

March 10, 2024

Atten: Jennifer Coutts  
Desjardins (Windsor) GP Inc.

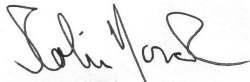
Re: Vibration Assessment Report of Rail Ground Vibrations for Proposed 6-story Residential  
Condominium Development at 11788 Tecumseh Road East – City of Windsor

Dear Ms. Coutts,

Please find enclosed a revised vibration assessment report for the proposed 6-story residential condominium development at 11788 Tecumseh Road East, in the City of Windsor. The purpose of this study is to measure and report the ground-borne vibration levels resulting from the nearby railroad line on the proposed residential building. The revision reflects the updated location of the proposed building and associated amenities.

I trust that the enclosed information meets your requirements. Please do not hesitate to contact me if you have any questions.

Sincerely,



Colin Novak PhD, PEng.

**Vibration Assessment Report of Rail Ground  
Vibrations for Proposed Residential Condominium  
Development at 11788 Tecumseh Road East  
City of Windsor**



akoustik  
engineering limited

**Submitted to:**

Atten: Jennifer Coutts  
Desjardins (Windsor) GP In

March 10, 2024

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## **Statement of Liability**

Akoustik Engineering Limited prepared this report for Desjardins (Windsor) GP Inc. The material in it reflects Dr. Colin Novak's judgement considering the information available to him and Akoustik Engineering Limited at the time of the study, including all measurements, under the stated test conditions. Any use that a Third Party makes of this report, or any reliance on decisions made based on it, is the responsibility of such Third Parties. Akoustik Engineering Limited accepts no responsibility for damages, if any, suffered by any Third Party resulting from decisions made or actions based on this report.

## **Introduction**

This is a revised report of the findings of a railroad ground vibration assessment conducted on behalf of Peltier Developments Inc for the proposed 6-story residential condominium development at 11788 Tecumseh Road East, in the City of Windsor. The rail vibration impacts have been assessed as per the Ministry of the Environment, Conservation and Parks (MECP) procedures as detailed and defined by the applicable MECP's Noise Pollution Control document (NPC-300) and the Federation of Canadian Municipalities (FCM) and the Railway Association of Canada (RAC). This report does not consider the noise impacts from the rail, or any other transportation or stationary sources of noise. The assessment of the potential noise impacts is to be performed by another company.

A scaled aerial view of the property location showing the local area features is provided in Appendix A: Property Location. Also provided in Appendix A is a more detailed site plan.

## **Site Description**

The proposed residential development is a 6-story condominium building at 11788 Tecumseh Road East, in the City of Windsor. A Zoning map of the area is given in Appendix B; Land-use Zoning Map. The building is proposed to include retail space at the front of the ground floor and with the middle section having partially covered parking and 5 storeys of residential above having 40 residential units. The proposed development is surrounded by commercial to the immediate east, west and south of the property. A CN rail main line, which is also operated by VIA Rail Canada, is located to the north of the property and Tecumseh Road East is located to the south. The northern perimeter of the proposed building is approximately 73 m from the centre of the rail right-of-way.

## **Rail Vibration Criteria**

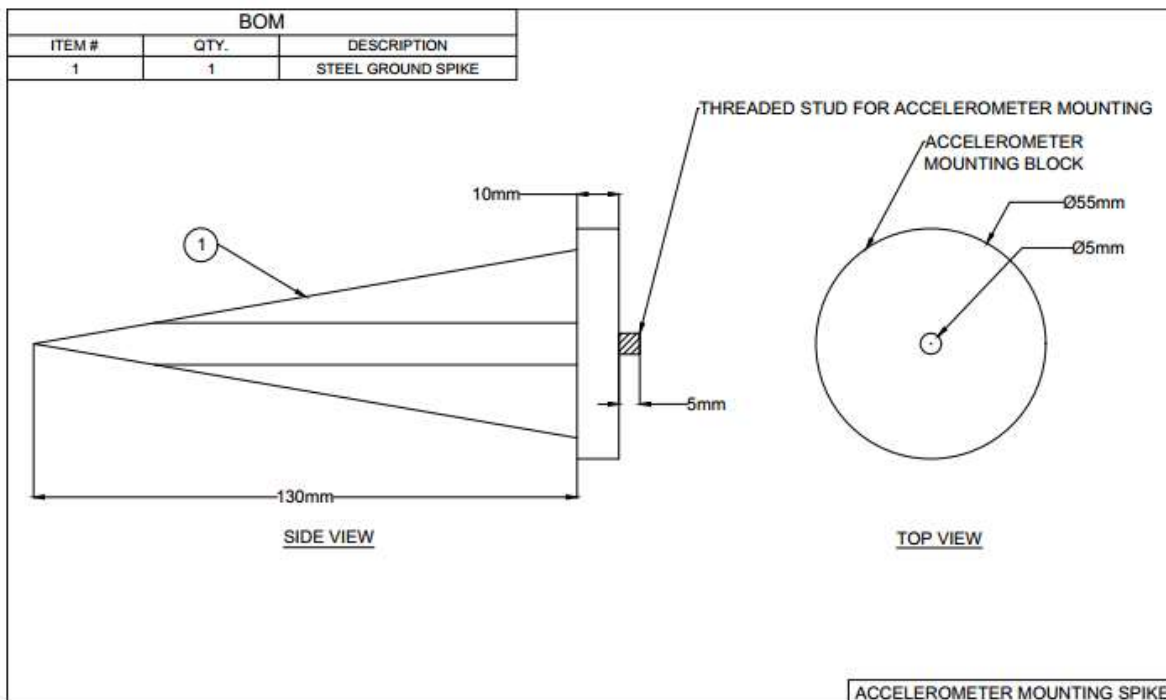
There are no MECP guidelines for rail vibration limits on proposed sensitive land uses. Instead, the applicable guidelines for rail vibration impacts are given in the 2013 document published by the Federation of Canadian Municipalities (FCM) and the Railway Association of Canada (RAC), "Guidelines for New Development in Proximity to Railway Operations". From this, the overall vibration levels from the railway operations should not exceed 0.14 mm/s RMS, measured minimally between the frequency range of 4 Hz and 200 Hz, on and above the first floor of the residential dwelling.

Given that the proposed building has not been constructed, the measurements are conducted on the ground at the perimeter of the proposed building nearest to the rail right-of-way. The 0.14 mm/s RMS limit is based on the threshold limit for human perception of ground-borne vibration

and is intended to ensure that vibration levels from the passing trains will not cause discomfort to the building occupants.

## **Measurement Procedure**

Ground vibration measurements were conducted during daytime hours on November 02, 2022, such that representative vibration data for a total of six trains from the adjacent operations of the CN/VIA rail line, shown in Appendix A, was measured. The rail line is located immediately north of the property, in near proximity to the proposed condominium building. The vibration sensor, a Brüel & Kjaer Type 4370 accelerometer, was located approximately 73 m from the centreline of the nearest track. Illustrated in Figure 1 is the measurement assembly used which includes an accelerometer mounting block integrated to a ground spike. The spike was installed in undisturbed solid ground with the mounting block making firm contact to the ground. This mounting block design is based on the configuration used by blast vibration monitors. The measurement system calibration and instrumentation batteries were checked at the beginning and end of each measurement series. A list of the instrumentation equipment used is given in Appendix C: Measurement Equipment List. Photos of the equipment set-up is given in Appendix D: Photographs of Vibration Measurement S. The measured vibration data for each pass-by is provided in Appendix E: Ground Vibration Velocity Measurements.



**Figure 1: Accelerometer Ground Spike Assembly**

The vibration accelerometer was connected to the Type 2511 vibration meter which was set to a lower limiting frequency of 3 Hz and the upper frequency limit was set to 1 kHz. These settings contain the lower and upper limits of 4 Hz and 200 Hz respectively, required by CN/CP. As such, the effective frequency range of measurement for the system was a more conservative 3 Hz to 1 kHz and the measured values are a composite value of all the frequency-based vibration velocity components inside this frequency range. As the measurement system spans a greater frequency range than that required by CN/CP and the Guidelines for New Development in Proximity to Railway Operations document, the values measured are conservative with respect to protection of the proposed development. A Type 4294 accelerometer calibrator was used to verify the calibration and proper working order of the vibration meter which was set to RMS with a 1 second response time.

## **Measurement Results**

As described above, ground vibration velocity levels were measured during the pass-by of six trains (5 passenger and 1 freight) for the CN/VIA rail line located north of the proposed 6-story residential building. Table 1 shows the maximum measured RMS ground vibration velocity for each of the six-train pass-bys. From inspection of the table, it is evident that the vibration levels for all six trains did not exceed the 0.14 mm/s RMS limit. The full data set of the measurements for each pass-by are given in Appendix D: Ground Vibration Velocity Measurements. As there are no exceedances to the 0.14 mm/s limit, abatement measures are not required.


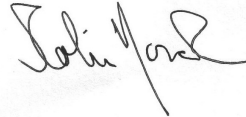
Table 1: Maximum Ground RMS Vibration Measurement

Date	Train Number	Train Type	Maximum RMS Vibration Velocity (mm/s)
Nov 02, 2022	1	Passenger	0.03
Nov 02, 2022	2	Passenger	0.04
Nov 02, 2022	3	Passenger	0.04
Nov 02, 2022	4	Passenger	0.03
Nov 02, 2022	5	Passenger	0.03
Nov 02, 2022	6	Freight	0.09

## **Conclusion**

A vibration assessment of the nearby rail line operations, consisting of ground-borne vibration measurements, was carried out for the proposed 6-story residential condominium development to be located at 11788 Tecumseh Road East, in the City of Windsor. The measured vibration data has demonstrated that the ground vibration levels due to rail traffic on the nearby CP rail line do not exceed the Federation of Canadian Municipalities and the Railway Association of Canada's criteria of 0.14 mm/s RMS velocity. Given that the measured vibration levels are within compliance to the

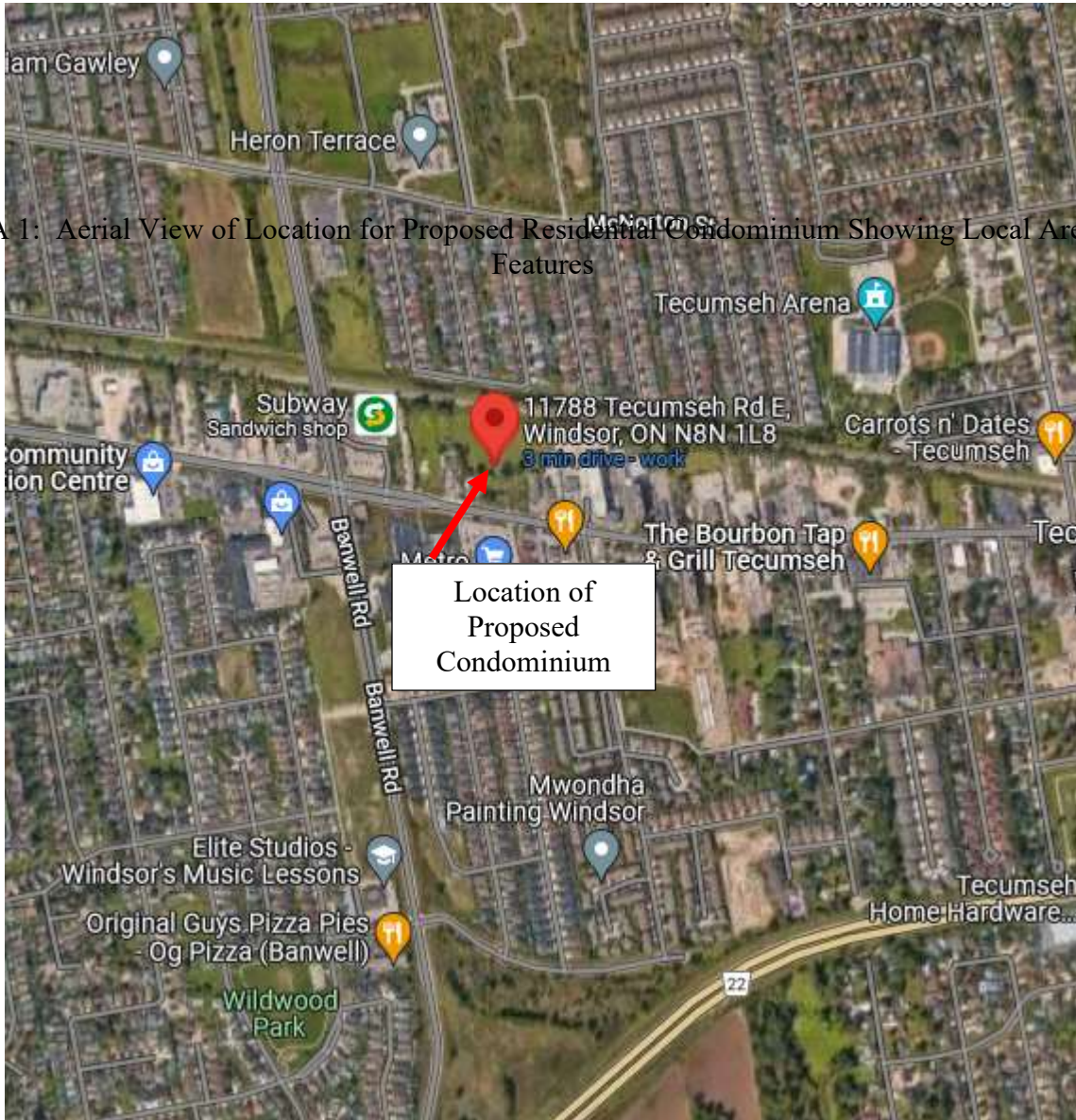
guideline, and that vibration abatement is not required to reduce the vibration levels at the proposed development, it is recommended that the development be given approval with respect to vibration impacts from the CN/VIA rail line.

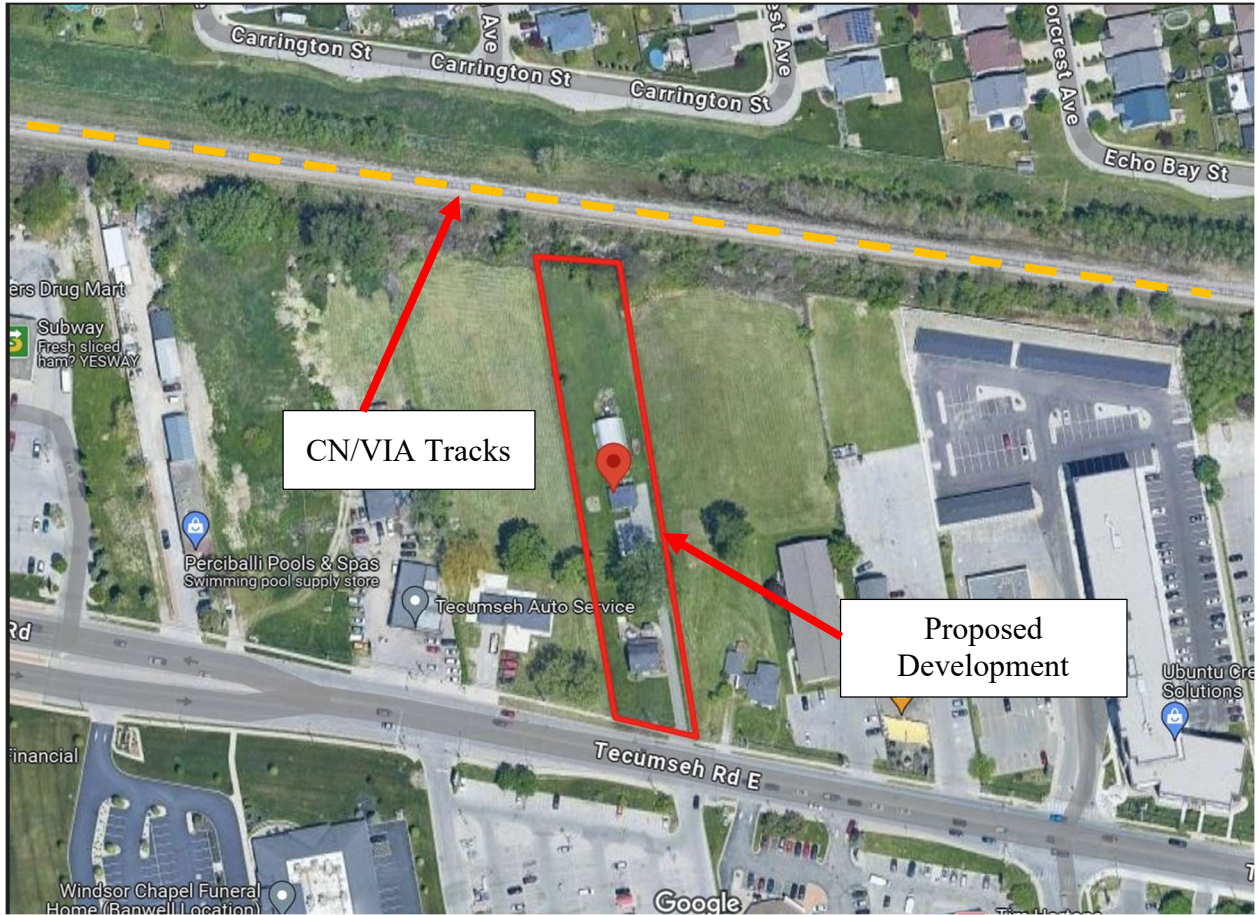
For  akoustik engineering limited		
	<b>Prepared by: Colin Novak, Ph.D., PEng</b>	



**Appendix A: Property Location**

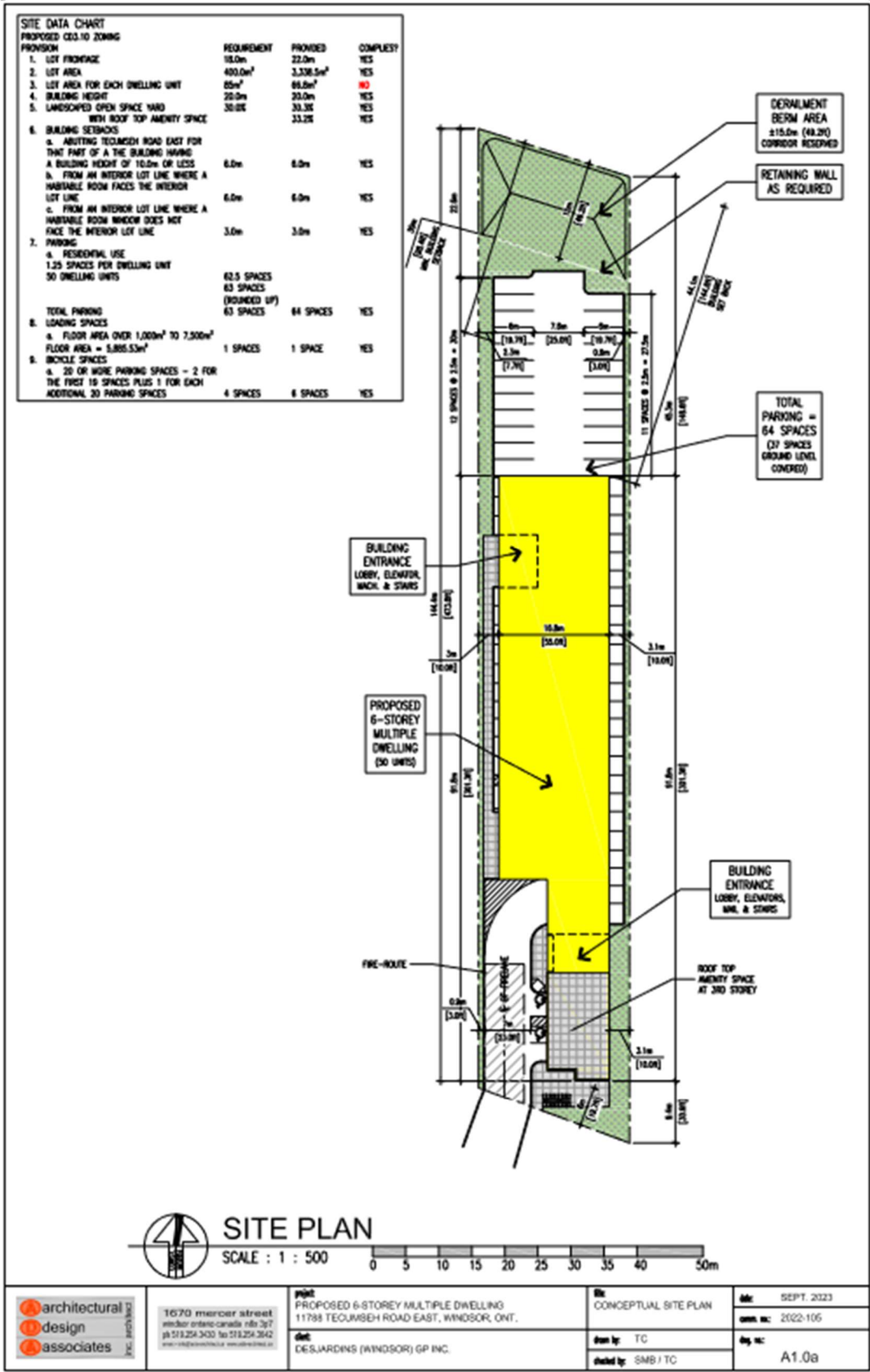
A 1: Aerial View of Location for Proposed Residential Condominium Showing Local Area Features





**A 2: Aerial View of Location for Proposed Residential Condominium and CN/VIA Tracks**





A 3: Site Plan for Proposed Development

**Appendix B: Zoning Map**



# Zoning Dist

**LEGEND:**

- Zone Boundary<sup>1</sup>
- ▬▬▬▬▬▬ Specific Zoning Ex<sup>2</sup>
- - - - - Specific Temporary Exemptions<sup>3</sup>
- ▬▬▬▬▬▬ Registered Plan Pa
- ▬▬▬▬▬▬ Ownership Parcel I
- Municipal Boundary
- █ Inland Watercourse Prone Area<sup>4</sup>
- █ Detroit River/Lake Flood Prone Area<sup>4</sup>

**NOTES:**

1. Each Zoning District symbol corresponds to a z... 8600 (i.e. CD1.1 – Commercial District 1.1.)

DRD 1.\_ - Development Reserve District  
 GD1.\_ - Green District  
 RD1.\_ - Residential Districts (Low Density)  
 RD2.\_ - Residential Districts (Medium Density)  
 RD3.\_ - Residential Districts (High Density)  
 ID1.\_ - Institutional District  
 CD1.\_ - Commercial Districts (Neighbourhood)  
 CD2.\_ - Commercial Districts (General)  
 CD3.\_ - Commercial Districts (Major)  
 CD4.\_ - Commercial Districts (Highway/Restr)  
 MD1.\_ - Industrial District (Light/Business Park)  
 MD2.\_ - Industrial District (Heavy)

An H symbol preceding the zoning district symbol... building permit until specific development precond... 21(13) specifies the uses permitted until such time... amending by-law approved by Council.

2. See Subsection 20(1) and the relevant clause fi

3. See Subsection 20(2) and the relevant clause fi

4. Represents the approximate limits of land subje... River, Lake St. Clair and Inland watercourses as d... Conservation Authority (ERCA). Within these area... restricted and possibly prohibited. Application for l... its review and the issuance of permits prior to the l... Windsor.

**B 1: Zoning Map 15**

## **Appendix C: Measurement Equipment List**

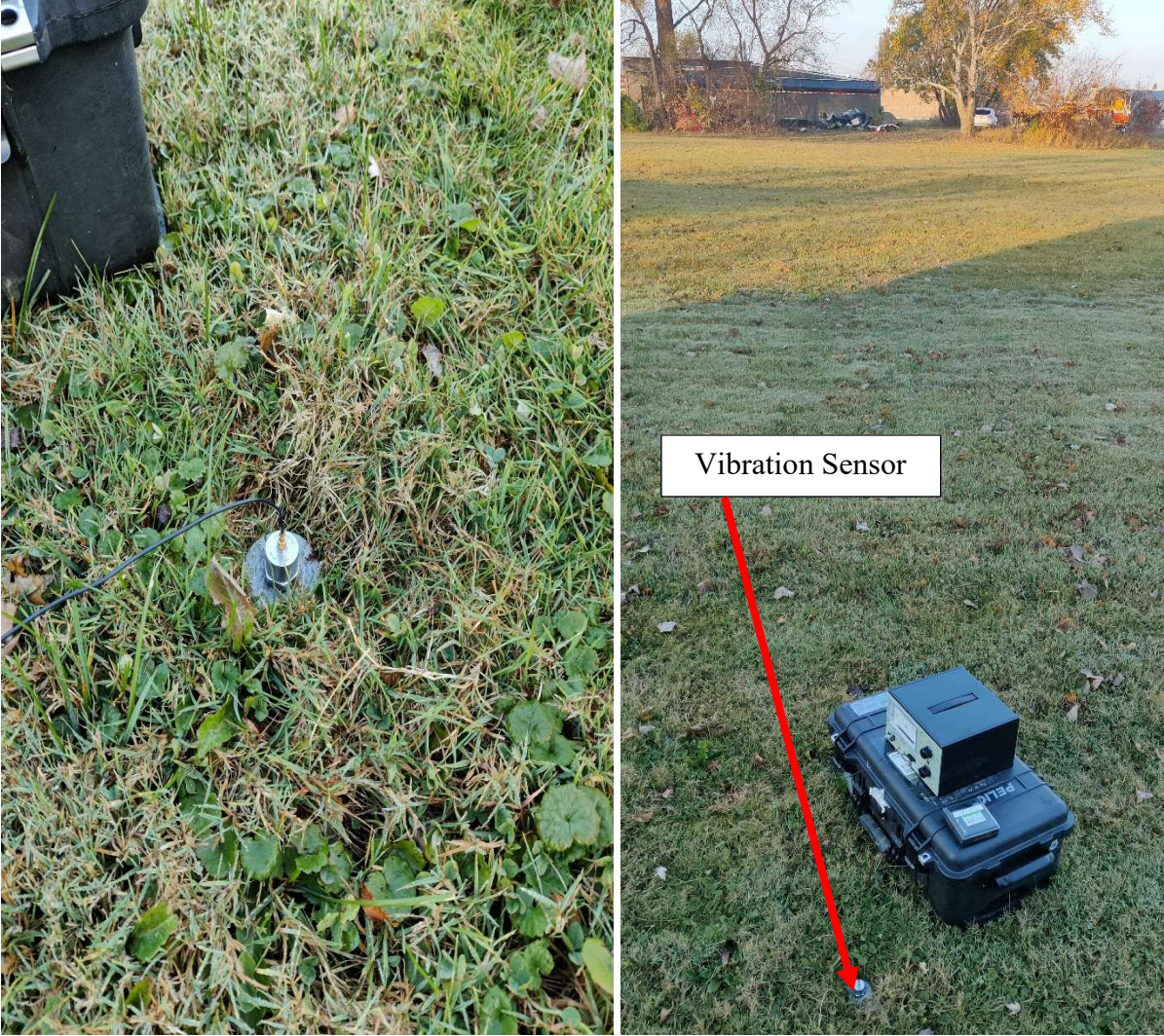
The following is the list of equipment used to perform the vibration measurements:

Type 2511 Brüel & Kjær Vibration Meter	Serial No. 1237766
Type 4370 Brüel & Kjær Accelerometer	Serial No. 1481123
Type 4294 Brüel & Kjær Calibrator Exciter	Serial No. 1121439

All measurement systems were checked for calibration before and after the measurement periods and were found to be within the acceptable calibration limits. The battery levels also remained within the acceptable levels during the measuring periods.



**Appendix D: Photographs of Vibration Measurement Sensor**



**D 1: Accelerometer and Ground Mounting Spike**

## Appendix E: Ground Vibration Velocity Measurements

	Maximum RMS Ground Vibration Velocity Measurements (mm/s)					
Location	11788 Tecumseh Rd E					
Date	2/11/2022	2/11/2022	2/11/2022	2/11/2022	2/11/2022	2/11/2022
Train Type	Passenger	Passenger	Passenger	Passenger	Passenger	Freight
No. of Car and Engine	1 engine 5 cars	1 engine 6 cars	1 engine 6 cars	2 engine 5 cars	2 engines 5 cars	3 engines 59 cars
	0.01	0.011	0.01	0.01	0.01	0.01
	0.018	0.013	0.015	0.011	0.018	0.011
	0.014	0.022	0.022	0.013	0.016	0.017
	0.016	0.04	0.02	0.015	0.022	0.022
	0.02	0.03	0.022	0.02	0.03	0.024
	0.022	0.024	0.036	0.024	0.028	0.018
	0.028	0.028	0.024	0.028	0.032	0.02
	0.02	0.024	0.028	0.026	0.028	0.024
	0.015	0.032	0.026	0.03	0.03	0.03
	0.014	0.03	0.024	0.028	0.028	0.032
	0.01	0.028	0.02	0.022	0.024	0.036
		0.024	0.022	0.028	0.028	0.03
		0.022	0.018	0.032	0.019	0.028
		0.018	0.015	0.02	0.015	0.026
		0.015	0.013	0.024	0.014	0.034
		0.012	0.01	0.02	0.01	0.032
		0.01		0.017	0.011	0.03
				0.014	0.01	0.038
				0.011		0.04
				0.01		0.05
						0.07
						0.07
						0.06
						0.09
						0.07
						0.06
						0.07
						0.08
						0.06
						0.07
						0.07
						0.05

						0.08
						0.07
						0.09
						0.07
						0.06
						0.04
MAX	0.028	0.04	0.036	0.032	0.032	0.09

**E 1: Rail Line Maximum RMS Ground Vibration Velocity Measurements**