

## MEASURING IMPACT OF VIBRATIONS ON PEOPLE

Ground-borne vibrations are associated with pressure waves that propagate through the ground and are typically experienced by people during earthquakes or when there is heavy traffic or machinery operating in the vicinity. In contrast to air-borne noise, ground-borne vibration is not a phenomenon that most people experience daily.

In the United States, the Modified Mercalli (MM) Scale is typically used to measure the effects of earthquakes at ground surface as it factors in key human responses and observable effects to determine an earthquake's intensity.

Some observable effects of ground-borne vibrations include movements of building floors, rattling of windows, and shaking of items on shelves or hanging on walls.

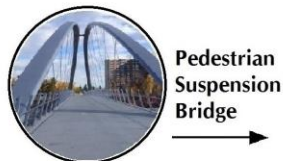
In some rare cases, ground-borne vibrations can even cause damage to property, buildings, and foundations. On the MM Scale, property damage starts at intensity level IV (out of XII levels), which correlates to a ground particle velocity of around 100 VdB (ref  $10^{-6}$  inches/sec).



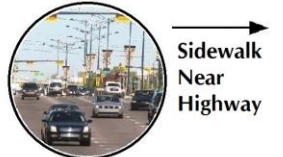
## GROUND-BORNE VIBRATION THERMOMETER

### Vibration Sources

Blasting from Construction Projects \*



Pedestrian Suspension Bridge

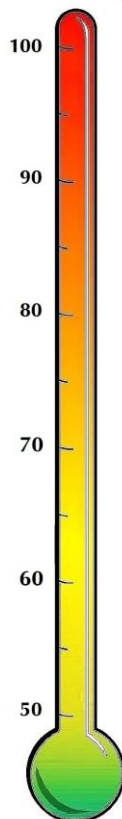


Sidewalk Near Highway



City Train Platform

Typical Background Vibrations \*



### Impacts of Vibration\* (based on avg. ground velocity)

Building Damage Threshold

Difficulty with Tasks (ex. Reading)

Causes Annoyance (Frequent Events)

Causes Annoyance (Infrequent Events)

Human Perception Threshold

Note: Scale shows RMS Vibration Velocity Levels measured in VdB relative to  $10^{-6}$  inches/sec  
\* Source: US Federal Transit Administration

The vibration thermometer on the left shows the intensities of commonly experienced events, and indicates the typical impacts that vibrations at different intensities have on people.

*Patching Associates has extensive experience in completing vibration monitoring and impact assessment for various industries including oil & gas, transportation and residential. Through the use of high precision vibration monitoring sensors and analysis tools, Patching Associates helps clients understand, and mitigate, the risk of vibration impacts and complaints.*

The velocity-based vibration scale represented on the thermometer is used to quantify the effects of seismic activity as experienced by people.

The Local Richter Scale, on the other hand, is used to quantify the seismic event itself and does not necessarily correlate with the impact the event has on people or buildings.

