

Authority Planning and Growth Committee Item , adopted by City of Toronto Council on, 2008;
Enacted by Council: xxxx xx, 2008

CITY OF TORONTO

BY-LAW No. xx-2008

To amend City of Toronto Municipal Code Chapter 363 with respect to regulation of vibrations from construction activity.

The Council of the City of Toronto HEREBY ENACTS as follows:

1. Chapter 363, Construction and Demolition, of The City of Toronto Municipal Code, is amended as follows:
 - A. By adding the following:

§ 363-3.6. Construction vibrations.

- A. Definitions.

As used in this section, the following terms shall have the meanings indicated:

CONSTRUCTION EQUIPMENT — Any equipment or device designed for use in construction, or material handling including, but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers or trucks, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment.

CONSTRUCTION VIBRATION — Vibration occurring as a result of the operation of construction equipment during construction.

FREQUENCY OF VIBRATION — The rate of oscillation that occurs in one second, measured in hertz where 1 hertz equals 1 cycle per second;

PEAK PARTICLE VELOCITY — The maximum rate of change with respect to time of the particle displacement, measured on the ground, and velocity amplitudes are given in units of millimeters per second from zero to peak amplitude;

VIBRATION CONTROL FORM— The form prescribed by the Chief Building Official to provide information regarding construction vibration to accompany an application for a permit;

ZONE OF INFLUENCE— 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 a construction activity where the peak particle velocity measured at the point of reception is equal

to or greater than 5 mm/sec at any frequency or such greater area where specific site conditions are identified by the professional engineer in a study contemplated in Subsection C3(a).

B. Table 1.0 “Prohibited Construction Vibrations”.

- (1) No person shall carry on a construction activity resulting in construction vibrations that exceed the levels set out in Table 1.0 “Prohibited Construction Vibrations:

Table 1.0 “Prohibited Construction Vibrations”	
Frequency of Vibration (hertz)	Vibration Peak Particle Velocity (mm/sec)
Less than 4	8
4 to 10	15
More than 10	25

- (2) Where the professional engineer has submitted a report under Subsection D and identified lower levels than set out in Table 1.0 above, then levels exceeding those in the report shall be the prohibited construction vibrations.

C. Vibration control form.

- (1) In addition to the other requirements of this article, an applicant for a permit for construction, including demolition, shall submit as part of the permit application a vibration control form that provides the following information and is accompanied by plans and other documents set out below
- (2) The vibration control form shall identify whether the construction activity will include blasting, deep foundations, drilled caisson, large scale soil compaction or construction within the water table, or any other construction activity or method that has the potential to cause vibrations which may impact on buildings or structures outside of the construction site that is the subject of the permit application.
- (3) If construction activities as described in Subsection B(1) are identified, the vibration control form shall also include the following:
- (a) A preliminary study, including a plan showing the construction site and adjacent land and buildings, prepared by a professional engineer that identifies the zone of influence of vibrations and whether the zone of influence will extend beyond the legal boundaries of the construction site that is the subject of the permit application.

- (b) The existence within the zone of influence of any buildings that have been designated under the *Ontario Heritage Act*; and
 - (c) A general review commitment certificate and letter of undertaking in a form acceptable to the Chief Building Official.
- (4) In determining the zone of influence for the construction the professional engineer shall consider the following:
- (a) Soil conditions of the construction site and adjacent land;
 - (b) Weather conditions that will exist at the time of construction that may result in construction vibrations;
 - (c) Whether the proposed construction will be above or below the water table;
 - (d) The presence of heritage designated or listed properties and sensitive structures or buildings or infrastructure;
 - (e) The precise location of the source of vibration;
 - (f) Any unique site conditions;
 - (g) Whether it would be prudent, in the circumstances, to have a zone of influence that is larger than would result if the analysis had only been restricted to the predicted peak particle velocity values set out in Column 1 of the Table in Subsection B; and
 - (h) Such further matters identified by the professional engineer which may be relevant to identifying the zone of influence in a specific situation.
- (5) After the issuance of a building permit, if a construction activity that was not identified in a vibration control form is proposed or commenced, the applicant shall comply with the requirements the Section, where in the opinion of the Chief Building Official the construction activity may contribute to vibrations.

D. Pre-construction consultation and monitoring program.

If a zone of influence will extend beyond the legal boundaries of the construction site that is the subject of the permit application, the applicant shall:

- (1) Carry out a public pre-construction consultation with all property owners and occupants within the zone of influence advising of the possibility of construction vibrations and the provisions of this section;
- (2) As part of an application for a permit provide a report from a professional engineer addressing the following matters:

- (a) A summary of the pre-construction consultations between the applicant and the owners and occupants of properties within the zone of influence, including comments provided to the applicant by the owners and occupants during the consultations;
 - (b) Pre-construction measurements of background vibrations within the zone of influence;
 - (c) Pre-construction inspection of adjacent buildings and structures within the zone of influence to identify existing cracks in walls, floors and exterior cladding of the first two storeys above grade and interior finishes of all storeys below grade in sufficient detail to facilitate comparison of pre-construction and post-construction condition;
 - (d) Where it is not possible to gain access for a pre-construction inspection, statements of the efforts made to gain access;
 - (e) Identification of mitigation measures to reduce the impacts of construction related vibrations within the zone of influence; and
 - (f) A monitoring program to measure variances in the vibration levels before and during construction activities which shall be verified by a professional engineer, and shall include:
 - [1] The number and location of seismographs to be used;
 - [2] The sampling frequency;
 - [3] The result transmittal protocol;
 - [4] Ambient vibration levels;
 - [5] A public communications protocol;
 - [6] A complaints protocol during construction; and
 - [7] Procedures for construction method alteration to address the occurrence of excessive vibrations.
- (3) The mitigation measures and monitoring program required under Subsection D(2)(e) and (f) shall be implemented so that construction activities do not exceed maximum frequency based limits for peak particle velocity as set out in Subsection B or such lower levels as may be identified by the professional engineer as being prudent taking into consideration site specific conditions.
- (4) The monitoring program shall include no less than one on-site seismograph that is to be operated continuously to record the vibration frequency and peak particle

velocity for construction vibrations at all times construction activities identified in subsection C(2).

E. Monitoring of vibrations during construction.

The applicant shall monitor the vibration levels and report on the monitoring as follows:

- (1) The applicant shall monitor vibration levels during construction in accordance with the monitoring program submitted with the application for a permit under Subsection D(2)(f).
- (2) Where in the opinion of the professional engineer it is prudent to do so monitoring shall be based to detect levels below those set out in the Table in Subsection B.
- (3) The applicant shall submit a copy in writing of all vibration measurements recorded as part of the monitoring program to the building inspector assigned to the project at the end of each work day, or as requested by the building inspector.
- (4) Construction activity shall not be carried on when it will result in vibration measurements that exceed the prohibited construction vibration levels set out in Subsection B.

F. Public communications and complaint protocol.

The applicant shall, in addition to the preconstruction survey required in Subsection C provide for the following public communications and complaints protocols:

- (1) At least one week before the commencement of construction activity that may cause vibrations the applicant shall notify the ward Councillor and owners and occupants of properties within the zone of influence of the scheduled construction activity.
- (2) The notice required under Subsection F(1), shall include the following:
 - (a) An explanation of the proposed construction activity and its potential to produce vibrations;
 - (b) A statement of the levels of construction vibration that are prohibited in this Section;
 - (c) The address of the construction site where the construction activity will occur;
 - (d) The date and time that the work will occur;
 - (e) The name, address, telephone number, and other contact information through which a person affected by vibrations may contact the applicant and the person carrying out the construction activity for the applicant; and

- (f) Contact information for Toronto Building staff assigned to the project.
- (3) In the event that the applicant receives a complaint or is otherwise notified of a complaint about vibrations from the construction activity, the applicant shall cause the professional engineer monitoring the project to immediately perform vibration measurement at the complainant's location during activities representative of the offending operation and to provide to the complainant and to the building inspector assigned to the project a copy of the measurement results including an interpretation by the professional engineer of the possible impacts such construction vibrations might have on the building or structure of the complainant; and
- (4) In the event that the measurements at the complainant's location exceed the limits set out in Subsection B, all construction activity generating the vibrations shall immediately cease and not resume until mitigation measures are implemented to reduce the vibration levels so that they are below the limits set out Subsection B.

2. This by-law comes into force on the day that is 60 days after it is passed.

ENACTED AND PASSED this day of, A.D. 2008.

Mayor

City Clerk