Five Myths of Construction Noise

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The requirements, techniques and tools for assessing and controlling construction noise are frequently misunderstood or conveniently ignored by those responsible for doing so. The failure to properly identify, plan for, and control noise and vibration at the construction site can result in a wide range of unintended consequences, up to and including work stoppages, public resentment, unwanted political and media attention, fines and threats of legal action. This article identifies and corrects several of the most common myths and misconceptions about construction noise assessment and control and helps to identify the correct regulations, tools and technical approaches for correctly addressing construction noise on federal, state and local projects.

Virtually any type of modern construction project includes some type of noise generation. For some types of projects, the temporary nature of the construction noise may be of only minor importance compared to the long-term operational noise, such as an airport runway. For other types of construction projects, such as the erection of a large office building, the construction process is largely the beginning and end of potential noise concerns.

While analysis or control of construction noise is typically required as part of a project from a regulatory aspect, this requirement is often ignored, misunderstood, or forgotten about, resulting in negative unintended consequences. This apparent lack of proper understanding or intent of construction noise policy and practice is often replaced with persistent myths and misconceptions about construction noise, such as how it can't or shouldn't be bothered with as part of the planning process or actual construction activities. We have collected some of the most persistent, and false, rumors, myths, and misconceptions regarding construction noise (typically perpetuated by folks other than noise control professionals) and attempt to provide some legitimate and compelling information to refute or correct them.

Please also note that the term "construction noise" as presented in this article can generally be taken to include both construction noise and vibration, especially when the devices, equipment or processes that produce one can often produce both.

Myth 1 – Construction Noise is Just a Temporary Nuisance. Define temporary. This may be true for some smaller projects that will only produce a limited amount of noise and involve a few days of construction work with few nearby sensitive receivers. However, many large-scale projects will require months or even years of noisy construction activity, and suggesting to angry neighbors that it is "only temporary" may result in negative and unexpected consequences, including a loss of credibility. As a result, demonstrating a short duration for noisy construction activities (such as a few days or weeks) may serve to lessen or limit some noise impacts, but in general "temporary" is no free pass for properly identifying construction noise impacts or appropriate noise abatement options.

This is particularly true for projects that require construction work at night. Often control of noise takes a back seat to traffic mitigation. Consequently, construction work that requires taking (closing) a traffic lane will be scheduled for nighttime hours to avoid commuter disruptions. Unfortunately this invariably leads to sleeping disturbance for nearby residents. Experience has shown that people can tolerate one night of disruption; however, they will become much more upset after two nights of excessive noise. And after three nights they are increasingly likely to band together, complain to the police, contact their local elected representatives and the newspapers, and demand that the work be stopped.

Myth 2 – Construction Projects Don't Need to Follow Restrictions for Noise. While some local jurisdictions may have noise ordinances or other laws or standards that specifically exempt construction noise, these exemptions often have strings attached, such as limits on nighttime or weekend construction activity, which may or may not be consistent with project construction schedules. In addition, if a project falls under the policy or guidance of a state or federal agency that requires construction noise analyses and abatement, a local construction noise ordinance exemption will typically not relieve that obligation. Indeed, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA) the Federal Railroad Administration (FRA), the Federal Energy Regulatory Commission (FERC) and many other federal, state and local agencies specifically require construction noise and vibration analyses during the environmental phase of their projects (regardless of local exemptions).

Noise-control curtains being used to reduce noise emissions from a rock-drilling operation to the surrounding community.

Myth 3 – There Aren't Enough Tools or Resources to Adequately Evaluate Construction Noise. Actually, there is a significant amount of guidance manuals and other tools to assist in developing defensible construction noise and vibration analyses, including free resources from many federal and state agencies. The following offers some of our favorites:

- FHWA Highway Construction Noise Handbook (http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/)
- FHWA Roadway Construction Noise Model (RCNM) (http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/)
- FTA Transit Noise and Vibration Impact Assessment Manual, Chapter 12 (http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf)
- FRA High-Speed Ground Transportation Noise and Vibration Impact Assessment Manual, Chapter 10 (http://www.fra.dot.gov/eLib/Details/L04090)
- Caltrans Manual for Highway Construction Vibration (vibration only) (http://www.dot.ca.gov/hq/env/noise/pub/Vibration_Guidance_Manual_Jun04.pdf)
- Power Plant Construction Noise Guide (out of print, but still a helpful reference), Empire State Electric Energy Research Corporation, New York

It is important to realize that even though all of these references were developed for use on particular project types (highway, rail, power plants), the information that they reference and the methods that they outline are general in nature and lend themselves for use on a wide variety of project types. For example, a large bulldozer or pile driver generally creates the same amount of noise and vibration

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regardless of the project type.

Myth 4 – Construction Noise Cannot be Effectively Controlled. Construction noise is just sound that happens to come from construction activities; there is no reason it cannot be predicted, measured, controlled and managed just like any other type of noise. Some construction equipment or processes will be particularly noisy. These include impact and vibratory pile drivers, hoe rams, jackhammers, rock drills, vacuum excavator trucks, and blasting events (if needed). Therefore, use of this equipment should be carefully scrutinized for potential noise impacts prior to their use, and mitigation measures should be required on a *proactive* basis. Control measures could include avoidance of these devices at night, required use of low-noise equipment models, required use of alternative quieter methods, or required use of noise barriers. The bottom line is that the best form of noise control is to *avoid* making noise in the first place.

If noise complaints are being received, then project managers must have the ability to effectively react in a timely manner. This usually means having a trained noise technician on hand and ready to respond to investigate the circumstances and evaluate conditions in the field that led to the complaints. Noise measurements should be performed, or recorded noise data should be reviewed, to see if the contractor was exceeding noise limits. If exceedances are found, then project managers can feel confident directing the contractor to immediately implement effective mitigation measures, or cease work, without fear of being charged by the contractor with expensive claims for lost productivity and inefficiencies.

All reasonable and feasible construction noise mitigation measures should be considered for potential noise-reducing effectiveness, cost, and burden on the contractor to maintain. In general, mitigation measures can be applied at the noise *source*, along the *pathway*, and/or directly affecting the *receiver*. Examples include:

Source Controls

- Time constraints – prohibiting work during sensitive nighttime hours
- Scheduling – performing noisy work during less sensitive time periods
- Equipment restrictions – restricting the type of equipment that can be used
- Specialty products – special-purpose pads, liners and enclosures
- Noise emission limits – specifying equipment noise limits (i.e., L_{max} at 50 feet)
- Substitute methods – using quieter methods or equipment when possible
- Engine exhaust mufflers – ensuring equipment have quality mufflers installed
- Lubrication and maintenance – well maintained equipment will be quieter
- Reduced-power operation – use equipment of only necessary size and power
- Limit equipment on site – only have necessary equipment at work site
- Noise compliance monitoring – have a technician on site to monitor compliance
- Quieter backup alarms – manually adjustable, ambient-sensitive, or broadband alarms, or prohibition, providing an observer directs the vehicles' rearward motion

Pathway Controls

- Noise barriers – permanent or portable, wooden, metal, plastic or concrete barriers
- Noise curtains – flexible vinyl curtains hung from supports or draped over equipment
- Enclosures – encasing/enclosing localized and stationary noise sources
- Increased distance – perform noisy activities farther away from receptors or off-site

Receiver Controls

- Window soundproofing – installing double- or triple-pane windows or storm windows
- Air conditioners – allow windows to remain closed and provides background noise
- Receptor noise limits – cumulative noise limits at receptor locations (i.e., L_{eq} or L_{10})
- Community meetings – open dialog to involve affected public and share information
- Noise complaint process – ability to log and respond to noise complaints
- Temporary relocation to hotels – only in extreme, otherwise unmitigatable cases

Myth 5 – Contractors can be Trusted to Control their Own Noise. Experience has shown that it is a rare contractor who can be trusted to self-monitor and self-regulate its own construction noise. Unfortunately, doing so would most often be counterproductive to work schedule and efficiency. And like they say, "time is money!" When projects have allowed contractors to monitor their own noise, the results seem to invariably conclude that the contractor is working in full compliance with all regulations and limits, even when that's obviously not the case. Consequently, it is a far better arrangement to have the construction management team or an independent entity be responsible for monitoring contractor compliance in the field. But monitoring alone is useless unless it is done to evaluate compliance with a comprehensive construction noise specification upon which mitigation actions can be justified.

A well written construction noise specification is essential for being able to manage construction noise and to manage the contractor in the field once work begins. It must be fair and balanced, meaning that it allows for the necessary work to be performed while also protecting the public from unreasonably excessive noise. The specification should clearly state, for the benefit of the contractor and the affected public alike:

- Exactly what equipment or activity restrictions will be in effec
- The noise criteria limits that will be enforced
- The requirements for developing noise control plans
- Expected capability of noise mitigation measures
- The means and methods by which the contractor will be evaluated for compliance, including payment or punishment.

This way the contractor knows what to expect going into the project and can account for it in the competitive bid price. Once a contractor wins the job, they then "own" the responsibility to comply with the noise specification.

Construction noise specifications should be "performance-based" specifications, meaning that the contractor is free to perform the work as they see fit and to find their own solutions so long as they comply with the noise limits and restrictions in the specification. Project officials should not be directing the contractor on how to mitigate excessive noise, otherwise the contractor can be excused from blame if the methods don't work as hoped. The bottom line is that the contractor is responsible for complying with their noise specification limits, and if they fail to do so, they can be financially punished or work can be temporarily halted.

Construction noise criteria should combine limits for both steady (continuous) noise as well as short-term (transient) noise. For example, the L_{eq} or L_{10} noise metrics, expressed in A-weighted decibels (dBA), have been shown to work well at regulating continuous construction noise when evaluated (averaged) over a period of an hour or less. This time duration allows for a timely response to noise complaints yet is not overly sensitive to occasional short-term loud noises the contractor may produce. To address impulsive noises, a short-duration metric such as the L_{max} should be specified as well. These limits should be evaluated at community receptor exterior locations for ease of monitoring.

Absolute noise limits or relative increase noise limits (e.g., background plus 5 dBA) can be specified providing they allow for the necessary work to advance while also providing the community with the protection required. It is also suggested that separate noise limits be established for daytime and nighttime periods, because background noise conditions can vary dramatically throughout a 24-hour period. Finally, noise limits can be tailored somewhat to the sensitivity of the receptors, meaning that less stringent limits can be applied to industrial or commercial receptors, while more restrictive limits can be applied to residential receptors.

Bonus Myth – There is no Way to Mitigate Noise From Pile Driving. Pile drivers, when present, are typically the loudest noise source on a construction site, but they do not necessarily have to

operate without effective noise control measures. Reducing noise from pile driving benefits not only the community but also laborers on the job site as well. Options to consider for controlling pile driver noise and related noise reduction benefits could include the following:

- Pre-auger or pre-trench the pile holes to loosen the ground (–5 to 10 dB).
- Use a nylon or rubber pile cap cushion on top of the piles (–5 to 10 dB).
- Use a bellows system around the pile as a noise enclosure (–15 to 20 dB).
- Use temporary noise barriers mounted close to the pile driver –5 to 10 dB).
- Use a vibratory pile driver instead of an impact pile driver (varies depending on pile and soil types).
- Use a hydraulic pile driver instead of an old diesel pile driver (–5 to 10 dB).
- Use a different system altogether such as slurry walls or a hydraulic pile pusher.
- Restrict the time of day when pile driving operations can occur.

References

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4. *Power Plant Construction Noise Guide*, Empire State Electric Energy Research Corp., New York, May 1977.
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