patersongroup memorandum

consulting engineers

re:	**Construction Impact Assessment Report** **Proposed Mixed-Use Development** **951 Gladstone Avenue and 145 Loretta Avenue North - Ottawa**
to:	CLV Group Developments Inc. - **Ms. Josie Tavares -** josie.tavares@clvgroup.com
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file:	PG5517-MEMO.02

Paterson Group Inc. (Paterson) has prepared this construction methodology impact report (CIAR) as it relates to the Trillium Infrastructure which is located in the vicinity of the aforementioned site, and also the 1,372 mm watermain and surrounding buildings. This memo should be read in conjunction with the Geotechnical Investigation Report (Paterson Group Report PG5517-1 dated March 31, 2021).

1.0 Background Information

Based on our review of available drawings and information obtained from GeoOttawa, the limits of the proposed development will be located approximately 18 m south-west of the Trillium rail line rock-cut corridor.

It is also understood that there is an existing 1,372 mm diameter watermain running in an approximate north-south direction, below Loretta Avenue, which is located to the west of the subject site. There are also several existing buildings located in proximity to the north, south, and western boundaries of the site.

2.0 Trillium Line Infrastructure

Due to the minimum 18 m distance between the proposed development and the Trillium Line infrastructure, foundation loads from the proposed building will not impact the Trillium Line. Further, with an anticipated maximum excavation depth of approximately 8.5 m, and the minimum 18 m distance between the proposed development and the Trillium Line infrastructure, the proposed excavation, which will be supported by a temporary shoring system, will not negatively impact the Trillium Line.

As discussed in the above-mentioned Geotechnical Investigation Report, bedrock removal is anticipated to be required for construction of the underground parking levels of the proposed development. Bedrock removal methods may include blasting. A pre-construction survey of the existing structures located in proximity of the blasting operations will be completed prior to commencing site activities.

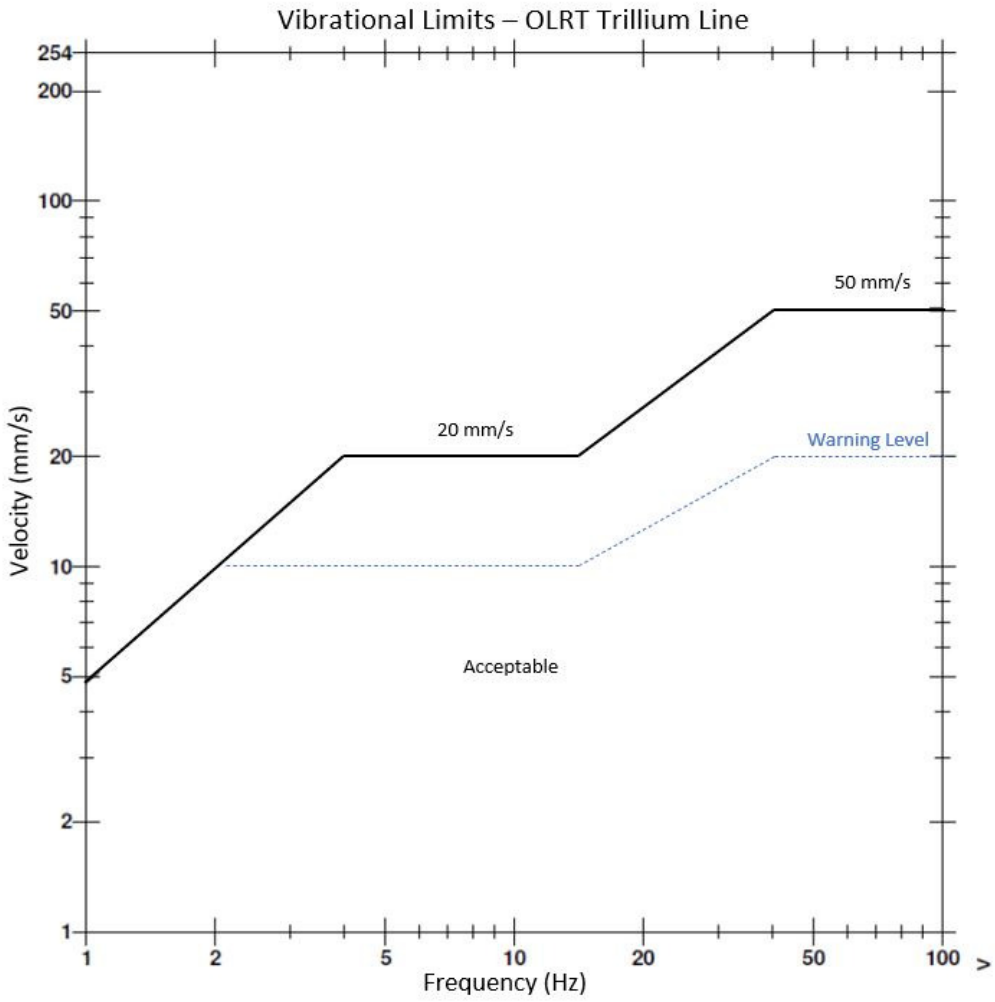
Further, vibration monitoring will be completed along the Trillium Line right-of-way to ensure that vibrations remain within acceptable limits, as discussed further below.

Vibration Monitoring

The Geotechnical Investigation Report recommends the implementation of a vibration monitoring program to monitor vibrations throughout the site preparation and foundation construction operations. It is recommended that the vibration monitoring program for the Trillium Infrastructure consist of the installation of 2 vibration monitors along the Trillium Line right-of-way.

Vibration levels at the Trillium Infrastructure will be continuously monitored in real time during the excavation and blasting programs, and foundation work. The monitoring equipment will consist of a tri-axial seismograph, capable of measuring vibration intensities up to 254 mm/s at a frequency response of 2 to 250 Hz.

Figure 1 below outlines the vibration limits for the Trillium Infrastructure:



3.0 Watermain and Surrounding Buildings

Monitoring System

Deflection Monitoring

The Geotechnical Investigation Report has recommended a program including installing two (2) inclinometers behind the temporary shoring system on the west side of the excavation, adjacent to the 1,372 mm diameter watermain. The inclinometers will be monitored daily until the the tiebacks are stressed and then weekly until the foundation extends above the exterior finished grade.

An alert level of 3 mm of deflection will require an assessment. An action level of 6 mm will required immediate attention and possible mitigation measures.

Vibration Monitoring

Vibration levels at the watermain will also be continuously monitored during the excavation and blasting programs. The vibration levels would be monitored using 2 vibration monitors installed directly behind the top of the temporary shoring system on the west side of the excavation, adjacent to Loretta Avenue.

A maximum vibration limit of 50 mm/s is recommended for vibrations at the western site boundary, adjacent to the 1,372 mm diameter watermain.

The same vibration limits provided above in Figure 1 for the Trillium Infrastructure could also be utilized for buildings adjacent to the site.

4.0 Exceedance Events and Reporting

If the respective recommended vibration limits described above are exceeded, Paterson will notify the site superintendent and operation will be stopped. Weekly reporting of the monitoring program and recommendations will be provided to the owner and the City of Ottawa.

The monitoring protocol should include the following information:

Warning Level Event

- ❏ Paterson will review all vibrations over the established warning level, illustrated by the blue line in the above figure, and;

- ❏ Paterson will notify the contractor if any vibrations occur due to construction activities and are close to exceedance level.

Exceedance Level Event

- ❏ Paterson will notify all the relevant stakeholders via email if any vibrations surpass the exceedance level, illustrated by the black line in the above figure.
- ❏ Ensure monitors are functioning
- ❏ Issue the vibration exceedance result

The data collected should include the following:

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

Monitoring should be compliant with all related regulations.

Incidence & Exceedance Reporting

In case a vibration incident/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:

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

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.

We trust that this information satisfies your immediate requirements.

Paterson Group Inc.

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