Welcome to Metro’s Environmental Construction Awareness Program module on minimizing noise and vibration during construction activities.

We believe in transforming Los Angeles using means that minimize disruption to the daily life of our community. We’re asking you to work with us to build infrastructure using methods that reduce the negative effects of construction noise and vibration.
Why do we focus on noise and vibration?

The Purple Line Extension - Section 1 runs along Wilshire Boulevard, along side the Los Angeles Museum of Contemporary Art. The museum holds outdoor concerts as part of its very popular summer series. These are the sounds and vibrations that make the neighborhood special. But during periods of local construction, no one wants to hear – or feel – construction noise during these concerts, so Metro and the project contractors schedule activity near the museum to avoid concert times.

This is about more than being a good neighbor and a good steward; this is one way we can show we appreciate all Los Angeles has to offer, even as we are creating the next Los Angeles.

Photo credit: LACMA
While some noise is expected during construction, excessive noise that can interfere with normal activities at home, at work, or cause physical discomfort for those nearby, diminishing their quality of life should be avoided.
Similarly, excessive vibration can create discomfort or annoyance for nearby building occupants or impact fragile structures, causing damage.

Metro believes that Historic structures should be protected. In this example, Metro created a physical shield between the work zone and the Samsung Building along the Purple Line Extension – Section 1 to minimize potential damage from working in close proximity of the building and any vibration due to that proximity.

In some cases, we monitor pre-existing cracks to ensure they are not getting worse due to construction activity. Projects might even place stationary noise or vibration monitors in or near sensitive locations for constant monitoring.

Image source (right): www.pixabay.com
Metro has a responsibility to comply with the EIR, EIS, local ordinances, and any additional project specifications. During construction, these documents restrict noise levels by time of day and type of activities allowed.

Projects that include multiple jurisdictions may have different noise ordinances for each location. For example, a typical daytime limit in Los Angeles is 75 decibels, which is similar to the sound of a loud city street. Other cities may have more or less strict requirements. Some may not allow work during certain hours.

In each case, Metro works with the cities to get a variance or other necessary permits to keep the project from taking any longer than it has to. Restrictions stated in these agreements must be followed as such permits can be rescinded, work can be delayed, and fines can be levied for non-compliance.
Because of how noise and vibration travels, construction projects must carefully analyze proposed activities in order to complete them with the least impact possible.

Projects may have sensitive receptors - specific locations like a residence, park, school, hospital, place of worship or theater - where we must be especially careful of noise and vibration levels.

Being aware of unique situations like proximity to high tech equipment - an MRI or electron microscope – is important when planning construction activities.
During the project's planning stage, Metro studies the existing noise levels in the area where work will occur to identify sensitive receptors and provides this preliminary data to our contractors. They may need to do additional ambient noise studies related to specific planned activities.

Based on the sensitivity of the area and local city ordinances, specific guidance is provided through the mitigation measures and specs to keep noise and vibration levels within acceptable limits.
As part of the initial stages of project implementation, the contractor’s acoustical engineer will develop noise and vibration control and monitoring plans describing how noise and vibration will be monitored daily; how the equipment used during night activities will be inventoried, tested and certified; and how calculations of noise and vibration levels will be reported quarterly and semi-annually.

Metro also has inspectors and monitors on site during construction activities to ensure effective implementation of permits, plans, and specifications.
Sources of noise and vibration

Equipment such as:
- Saws
- Jackhammers
- Bulldozers
- Rollers
- Drilling rigs

Some equipment - like a saw - creates noise; some - like a roller - creates vibration, and some equipment – like a jack hammer – creates noise and vibration.

If not controlled or if used in combination, the sum of equipment can exceed allowable noise and vibration levels. Contractors often need to use alternate methods or to implement best management practices to keep within such limits.
Activities including demolition, excavation, compaction, pile driving, and shoring can create a nuisance, especially around sensitive receptors. One successful strategy to reduce impacts is to keep noise within construction areas by using temporary sound barriers and walls.
Construction Noise Vibration Control specifications provide guidance on noise-suppression devices and other noise control measures necessary to protect the public. Best practices include using quieter equipment and processes whenever possible, using noise blankets and enclosures for saw cutting, noise barrier fences, control curtains, and battery-operated equipment.
Workers should:
> Avoid metal-on-metal contact
> Transfer material quietly
> Avoid banging drilling auger
> Use hand signals
> Avoid loud music

Workers should be reminded to avoid metal-on-metal contact and not to drop metal onto a hard surface. Think through procedures. For example, utilize strategies to transfer material, like concrete, into trucks more quietly. Avoid banging drilling auger to sluff-off wet soils. Use hand signals rather than yelling or whistling to communicate as practical and avoid playing loud music.
Equipment should use quiet back-up alarms, avoid idling for more than 5 minutes, and travel on approved haul routes, designed to avoid sensitive receptors.
Failure to comply with noise and vibration requirements may impact the trust we build with the local community. We know that people’s experience doesn’t always match what our monitoring tells us, so Metro’s Community Relations teams get to know the residents so even when we are within measurement limits we look for ways to meet specific local needs.

Delays in construction can result from community complaints or recorded noise or vibration exceedances. Such situations can result in permits withdrawn or even a complete shut down of the project while the situation is researched and resolved.

At the extreme, projects can incur additional costs and legal action such as a misdemeanor charge to the responsible party, punishable by fine or even imprisonment.
We look to our contractors as partners in using best management practices to control noise and vibration. A key to success in this area is planning ahead, which can go a long way to keeping the project moving forward smoothly.

We encourage contractors to stage equipment away from sensitive receptors, to schedule particularly noisy activities during the day, to have monitors on-hand, and to inform the public of anticipated activities.
Contracts’ role

- Train workers in noise awareness
- Update plans every 3 months to reflect changes

Training all workers on the site raises awareness about noise and vibration, creating opportunities to share strategies available to minimize potential issues from occurring. Trainings should be on-going with refreshers to keep everyone attuned.

And update your plan as the situation changes so everyone knows what is expected.
The monitoring team should be properly trained with the appropriate qualifications as discussed in the MECA module, “Your Environmental Team.”

These monitors should be familiar with the proper location and orientation for fixed and hand-held monitors.

All monitor equipment should be calibrated regularly according to manufacturer’s specifications and as required by the project and best monitoring practices.
The contractor should be prepared to provide submittals related to noise and vibration. Each of these are efforts to keep Metro informed of planned and implemented activity. Such information is needed for compliance as well as providing information so Metro can be an active partner in ensuring the project’s success.
Metro’s operational specifications ensure that operational noise and vibration are considered in the planning phase, establishing protocols and decision making related to design features and testing these features for their effectiveness. For example, the project should be designed with features built in to reduce ground-borne noise from vibration. The use of direct fixation resilient rail fasteners and low impact cross-overs such as a moveable point frogs or spring-loaded frogs can have a measurable impact on measurable levels of noise and vibration.

Image: Dana Jones, Metro
In conclusion, successful projects plan ahead in order to minimize noise and vibration in activities. Teams are aware of sensitive receptors and implement best management practices in order to work within restrictions designed to protect these areas regularly. Submittals are provided on time and are complete so we can provide the best partnership in creating the future Los Angeles.
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Let us know that you watched and learned from this module. You might want to take a screen shot of this certification and include it in materials you share with Metro.