re:	**Vibration Monitoring Plan** **Proposed Hillside Development** **3277 St. Joseph Boulevard - Ottawa**
to:	Landric Homes - **Mr. Matthew Firestone** – matthew.firestone@landrichomes.com
to:	DCR Phoenix Homes - **Mr. Michael Boucher** - mboucher@phoenixhomes.ca
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file:	PG5625-MEMO.03 Revision 1

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a detailed Vibration Monitoring Plan as it relates to the protection of the 1,200 mm diameter Class V Gloucester Cumberland Trunk Sewer located at the subject site. This memo should be read in conjunction with the Geotechnical Investigation Report (Paterson Group Report PG5625-1 Revision 2 dated April 28, 2022) and the Settlement Monitoring Plan (Paterson Group Memo PG5625-MEMO.02 Revision 1 dated April 28, 2022).

1.0 Site and Utility Conditions

Based on available information, the existing 1200 mm diameter Class V Gloucester Cumberland Trunk Sewer is located within a 10 m service easement which bisects the central portion of the subject site into an east and west parcel. Furthermore, and based on the drawing prepared by Annis O'Sullivan Vollebekk Ltd., the invert levels of the existing sewer trunk step down from approximate geodetic elevation 67.5 m to 56.5 m, from south to north, respectively.

Based on the available drawings, the proposed building footprints are anticipated to be located approximately 6 to 7 m away from the centerline of the subject sewer trunk. In addition, the anticipated excavation elevation for Building A located to the east of the existing trunk is approximately 59.0 m. Likewise, the anticipated excavation elevation for Building B located to the west of the existing sewer trunk is approximately 61.8 m. Bedrock removal is anticipated as part of the site excavation.

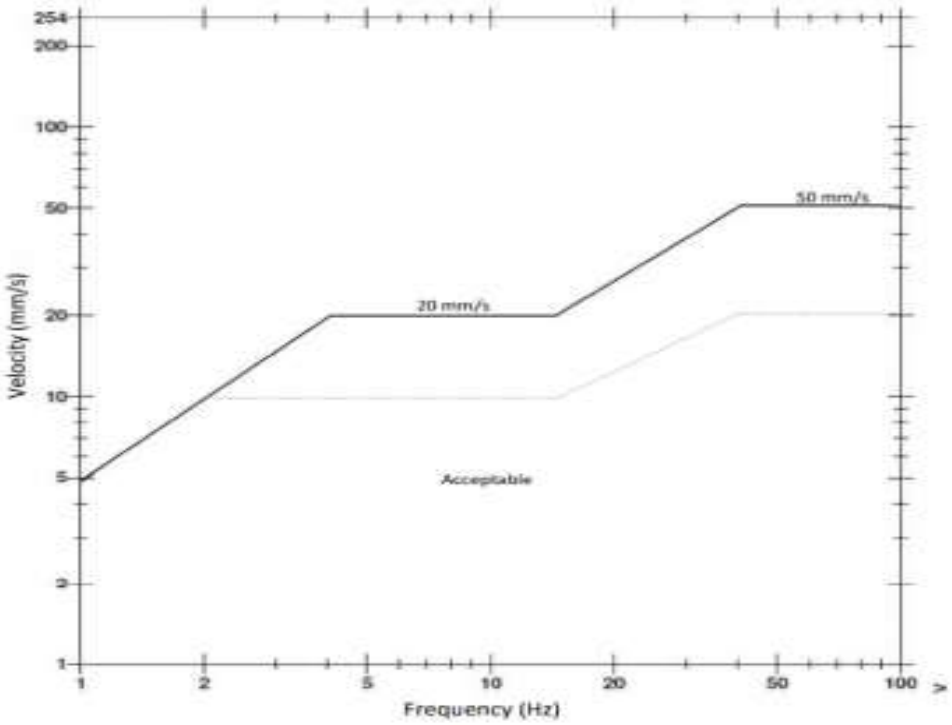
2.0 Vibration Monitoring Equipment

Vibration levels at the trunk sewer should be continuously monitored during the excavation and blasting programs. The vibration monitoring equipment should consist of 2 tri-axial seismographs, capable of measuring vibration intensities up to 254 mm/s at a frequency response of 2 to 250 Hz, and should be installed directly on top of the trunk sewer.

3.0 Vibration Monitoring Criteria

Paterson provided generalized vibration criteria for the 1,200 mm sewer trunk in the Geotechnical Investigation Report, which recommended a maximum vibration of up to 50 mm/s for frequencies exceeding 40 Hz, this is shown on Figure 1 on the next page.

Figure 1 – Vibration Criteria for the Class V Gloucester Cumberland Trunk Sewer



If the recommended vibration limit is exceeded, Paterson will notify the site superintendent and operation will be stopped, and the settlement monitoring points on the trunk sewer will be surveyed. 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.

Paterson will also ensure the monitors are still functioning, and will 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.

4.0 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:

- ❑ Identify 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.

Best Regards,

Paterson Group Inc.

Maha Saleh, Provisional P.Eng.

Scott S. Dennis, P.Eng.

Paterson Group Inc.

Ottawa Head Office
154 Colonnade Road South
Ottawa – Ontario – K2E 5S9
Tel: (613) 226-7381

Ottawa Laboratory
28 Concourse Gate
Ottawa – Ontario – K2E 7T7
Tel: (613) 226-7381

Northern Office and Laboratory
63 Gibson Street
North Bay – Ontario – P1B 8Z4
Tel: (705) 472-5331