

Protection of Community and Neighbourhood Characteristics: Vibration Impact Assessment

This document provides an overview of the vibration impact analysis completed to date as part of the Detroit River International Crossing (DRIC) Environmental Assessment. The potential change in vibration is considered under the broader factor group "Protection of Community and Neighbourhood Characteristics."

Vibration is the movement of particles in time and space. Any moving disturbance produces vibration. Like sound, vibration travels in the form of waves from the source to the receiver. However, unlike sound, vibration requires the presence of a solid medium for its existence, transmission and perception. The vibration levels from a given source are established either through prediction or through measurements at a sensitive receptor location.

Purpose of the Vibration Impact Assessment

In general terms, vibration impact is usually evaluated in terms of human response to building vibration. It is generally accepted that 0.14 mm/sec is the threshold of vibration perception for the average person. This means that at this vibration level, humans may begin to feel small vibrations. As the vibration level increases from this threshold, the average person will become increasingly uncomfortable. At 50 mm/sec, vibrations are likely to cause structural damage to buildings.

How the Analysis was Done

The methodology used for estimating vibration from the DRIC project consisted of the following key steps:

- First, through consultations with other disciplines, an effort was made to identify areas and facilities within the study area that are potentially vulnerable to ground vibrations.
- Then, receptors within the potentially vulnerable areas were identified for vibration monitoring.

Eight receptor locations were chosen to measure current vibration levels. Ground vibration levels were measured at two locations (side-by-side) at each of eight receptors. The eight locations are:

1. The grassy area adjacent to the roadway at the house between 1140 and 1202 Talbot Road (1170 Talbot Road)
2. Adjacent to the west sidewalk opposite to Assumption Church (at the anchor block of them Ambassador Bridge – the fifth block south of Riverside Drive)
3. Adjacent to the sidewalk of the cul-de-sac at the end of Mill Street
4. The grassy area adjacent to the roadway (east side of Highway 3/Talbot Road) outside the Heritage Park Alliance Church
5. In the park near the cul-de-sac at the end of Northway Avenue
6. Just south of the railway tracks at the intersection of Ojibway Parkway and Broadway Boulevard
7. Just north of the E.C. Row Expressway (west side) at 4340 Malden Road
8. Near the sidewalk of the turn-around-loop on Huron Church Road – opposite to 3495 Huron Church Road.

The traffic at each location was monitored over a period of 30 minutes. The monitoring was conducted over two different days to identify any differences in the vibration patterns. (Note: If traffic is busy, truck speed reduces considerably, thereby reducing the vibration signal).

The vibration measurements were conducted within 5 m (16 ft) of the edge of the roadway and for the most part, the levels measured were within 0.14 mm/sec. These levels do not decay very much with distance at close proximities to the road edges and should the roadway contain an expansion joint, etc., these levels may increase to the threshold level of perception. Hence, as a precautionary measure, receptors within 25 m (82 ft) of the right-of-way (ROW) were counted as potential locations where vibration levels could potentially reach the threshold value of 0.14 mm/sec.

Findings to Date

The analysis of the monitoring results to date has determined that vibration mitigation measures are not required since vibration levels are not expected to approach 50 mm/sec which is the threshold for structural damage.

The vibration monitoring results show that the maximum vibration velocity levels measured are below the guideline limit of 0.14 mm/sec. for all locations in the Area of Continued Analysis.

Based on the field monitoring results, it is expected that the vibration levels caused by the proposed project will comply with guidance limit of 0.14 mm/sec. For this reason, no measures to migrate vibration are being proposed. None of the route options are expected to cause vibrations in the 50 mm/sec range; therefore, no structural damage is anticipated from vehicular traffic.

There are several route segments with receptors within 25 m (82 ft) of the ROW. As noted above, at this distance, there is a potential for receptors along the route to experience vibration levels near the threshold value of 0.14 mm/sec. This means that receptors within 25 m (82 ft) of the ROW may at times feel small vibrations. The road segment with the highest number of receptors within 25 m (82 ft) is between Malden Road and Pulford Street. The road segment with the least number of receptors within 25 m (82 ft) is between north of Lennon Drain to Cousineau Road.

Remaining Activities

Additional vibration analysis will be carried out at the design phase of the technically and environmentally preferred alternative. Should the results of this analysis indicate that the potential for project-related vibration levels are much higher than 0.14 mm/sec, mitigation measures will be considered.