

In the event that vibratory hammers are utilized, both vibrations and noise will result. If drilled shaft foundations are required on a given project, and if vibratory hammers are used to install the casings, the vibrations and noise will typically be intermittent and for relatively short durations. If a sheet pile wall is being constructed with the use of a vibratory hammer, the vibrations and noise will be produced for longer durations and will be potentially more frequent during construction at specific wall locations.

The noise and vibration will frequently cause windows, dishes and other such objects to rattle in a manner similar to having a stereo on with the volume turned up. Likewise, it is unlikely that the noise and vibration induced by a vibratory hammer would lead to structural concerns. However, the noises induced by vibratory hammers will frequently extend for a greater distance than will the induced ground vibrations, depending upon wind speed, direction, and obstacles. The ground vibrations induced from a vibratory hammer can travel as well, and thus will be closely monitored.



**Vibratory Impact Rollers**

Vibratory rollers are typically used to compact soils beneath a planned roadway. The purpose is to help prevent the future roadway from settling and rutting and to increase the overall lifespan of the road that is being constructed. Vibratory rollers induce much of the same effects to adjacent structures as those referenced earlier for the vibratory hammers.

However, vibratory rollers typically produce less noise than vibratory hammers. The noise may still be audible if you are close enough to the operation, but it will usually not travel as far, and it will be at lower levels. If a vibratory roller is in use near the structure that you own or occupy near the construction project, one can expect that its operation in the area will be fairly continuous and for some potentially lengthy time periods.

**Responsibility**

The contract between the Department and the contractor contains provisions for the contractor to indemnify, defend, and hold harmless the Department on any claims related to construction.

For additional information on the contractor’s legal requirements and responsibilities to the public, please visit:

<http://www.dot.state.fl.us/specificationoffice/Implemented/SpecBooks/2015/2015BK.shtm>

For more information, please contact:

Public Information Officer  
Dayana Iglesias  
(954) 940-7585  
diglesias@corradino.com  
www.d4fdot.com/bcfdot

January 2015



# Guide to Construction Vibrations

Adapted from an article written by:  
Daniel C. Hart II, P.E.  
Senior Geotechnical Engineer

## Construction Vibration

If you live in or own property within a few hundred feet of a heavy construction zone, you will probably hear and feel the effects of vibrating / operating construction equipment. It is common, and understandable, for people to be concerned about the effects of such activities and vibration on the biggest investment in their life, their home or business. The good news is that these vibrations, induced by construction activities, are being closely monitored and measured by the contractor performing the work for the State of Florida.

Ground vibrations are caused by elastic waves emanating from construction activities and are often cited as a cause of damage to structures. The peak particle velocity (PPV), which is mostly used for measuring ground vibrations, is the speed at which a particle of earth moves, not the distance. One method used to measure PPV is a seismograph, or a vibration monitor. The equipment is secured to the ground, or buried below the ground surface, at various distances from the source of vibrations. This allows for determination of the rate of vibration dissipation, or “attenuation rate,” with regard to distance from the source of the vibrations.

Studies have shown that human perception is more sensitive to vibrations than are structures. Vibrations perceived as destructive by humans are typically much lower than the vibration levels that would be considered critical for structures, such as your home or office. However, the fact that your building or home may not be exposed to damage, or even the risk of damage, does little to reduce the feeling of discomfort created by these vibrations.

Regulations have been established to prevent the construction related vibrations from inducing even cosmetic damage (damage which does not structurally weaken a building, such as minor cracks in stucco, paint, or drywall). One of the most common damage complaints regarding construction induced vibrations is that existing cracks may increase in size.

However, it should be noted that the vibrations are being monitored and maintained within limits specifically designed to protect against even cosmetic damages.

Please take comfort in the fact that the construction induced vibrations will be closely monitored, and that there are regulations in place to minimize the effects of these vibrations away from the job site as well as within the project limits. You may have been, or will be, contacted shortly before or during construction, by a person representing the construction project, in order to access your property for the purpose of performing surveys, or to obtain other relevant information. These representatives will properly identify themselves, and you are welcome to contact the public information officer for verification if you feel it is necessary.

Before starting construction projects in which vibrations are expected, the contractor is responsible for notifying all residents or owners of existing structures within 200 feet of the project area. Any resident or owner of a dwelling or structure that is outside of this radius may request a pre-construction survey at their own expense. Also, any owner or resident of a structure which has a pre-construction survey performed may request a copy of the survey .

The following paragraphs discuss some of the different types of construction equipment that may cause vibration and noise.

### Impact Hammers

Impact hammers are often used for the purpose of pile driving operations. Piles are often driven to provide support to bridges. Impact hammers repeatedly strike the top of a concrete or steel pile with the purpose of driving it into the ground sufficiently to support the weight of the bridge and traffic. As a result of these impacts, there are energies and vibrations induced into the ground and these vibrations can travel through the soil and be felt at nearby structures.

Much like other sources of vibrations, pile driving will cause noise and will potentially cause walls and/or windows to rattle, along with dishes in the cabinets or sink, coffee pots, and other similar items. During pile driving operations the impact hammer could run continuously in specific areas for extended durations. The noise and vibration induced will be repetitive. Again, the vibrations induced from this operation will be closely monitored as previously referenced, and kept within a specified range to avoid damage to nearby structures.



**Vibratory Hammer**  
Vibratory hammers are considered to be non-impact hammers, and use rapid vibrations to install steel pipes and sheet piles into the ground. In doing so, energy is transferred into the surrounding soils.

This energy generates some vibration. These vibrations will be monitored and measured using the peak particle velocity method during construction, as previously described. Vibratory hammers are often utilized to drive steel pipes, or steel sheet piles. Steel pipes are sometimes referred to as “casings,” and they may be driven to construct drilled shaft foundations in place. Steel sheet piles are driven to construct certain types of walls, in order to temporarily or permanently retain soil.