

Total new units: ~1,164 (~2500 new residents / 1,160 vehicles)

Future Residential

Developer: Hoyt Street Properties

1420 Pearl Apartments

Developer: Mill Creek Residential, Dallas, Texas

8 stories - 269 units.

Abigail Income Restricted

Developer: Bridge Housing

6 stores - 142 units



Parker Apartments

Developer: Robert Ball, Ascor Pacific

Lorentz Brunn Construction

6 stories - 177 units.

165 below grade parking spaces

Complete Summer 2014

Overton Apartments

Developer: Unico Properties, Seattle/

Anderson Construction

26 stories - 275 units
271 below grade parking spaces

Block 17 Apartments

Developer: Wood Partners/

Andersen Construction

16 stories • 280 units
280 below grade parking spaces

Phase 1 complete June 2015
Phase 2 complete December 2015

Park Central Condos

Developer: Hoyt Street Properties/

Anderson Construction

28 stories + 165 units
173 below grade parking spaces

Construction begins August
Pre Sales September 2014

Pile Driving: It's Impact on Community Health, Well-being and Productivity

compiled by Patrice Hanson
(Bullet Points of Highlights- details within)

- **Effects of noise and vibration from pile driving:**

Noise from pile driving has been calibrated at 101dB and above.

Sounds above 50dB cause annoyance.

Sounds above 55dB cause serious annoyance.

Sounds above 85dB are harmful.

The effect of noise on the listener increases exponentially and a 10 decibel reduction of noise is experienced as half as loud.

High intensity intermittent sound produces discomfort, instability, distraction, changes in blood pressure, respiration, heart rate, pulse, etc.

Stress from noise has been increasingly linked to illness.

- **Effects on children:**

Above 85 dB can cause permanent hearing loss

- **Noise level tables and OSHA Noise Level Tables**

- **City Policy on noise and current construction noise ordinance:**

City policy intends minimal exposure of citizens to negative impact of excessive noise. Pile driving is exempt from noise regulation

- **Stories of impact on residents of the Pearl**

Pile Driving: It's Impact on Community Health, Well-being and Productivity

compiled by Patrice Hanson

(Items in parentheses are comments by Patrice Hanson-May 2014)

Dealing with Vibration and Noise from Pile Driving by W. Allen Marr, P.E.

"Studies by the World Health Organization have shown that the majority of people become moderately annoyed by steady, continuous sound levels above 50dB(A) and seriously annoyed at continuous sound levels above 55dB(A).

In today's urban world, people demand a secure environment free from annoyance. Contractors must develop means to manage the vibration and noise problems produced by pile driving: (they offer two of the following suggestions in addition to others)

- 1) Education-People that may be impacted by pile driving need to be informed in advance of the planned activities and what the impact to them may be.
- 2) Abatement-Try to reduce the time required by pile driving.
Use noise shrouds or curtains to reduce noise levels by 15-30 decibels"

(Reduction of decibels is important as the effect on the listener increases exponentially as decibels increase. Even a 10 decibel decrease can make a significant difference.)

Pile Driving Noise by Weiland Acoustics

"Considering that the human ear perceives a 10 dB reduction of noise as half as loud, this will give you some idea of the relief provided by a 20 dB decrease. That's the good news."

Database: PsycARTICLES

[Journal Article]

The effects of high intensity intermittent sound on performance, feeling and physiology.

Plutchik, Robert

Psychological Bulletin, Vol 56(2), Mar 1959, 133-151

Abstract

1. There has been in recent literature some evidence indicating that intermittent sound as opposed to steady sound sources has a more disturbing effect. This paper includes those studies which have appeared since 1950 and indicates that high intensity or intermittent sound generally produces symptoms of discomfort, instability, and distraction. In addition decrements in performance may be related to the level of the sound as well as its intermittency. Changes in blood pressure, respiration, EEG, pulse rate, etc., as a result of sound have been reported in some studies. Some theoretical issues are included in the discussion. 80 refs. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Noise Pollution: A Modern Plague

Lisa Goines, RN, Louis Hagler, MD
South Med J. 2007;100(3):287-294.

"Domestic tranquility is one of the six guarantees in the United States Constitution, a guarantee that is echoed in some form or other in every state Constitution. In 1972, the Noise Control Act was passed by Congress, declaring, ... it is the policy of the United States to promote an environment for all Americans free from noise that jeopardizes health and welfare."

"In residential populations, combined sources of noise pollution will lead to a combination of adverse effects such as impaired hearing; sleep disturbances; cardiovascular disturbances; interference at work, school, and home; and annoyance, among others. These effects are the result of stress from noise, stress that has been increasingly linked to illness.

Vulnerable groups, generally underrepresented in study populations, include patients with various diseases, patients in hospitals or those who are rehabilitating from injury or disease, the blind, the hearing impaired, fetuses, infants and young children, and the elderly. Because children are particularly vulnerable to noise induced abnormalities, they need special protection."

Noise pollution: non-auditory effects on health

Stephen A Stansfeld and Mark P Matheson

"It is likely that children represent a group which is particularly vulnerable to the non-auditory health effects of noise. They have less cognitive capacity to understand and anticipate stressors and lack well-developed coping strategies. Moreover, in view of the fact that children are still developing both physically and cognitively, there is a possible risk that exposure to an environmental stressor such as noise may have irreversible negative consequences for this group."

Dangerous Decibel Level for Babies

by Renee Miller,

"A general rule you can follow is that if a noise makes it difficult to hear conversation at a normal volume, then it could damage your child's hearing. To understand how loud this is, keep in mind that a normal conversation is about 60 decibels. If you have to raise your voice to be heard, or the sound is loud enough to make hearing difficult for you, then it is likely too loud for your baby."

(Decibel levels of 109 were measured by Paul Van Orden, Noise Control Officer, in The Fields Park)

Noise-Induced Hearing Loss in Children: American Academy of Otolaryngology:

"Above 85 decibels can produce permanent hearing loss."

More from: **Noise Pollution: A Modern Plague:**

"Average outdoor residential day-night sound levels below 55 dB were defined as acceptable by the EPA; acceptable average indoor levels were less than 45 dBA. Sound levels above this produce annoyance in significant numbers of people.

The results of annoyance are privately felt dissatisfaction, publicly expressed complaints to authorities (although underreporting is probably significant), and the adverse health effects already noted. Given that annoyance can connote more than slight irritation, it describes a significant degradation in the quality of life, which corresponds to degradation in health and well-being."

"Noise levels above 80 dB are associated with both an increase in aggressive behavior and a decrease in behavior helpful to others"

"Annoyance increases significantly when noise is accompanied by vibration or by low frequency components."

"The term annoyance does not begin to cover the wide range of negative reactions associated with noise pollution; these include anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion. Lack of perceived control over the noise intensifies these effects."

"Noise makers and the businesses that support them are as reluctant as smokers to give up their bad habits. Legislators at all levels should protect us from noise pollution the same way they protected us from tobacco smoke and other forms of pollution. It is clear that laws can change behaviors in ways that benefit society as a whole."

18.02.020 Policy Statement. Title 18 Noise Control:(Added by Ordinance No. 175772, effective August 1, 2001.) It is the intent of the City Council to minimize the exposure of citizens to the potential negative physiological and psychological effects of excessive noise and protect, promote and preserve the public health, safety and welfare. It is the intent of the City Council to control the level of noise in a manner that promotes the use, value, and enjoyment of property, conduct of business, sleep and repose and reduces unnecessary and excessive sound in the environment.

Portland Construction Noise Ordinance:

From 7:00 am to 6:00 pm, Monday through Saturday, the City permits a very liberal standard for construction noise (85 dBA at a 50' distance). This means that, provided your equipment is in good repair and muffled (if possible), it will be compliant. The few kinds of equipment that cannot meet this level – (for example: jack hammers, concrete saws, and pile drivers) are exempt from the standard during this period."

Stories of the Effects of Pile Driving

Since the construction began I've been mildly irritated..... I try to be zen and I've been making the most of a poor situation by going to bed earlier and getting up earlier, but I have been in disbelief since the pile driving began - especially on the weekends when so many people are at home! It drives me batty and there's no escape from it. Even with my efforts to change my sleep schedule to accommodate construction last week was so busy I couldn't keep their hours and I was so sleep deprived, I came home from work Thursday at about 6, fell asleep immediately and slept straight through until they began pile driving the next morning - that was about 14 hours of sleep.

Now that I know there are other options they could be using I'm just shy of infuriated. Thinking about this construction going into the summer, and over the next few *years*, as well, being unable to open my windows. Portland is about doing better. -Lea

My apartment has been rocked and my cable service has been disrupted 3 times in two weeks.

I know this is going to continue, and even though we are so happy to see the neighborhood grow, but this way it feels worse than anything imagined.
-Charles

The construction in our neighborhood has had a huge impact on my life and well being. My apartment is MAYBE the minimum of 50' from and facing the construction. When they are driving I cannot be in my home, even with ear plugs. My apartment is jolted with such force that it rattles the glasses in the hutch.- Maura

I live in the Sitka Apartments, overlooking 11th Street, between Overton and Northrup. I am on the 2nd floor. As a freelance writer, I spend most of my days at home. Since Andersen Construction started pile driving on Block 17, this means many of my work hours are spent finding ways to drown out the noise, and many times, finding somewhere else to get my work done, when the constant pounding and shaking becomes too much. My work includes movie reviews, and watching films at home, that I can barely hear. Now that the weather is warm, I can't open my windows to get air lest the hammering fill the whole room. The construction has affected my sleep patterns, waking me up every morning in a most unpleasant manner, making it hard to transition out of sleep and into my day. Depending on where the pile driver is positioned, the sound travels up Overton to the buildings just past 10th, and then echoes back, creating a doubling effect and an inescapable cacophony. Escapes to the public park are impossible, as the noise there is unbearable. When I go on my jog, I can hear the noise

all the way up to Thurman and 17th and down to the waterfront. These people have taken over life for blocks upon blocks. There's little escape. It's hard to sleep, it's hard to think, I go between feeling trapped in their bubble and being run out of my own apartment. It's the very definition of "unsettling." - Jamie S. Rich

The pile driving is quite disruptive to my concentration. I work from home using a computer and the phone all day. And now into the night. My wife and I live in the West building. Sixth floor facing Northrup. The pounding and shaking begin around 8 am each morning and go throughout most of the day...every 20 minutes or so, a 10-15 minute pounding and shaking cycle begins as another steel pole is driven into the ground. Impressive sight to watch. But very disruptive to my work efforts. I cannot concentrate during a pile driving cycle. Work productivity slows during the day and I have to work into the night to catch up. During client calls I have been asked what the rhythmic hammering sound is. They are amazed I accomplish any of their project objectives. And my calls are done with the window tightly closed. I would like to keep the window open all day...but shut it at the beginning of each cycle. Now as the weather warms up I live with my office being hot and stuffy at times throughout the day!

-Brad Dong

The pile driving that takes place six days per week across the street from my residence is extremely disruptive to my daily life. I notice that I, and my neighbors, are more emotionally on edge and more agitated in general. Urban living can already be stressful for many community members, and the increased, un-regulated noise resulting from the pile driving exacerbates that stress.

The raising of voices regarding extreme construction noise in the Pearl District is about community values. A community is an interdependent group of people based on mutual respect. This is not an "us (residents) vs. them (developers)" situation – this is an opportunity to address how all community members (workers, children, elderly, developers, investors, pet owners, city officials, et al) may be best served.

-Mark Woodlief

I for one am suffering from headaches and spastic nerves and muscle spasms from the endless impossible pounding. I am a pretty calm person and already at 8:40 am I can feel the tension and my muscles tightening. I was at the chiropractor yesterday and twice last week, it helps for a while then I return to this. Personally as a heart patient I try so to remain calm this so doesn't help.-anonymous

My name is Isabella Giordano, I am 23 years old and currently live at the Sitka. Every morning I am rudely awakened by my apartment shaking. Once this awful sound starts I am no longer able to sleep and lie in bed listening to the repeated pounding until I have to get up for work. I think it goes without saying that my work performance is being affected because I'm so incredibly tired and aggravated. The Sitka is the perfect building for me because I can only afford low income housing and it is close to my job that I have been at for four years. If the ludicrous and absolutely unnecessary construction begins of the 28 story building in the lot across from me, and the already existing construction behind me continues I will be forced to leave. No person can live in such unbearable conditions. The noise would be abusive. I feel that it is mentally and physically affecting me, my neighbors, children, pets, and the community. Please help.

Six weeks ago I was a different person. I was calm and reasoned well, I was making future plans. Within the last six weeks that has changed on mentally and physically to where I have difficulty maintaining my patience, my sleep has radically changed from deep to a few hours at a time, my low-blood pressure is now 15-20 points higher than normal, and my hands sweat every time the pile driver booms into the ground.

My neighbor's dog whines and yaps all day to it out of frustration; my cat hates me because it can't nap during the day and my mind is foggy all the time too. There are days when I'm out somewhere and I feel oddly dizzy and fatigued and it frightens me a bit. And some days indoors when the pounding (physically visceral -- vibrating) is literally endless I feel like screaming back. We have two more weeks and I'm worried that it will have more than a side effect on my health.

The continuous vibration during the day makes it impossible to nap and that is not good.
-Jen Elliott

I join my fellow residents in the Pearl in expressing my deep concern for the absolute shattering of my quality of life in the Pearl. To the construction people, or should I say the destruction people, in your zeal to complete the buildings you are assigned to do, there has been no regard for the people who live with this on a daily basis. If you think we are going to give up on asserting our rights, you are very much mistaken.
-BTS

I have been recovering from recent spinal surgery and am still in almost constant severe pain. Because I don't sleep well, I usually need to sleep in quite late in the morning, as well as take daily naps. Both have been impossible due to the endless horrible noise and vibrations from the pile driving. Consequently, my doctor has put me on additional medication for both my nerves and exhaustion. I have also started suffering from severe migraine headaches, my first in over thirty years, and am being treated for them as well, with additional medication. The combination of chronic exhaustion and severe migraines has just about pushed me over the edge, and is dramatically slowing my

recovery. I am also receiving additional help from my physical therapist because the back muscles surrounding my incision have become so tight from the constant tension, and my hearing aids "squeal" painfully whenever I go to my car, because the noise in the garage is so over-powering.-Susie Mize

The deafening noise is just one of the many deleterious effects of pile driving. Not only has it severely impacted my quality of life but also it has infringed on my livelihood as well. As a writer, the majority of my work requires a great deal of quiet time to formulate sentences into concepts that convey the essential sentiments of my clients. The insufferable resounding of the pile driver, deprives me from my ability to concentrate for any significant length of time. The incessant reverberation affects not only my bookcases, shaking them but also my entire body is subjected to the earsplitting noise and vibration, hour, after hour, approximately 10 hours for 6 days a week. I have never been an anxious person but since this construction fiasco has commenced, hitherto, my anxiety level has risen exponentially; this effect I gravely attribute to the outdated mechanism, the city of Portland has willfully condoned to use for this construction project. Finally, I quake with panic at the thought of going forward for the duration of the remainder of the year, as there approximately will be 4-5 more construction projects slated for development in this area; these projects will all necessitate the use of this noise polluting contraption. For a city that uses and prides itself on the slogan "the city that works", I unfortunately feel this method is not working; and regrettably I feel bullied into accepting and tolerating the loss of the sanctity of my quality of life because of it.
-Grace Forrester

I am a stay-at-home Dad and my daughter has a tough time with the noise. Once we were out walking and we were on the corner of Overton and 12th when the pile driving started without a warning. It startled me and her. She would not stop crying for a while after that. I don't like the idea that it could be affecting her hearing. I avoid going outside when the pile driving is going on, but it is inevitable. - Tommy Beck

My blood pressure is normally low at 120/70 or less. With the start of pile driving, it has gone up to 135/91 which is pre-hypertensive. My doctor prescribed anti-anxiety medication. Normally I do not take any medication.- P. Hanson

Five Myths of Construction Noise

Paul L. Burgé, URS Corporation, La Jolla, California

Erich Thalheimer, Parsons Brinckerhoff, Boston, Massachusetts

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.

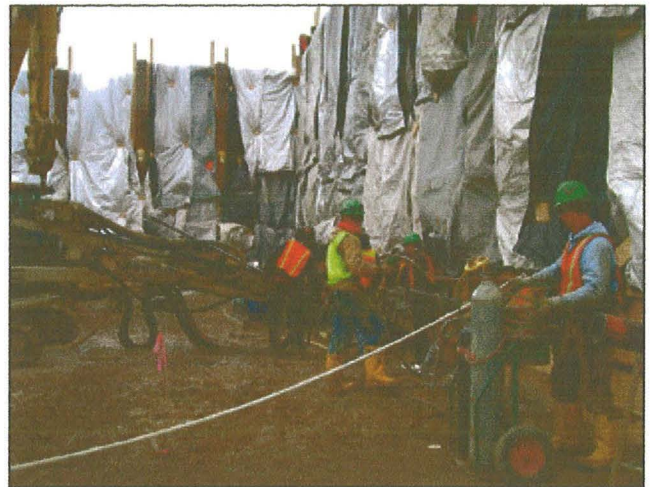
Myth 1 – Construction Noise is Just a Temporary Nuisance.

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



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

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).

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

Based on a paper presented at Inter-Noise 2012, the 41st International Congress and Exposition on Noise Control Engineering, August 2012.

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 loca-

tions (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 effect
- 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).

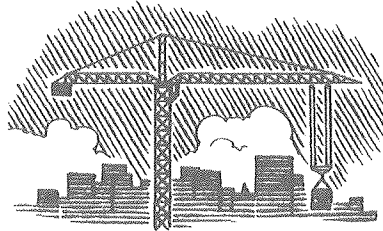
- Use a different system altogether such as slurry walls or a hydraulic pile pusher.
- Restrict the time of day when pile driving operations can occur.

References

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2. *FTA Transit Noise and Vibration Impact Assessment*, U.S. Department of Transportation, Federal Transit Administration, FTA-VA-90-1003-06, May 2006.
3. *Transportation- and Construction-Induced Vibration Guidance Manual*, Jones & Stokes, J&S 02-039, Prepared for California Department of Transportation, Noise, Vibration, and Hazardous Waste Management Office, Sacramento, CA, June 2004.
4. *Power Plant Construction Noise Guide*, Empire State Electric Energy Research Corp., New York, May 1977.
5. E. Thalheimer, "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project," *Noise Control Eng. J.* Vol 48, No 5, pp. 157-165, September-October 2000. **SV**

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Parsons, Susan

Subject: FW: June 25th City Council public testimony

From: Mary Sipe [mailto:maryesipe@gmail.com]

Sent: Monday, June 16, 2014 5:30 PM

To: Parsons, Susan

Subject: Re: June 25th City Council public testimony

My presentation is about Alternatives to Impact Hammer Pile Driving Method and amending City Code Title 18 Noise Control as it relates to Construction Activities and Equipment.

Mary

From: Mary Sipe [mailto:maryesipe@gmail.com]

Sent: Friday, June 13, 2014 10:28 AM

To: Parsons, Susan

Cc: Maura Jess

Subject: Re: June 25th City Council public testimony

Susan,

As you requested, I am confirming that I will present public testimony at the City Council Meeting on June 25, 2014.

Thank you for accommodating the change.

Mary Sipe

Request of Mary Sipe to address Council regarding overview of pile driving
(Communication)

JUN 25 2014

PLACED ON FILE

Filed JUN 20 2014

LaVonne Griffin-Valade
Auditor of the City of Portland

By 

COMMISSIONERS VOTED AS FOLLOWS:		
	YEAS	NAYS
1. Fritz		
2. Fish		
3. Saltzman		
4. Novick		
Hales		