

27 WINONA DRIVE

WHITCHURCH-STOUFFVILLE, ONTARIO

CONSTRUCTION VIBRATION ZONE OF INFLUENCE

RWDI # 2406483

August 19, 2024

SUBMITTED TO

Darul Khair Center Stouffville

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Worship-Mosque

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VERSION HISTORY

Index	Date	Author	Reviewed By
1	August 19, 2024	Caelan Weber-Martin	Jacquie Kelton



1 INTRODUCTION

Rowan Williams Davies & Irwin Inc (“RWDI”) was retained to determine the vibration zone of influence (ZOI) for the Worship Mosque construction project at 27 Winona Drive in Whitchurch-Stouffville, Ontario. The scope of this review is limited to the potential for ground-borne vibrations during construction, and excavation activities at the project site.

1.1 Project Summary

The project site is located at 27 Winona Drive in Whitchurch-Stouffville, Ontario and consists of the construction of a new 3-storey Mosque, including a ground-level parking lot and common Mosque spaces on the 2nd and 3rd floors. Construction to support the delivery of services as well as driveway and ground-level parking lot for the new Mosque will also be conducted on-site. A review of the area did not identify any designated heritage properties immediately adjacent to the site.

The development site is shown in **Figure 1**. The proposed development at 28 Fairview Avenue, directly to the east of the proposed mosque, is shown in **Figure 1**. However, it should be noted that the 28 Fairview Avenue development has not currently been approved for ZBA.

2 CRITERIA

The Town of Whitchurch-Stouffville does not have specific assessment criteria for use in a construction vibration zone of influence study, therefore the criteria were defined based on available best practices guidelines for assessment of construction vibration.

The proposed criteria consist of a construction vibration Peak Particle Velocity (PPV) limit depending on the frequency of vibration, as indicated in **Table 1**.

Table 1: Prohibited Construction Vibration Levels

Frequency of Vibration (Hz)	Vibration Peak Particle Velocity (mm/s)
Less than 4	8
4 to 10	15
More than 10	25



In addition to the prohibited construction vibration levels (beyond the property line), a Construction Vibration Zone of Influence (ZOI) is defined as the area of land within or adjacent to a construction site, including any buildings or structures, that potentially may be impacted by vibrations emanating from construction activity where the peak particle velocity at the point of reception is equal to or greater than 5 mm/s at any frequency.

This 5 mm/s peak particle velocity has been adopted for determining the ZOI setback distance for this report. Building damage is typically not expected below 8 mm/s. The ZOI threshold of 5 mm/s PPV is applied conservatively with the intent to flag potentially damaging vibration levels before damage is done.

3 DEMOLITION AND CONSTRUCTION EQUIPMENT

Construction of the development will require site excavation and ground works as well as compaction. Vibration is a concern given the proximity of the construction activities to the existing buildings near the site.

The equipment that will be employed during demolition, excavation and construction potentially includes the following:

- Compacters;
- Loaders;
- Graders;
- Bulldozers;
- Excavators; and
- Trucks.

A hammer-type or vibratory-type pile driver will not be used. Blasting is not expected to occur at the site however if it is required additional analysis would be required prior to the start of those activities.

4 ZONE OF INFLUENCE

Using data provided in the Journal of Geotechnical Engineering Division¹, the construction Zone of Influence (ZOI) has been determined based on the types of construction equipment/activity anticipated to operate in the area.

Table 2 presents the ZOI distances for a peak particle velocity (PPV) up to 5 mm/sec for the construction equipment.

¹ Journal of the Geotechnical Engineering Division, Construction Vibrations: State-of-the-Art, J. Wiss Feb 1981.

Table 2: Predicted Vibration Potential Zone of Influence for Construction Equipment

Equipment Type	Vibration Zone of Influence (m) 5mm/s PPV
Vibratory Soil Compaction	8 m
Truck Movements	4 m
Non-Vibratory Soil Compaction (e.g. Smooth and Sheepsfoot Roller)	4 m

The ZOI is calculated for the most impactful equipment, which for this site would be compacting equipment (vibratory roller/ground compactor). Calculations were based on vibration levels provided in the Federal Transit Administration – Transit Noise and Vibration Impact Assessment Manual. The ZOI for compacting equipment is expected to extend outward by approximately 8 m beyond the extent of the development property under worst-case conditions (i.e., the most impactful type of equipment operating in stiff soil conditions). **Figure 2** shows the predicted ZOI (8m setback) for vibratory soil compaction.

The adjacent commercial plaza adjacent to the south is within the predicted ZOI. Additionally, should the site plan for 28 Fairview Avenue change to be closer to the property line of 27 Winona, it may also fall within the predicted ZOI. This should be reviewed closer to the beginning of construction at 27 Winona.

Since the ZOI extends outside of the boundary of the construction site, a report including the results and summary of the following is recommended prior to beginning construction activities that may cause the vibration zone of influence to extend beyond the property line:

- pre-construction consultation with all property owners within the ZOI advising of the possibility of construction vibrations;
- pre-construction inspection of adjacent buildings and structures within the zone of influence;
- a public communications and complaints protocol;
- pre-construction measurement of background vibration;
- identification of mitigation measures; and
- a vibration monitoring program.

Work to meet these requirements has not yet been completed but is anticipated to be completed prior to the commencement of construction and demolition activities.

A monitoring program will be developed to monitor vibration from construction and further information will be gathered regarding underground services to determine whether monitoring in these locations is required.

5 CONCLUSION

We trust that this information meets your present needs and look forward to providing further detail regarding baseline monitoring, construction monitoring, and consultation.



6 STATEMENT OF LIMITATION

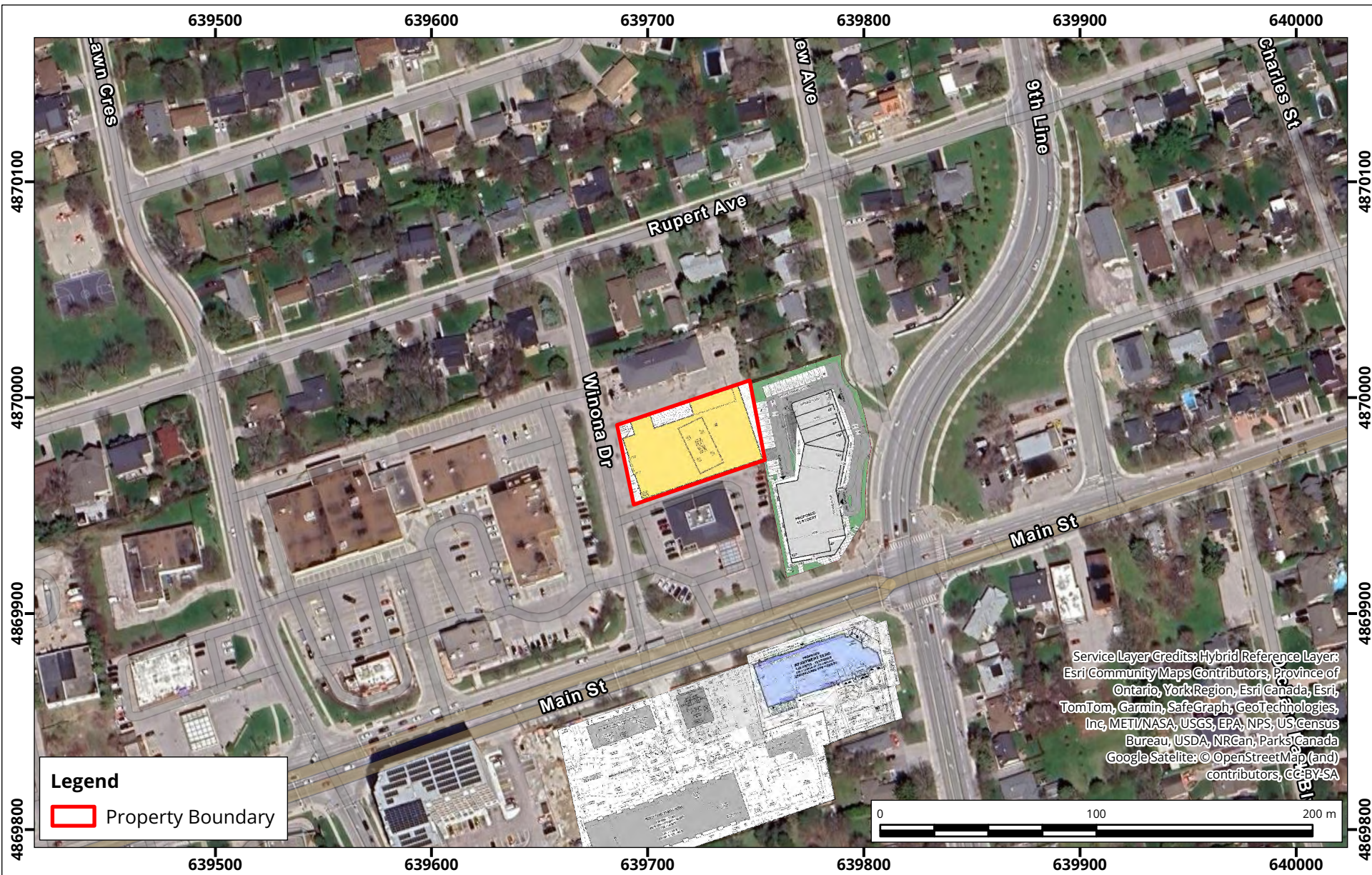
This report entitled Construction Vibration Zone of Influence – 27 Winona Drive was prepared by Rowan Williams Davies and Irwin Inc. ("RWDI") for Darul Khair Center Stouffville ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein to understand the different factors which may impact the conclusions and recommendations provided.

FIGURES

Map Document: M:\AM\Jobs\2024\2406483\3\WorkItems\20EnvironmentalNoiseAnalysis\ArcGIS\27 Winona Drive - Witchurch-Stouffville, Ontario.aprx



Site Context Plan

Map Projection: NAD 1983 UTM Zone 17N
27 Winona Drive - Witchurch-Stouffville, Ontario



Drawn by: CWM

Figure: 1

Approx. Scale: 1:2,500

Date Revised: Aug 16, 2024

Project #: 2406483



