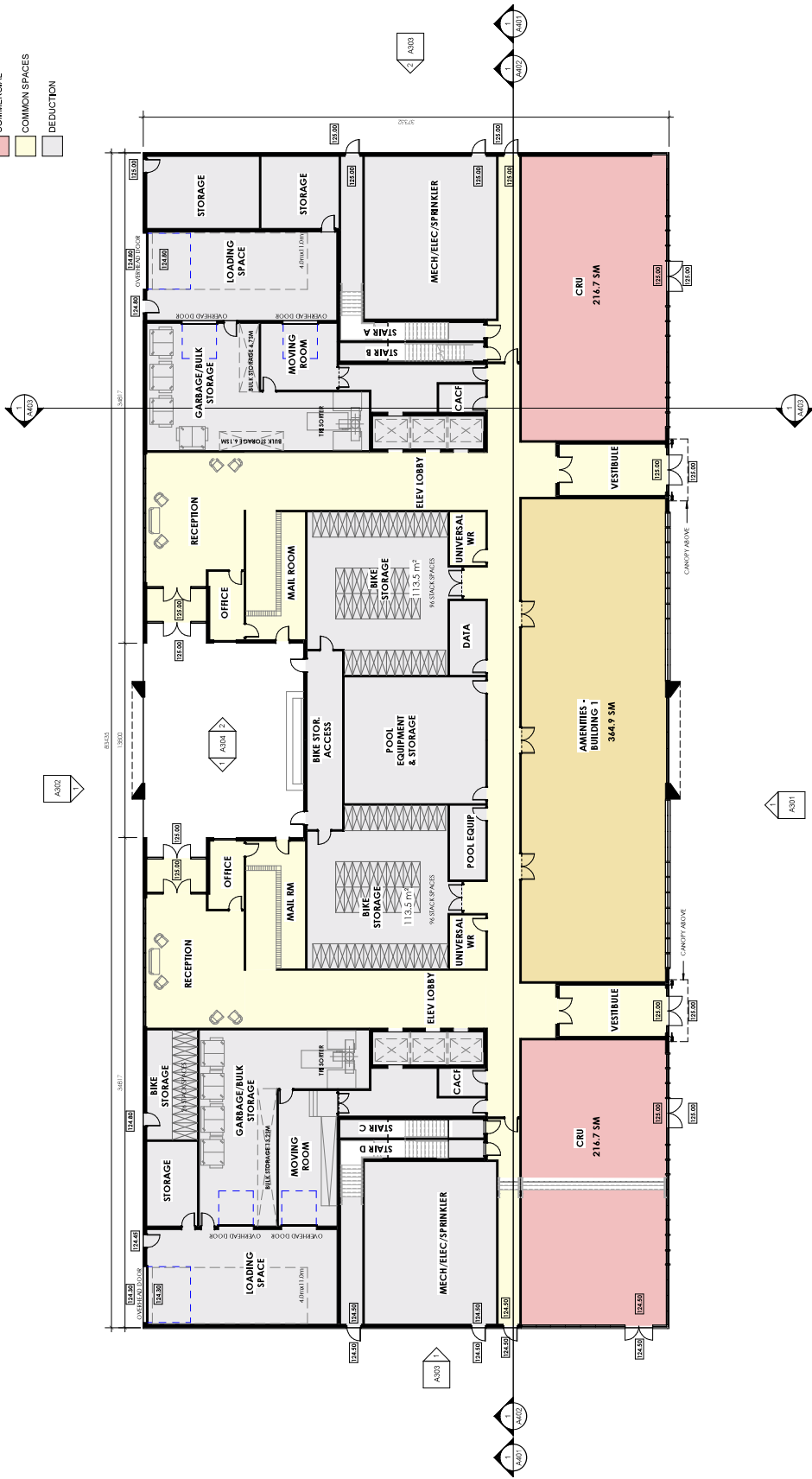
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| Scale: | Date: | Project No.: |
| 1:200 | ISSUE DATE | 20-034 |
| Drawing No.: | A204 | |

01c



GFA COLOR LEGEND

- AMENITY
- COMMERCIAL
- COMMON SPACES
- DEDUCTION



| REV. | DESCRIPTION | REV. DATE |
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SPA FILE NO. -

Drawn: bowmanville

WORK IN PROGRESS

MATAJ ARCHITECTS
INCORPORATED

PROJECT: BOWMANVILLE

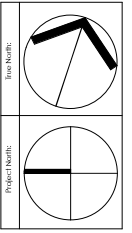
10 ASPEN SPRINGS DR.,
BOWMANVILLE, ONT L0C 1M7

| | | |
|--------------|-------------|--------------|
| Design By: | Author: | Approved By: |
| Designer: | Author: | Approver: |
| Scale: | Date: | Project No.: |
| 1 : 150 | Issue Date: | 20-034 |
| Drawing No.: | A205 | |

Sheet Title:
BUILDING 1 - ENLARGED 1ST FLOOR PLAN

Drawing Scale:

| | | | | | |
|---|-----------------------|--|--|---|------------------|
| | SPA FILE NO. - | | REV. | DESCRIPTION | REV. DATE |
| <p style="text-align: center;"><i>(Table with multiple empty rows for revision tracking)</i></p> | | | | | |
| <p style="text-align: center;">NOTES</p> <p>1. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE NATIONAL BUILDING REGULATIONS AND ALL APPLICABLE STANDARDS AND SPECIFICATIONS. THE DESIGNER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED IN THIS DRAWING. THE USER OF THIS DRAWING SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE RELEVANT AUTHORITIES. THE DESIGNER HAS CONDUCTED VISUAL GENERAL VERIFICATION OF THE INFORMATION PROVIDED BY THE CLIENT AND HAS FOUND IT TO BE SUFFICIENT FOR THE PURPOSES OF THIS DRAWING. THE DESIGNER HAS CONDUCTED VISUAL GENERAL VERIFICATION OF THE INFORMATION PROVIDED BY THE CLIENT AND HAS FOUND IT TO BE SUFFICIENT FOR THE PURPOSES OF THIS DRAWING.</p> | | | | | |
| | | | <p style="text-align: center;">WORK IN PROGRESS</p> | | |
| <p style="text-align: center;">MATAJ ARCHITECTS INCORPORATED 411 Kenwood Street Unit 200 Toronto, Ontario M5T 2L7 Tel: (416) 593-1234</p> | | | | | |
| <p style="text-align: center;">BOWMANVILLE</p> <p style="text-align: center;">10 ASPEN SPRINGS DR., BOWMANVILLE ONT L1C 4W7</p> | | | | | |
| <p style="text-align: center;">Project Title: BUILDING 1 - 2ND FLOOR PLAN</p> | | | | | |
| <p>Design By: [Blank] EM: [Blank]</p> | | <p>Drawn by: [Blank] BL: [Blank]</p> | | <p>Approved By: [Blank] EM: [Blank]</p> | |
| <p>Scale: 1:150</p> | | <p>Date: [Blank]</p> | | <p>Project No.: 20-034</p> | |
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GFA COLOR LEGEND

| | |
|--|-------------------|
| | AMENITY |
| | COMMON SPACES |
| | DEDUCTION |
| | RESIDENTIAL UNITS |



Drawing Scale: 1:150

