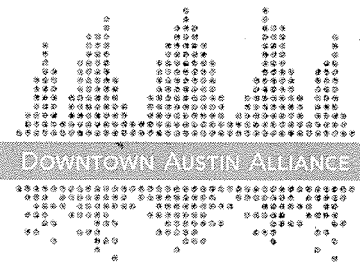


**DOWNTOWN AUSTIN ALLIANCE**  
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512.469.1766

www.downtownaustin.com



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Preserving and Enhancing the Value  
and Vitality of Downtown Austin

June 5, 2015

Council Member Gregorio Casar  
City of Austin  
P.O. Box 1088  
Austin, Texas 78767

Planning & Neighborhoods Chair Casar,

Re: DAA Support for City Staff Concrete Pours Position  
June 9, 2015 Planning & Neighborhoods Committee Agenda Item 4

The Downtown Austin Alliance appreciates your consideration of our position on after-hours concrete installation in downtown. After participating in the stakeholder process, the Alliance revised its position to reflect the approach of limiting noise, not hours, and to reduce the allowed noise level after 2:00 a.m. However, since city staff recommends a different structure because of the complexity of setting and enforcing decibel limits, we are in support of the staff recommendation as a compromise. We are joined in this position by the Real Estate Council of Austin, Texas Aggregates and Concrete Association, and the Austin Chapter of the Associated General Contractors of America.

As downtown is both a commercial and residential neighborhood, with about 11,000 residents and 123,000 daytime employees commuting in from all parts of Central Texas, this is a complex issue with many priorities to balance. We are sensitive to the needs of downtown residents and their desire to sleep at night. However, there are several unintended consequences that could occur if deliveries are shifted solely to the daytime, including traffic impacts to daytime businesses and pedestrians, worker safety in the Texas summer heat, non-attainment of emissions and ozone limits, and cost and construction duration implications for limiting construction activity.

The stakeholder process to seek solutions to this difficult issue was fair and thorough. We are hopeful that the proposed compromise will satisfy affected parties on both sides and ask that you support the city staff position.

Sincerely,

Jerry Frey, Chair





March 20, 2015

Re: Concerns over the Downtown Commission recommendations for Concrete Pouring Ordinance

Dear Commissioner Sher:

On March 18, 2015, the Downtown Commission passed recommend language in an effort to amend the temporary ordinance<sup>1</sup> prohibiting concrete placement in the downtown business district. Prior to this meeting, TACA had submitted alternate language (attached) that was developed after 12 hours of listening and participating in stakeholder meetings. The alternate language submitted by TACA was done as a balance between the downtown business district residents and the commercial construction community.

While the Downtown Commission may have used our suggested framework to develop a performance based ordinance, they did not use any of our suggested time frames nor actual noise levels based on actual measurements taken by City of Austin staff. As a result, there are several aspects of the Downtown Commission's recommendations that are creating serious concern for the construction community, and as a result will create immediate and severe negative impacts for the City of Austin in the downtown business district.

Below are some of those concerns and impacts as related to key aspects of the downtown Commission's recommendations:

**DOWNTOWN COMMISSION'S  
PROPOSED LANGUAGE:**

*Set decibel maximum of 75 dBA for construction activity between 10:00 p.m. and 2:00 a.m. measured from the construction boundary line.*

**CONCERNS:**

- If construction activity is being done in the Entertainment District, (which is still located in the business district) the noise level can be up to 85dB for a music venue at the property line<sup>2</sup> until 2:00AM but for construction activity, it has to be 75dB after 10:00PM. This is not consistent with current COA ordinances. Furthermore, it is unnecessarily restrictive on construction activity because the problem —noise—still exists. If 85dB is a reasonable sound limit for music venues, why is it too loud for concrete and related construction activity?

<sup>1</sup>City of Austin Code §9-2-3(A)(3). It is not abundantly clear whether the Downtown Commission intends to reference all construction activity or solely concrete installation. We assume that the Downtown Commission does not intend to expand the scope of the temporary ordinance that was the subject of the stakeholder meetings to all construction activity given the restrictive limits in its proposal.

<sup>2</sup>City of Austin, Tex., Code of Ordinances § 9-2-4(1).



- What is the actual basis for the 75dB during this time period, when other activities are allowed to go to 85dB? As reported during the stakeholder meetings and previous Downtown Commission meetings, the noise from the concrete trucks and concrete pumps were greater than 80dB.

**DOWNTOWN COMMISSION'S  
PROPOSED LANGUAGE:**

*Set decibel maximum of 65 dBA for construction activity, under special circumstances, from 2:00 a.m. to 6:00 a.m. measured from the limits of the construction boundary line.*

**CONCERNS:**

- Arbitrarily setting the limit at 65dB (without consideration of the actual input from the construction or concrete industry) **effectively eliminates the possibility of concrete installation during these hours**. As a consequence all this activity will now shift to the daytime hours.
- What does “special circumstances” actually mean? The current practice is to deliver concrete during early morning hours in an effort to minimize congestion, provide a quality product, improve worker safety, lower costs, improve air quality, etc. Do these factors qualify as “special circumstances? If not, this **effectively eliminates the possibility of concrete installation during these hours**. As a consequence all this activity will now shift to the daytime hours.
- Establishing such a low threshold of 65dB, which is below the actual levels reported by the COA staff, all but guarantees that concrete delivery will cease at night. As a result, it will shift to the daytime hours, starting at 9:00AM when the transportation permit<sup>3</sup> allows for trucks to be staged in the streets.
- This also means that COA will also not be able to handle street repairs or municipal repairs or construction within the downtown business district as they will not be able to comply with these limits.
- Once the concrete work shifts to the daytime hours, the construction activities currently conducted during the day will shift to the night time hours, during which time there is no sound limit for such activity. Effectively, noise will continue at night, and under this proposal is allowed as long as it is neither concrete delivery nor placement. If the original root cause was a noise complaint, this language does NOT solve that actual problem. Because the language uses the terms “construction activity” interchangeably with “concrete installation” it is unclear as to the intent. Does this mean all construction activity of which concrete installation is a part? There needs to be some very clear and specific language (definitions) as to what constitutes these types of collective or discrete activities.

---

<sup>3</sup> City of Austin, Tex., Transportation Criteria Manual § 8.5.3(A)(1).



**DOWNTOWN COMMISSION'S  
PROPOSED LANGUAGE:**

*Projects for which an application for building permit has been submitted to the city as of the date the new ordinance is adopted shall be grandfathered for the first three months and then subject to the new ordinance.*

**CONCERNS:**

- If this were to be adopted on April 1, this means that the grandfathering would expire on July 1, placing all concrete work during daytime hours, during the hottest part of the year, severely increasing the safety risk and health of the construction workers that will be delivering and installing concrete.
- The construction costs for downtown projects have been developed or bid based upon a construction schedule that does not account for the new ordinance. When all the concrete installation shifts to the daytime hours, construction schedules will be drastically altered, thereby increasing costs, as contractors and owners work to revise the construction schedule and implement necessary measures to comply with this ordinance. Contractors are not going to be able to satisfy their existing contractual obligations, resulting in costly delays.

I would strongly urge you to consider the direction and approach we suggested with our language in an effort to reach a more balanced approach to solving this issue. The current language from the Downtown Commission does not solve the problem in a balanced manner. In fact, it so severely limits the construction community, which overnight concrete pours will effectively cease. Consequently, there will now be a dramatic increase in construction traffic during the daytime hours in downtown Austin, the safety risks for workers will increase, commercial businesses will be negatively impacted, construction projects will now take longer, and costs will increase.

We would be more than happy to assist in providing data, facts, or other helpful evidence to prepare a more reasonable and practical language for this ordinance.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

Rich Szecsy, PhD, PE  
President



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winstead.com

*DRAFT DOCUMENT – FOR DISCUSSION PURPOSES ONLY*

## **§ 9-2-1 - DEFINITIONS.**

"Construction Activity" means any commercial or individual activity designed to build, construct, demolish, erect, any portion of a building, residence, municipal, civil, or other structure, object, or item.

## **§ 9-2-3 - GENERAL RESTRICTIONS.**

(A) A person may not:

(3) ~~conduct Construction Activity~~ operate a machine that separates, gathers, grades, loads, or unloads sand, rock, or gravel within 600 feet of a residence, church, hospital, hotel, or motel between 7:00 p.m. and 6:00 a.m., except for the installation of concrete as authorized under ~~Section 9-2-21~~ Section 9-2-15 (Permit for Construction Activity Concrete Installation During Non-Peak Hour Periods);

## **§ 9-2-14 - RESTRICTIONS ON PERMITS IMPACTING RESIDENTIAL PROPERTIES.**

(B) The accountable official may not issue a permit for use of sound equipment within 100 feet of property zoned and used as residential, except as authorized under ~~Section 9-2-21 (Permit for Concrete Installation During Non-Peak Hour Periods)~~, Chapter 8-1, Article 4 (Restrictions on Amplified Sound), or Section 14-8-34 (Permit Required for the Use of Sound Equipment).

## **§ 9-2-15 - RESTRICTIONS ON MULTIPLE PERMITS FOR A SINGLE PROPERTY.**

(A) Except as otherwise provided under Chapter 8-1, Article 4 (Restrictions on Amplified Sound) or ~~Section 9-2-21 (Permit for Concrete Installation During Non-Peak Hour Periods)~~, the accountable official may not issue more than one sound amplification permit under this chapter for the same site or property within 30 days.

## **§ 9-2-21 - ~~PERMIT FOR CONSTRUCTION ACTIVITY~~ CONCRETE INSTALLATION DURING NON-PEAK HOUR PERIODS.**

(A) Subject to the limitations in Subsections [subsections] (B), ~~and~~ (C) ~~and~~ (D) of this section, ~~a person may conduct Construction Activity~~ the director may issue a permit authorizing an applicant to deliver, finish, place, or pour concrete during the non-peak hour period of 7:00 p.m. to 6:00 a.m. at property that is located within:

(1) the Downtown Density Bonus area identified in Section 25-2-586(B) (Downtown Density Bonus Program) and one of the following zoning districts:

(a) the Central Business District (CBD) base zoning district; or [and]

(b) the Public (P) zoning district; and

(2) 600 feet of a residence, church, hospital, hotel, or motel.



(B) ~~The director may issue a permit under subsection (A) of this section only if the director determines that the delivery, finishing, placement, or pouring of concrete during non-peak hour periods is in the interest of public health, safety, or welfare or is justified by urgent necessity.~~

(C) ~~A permit issued under this section must state the duration during which the authorized activity may occur, which may not exceed 72 hours.~~

(D) In addition to information required by Section 9-2-12 (Application Requirements), a person intending to conduct Construction Activity an application to deliver, finish, place, or pour concrete during non-peak hour periods must notify the director of the proposed activity and provide under Section 9-2-22 (Restrictions on Permit) must include:

- (1) the name, address, and telephone number of the person intending to conduct Construction Activity applicant;
- (2) the address or a description of the location of the property where the work will be performed; and
- (3) the amount of time, up to 72 hours, needed to complete the work and the reason why the work cannot be completed during normal business hours.

(C) To mitigate possible impacts and minimize disruptions to adjacent residential and commercial uses, the director shall require the person intending to conduct Construction Activity to:

- (1) contact adjacent property owners located next door or across the street, and representatives of property owners or residents within 600 feet, to inform them when the non-peak Construction Activity will occur and the duration of the project;
- (2) provide 24-hour contact information for the individual with primary responsibility for the project to adjacent property owners located next door or across the street, to representatives of property owners or residents within 600 feet, and to city staff; and
- (3) provide a sound and light mitigation plan, which must:
  - (a) identify where vehicles related to Construction Activity will queue to ensure minimal disruption to adjacent residences and businesses and, if necessary, relocate them to a location that will minimize disruption to adjacent residential uses;
  - (b) shield after-hour lighting associated with Construction Activity from adjacent residential uses; and
  - (c) require such other actions as the director determines are reasonably necessary to protect public health, safety, and welfare and to ensure reasonable expectations of a sound environment that does not preclude sleep.



(D) In no event shall this section authorize a person to conduct Construction Activity between 2:00 a.m. and 6:00 a.m. in excess of 75 decibels, as measured at the property line of the work site except in special circumstances of limited duration.

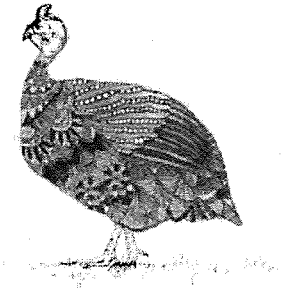
(E) If an application for a building permit was submitted prior to December 1, 2014, the director shall:

(1) permit the Construction Activity associated with that building during the non-peak hour period of 7:00 p.m. to 6:00 a.m. under the ordinances in effect when the application for building permit was submitted; and

(2) require a sound and light mitigation plan, as provided in Subsection (C)(3) of this section.

*\*\*Note, these changes are shown as compared to the permanent ordinance that will be in place when the 120-day ordinance expires.*





**Rainey Neighbors Association**

Bonita White  
Villas On Town Lake

Kathryn McMahon  
Milago

Andre Suissa  
The Shore

Brooke Schumacher  
Windsor on the Lake

Don Grillo  
Towers of Town Lake

Augustin Cherg  
Milago

Clif Steed  
The Shore

Doug Kissner  
Towers of Town Lake

Phyllis Fletcher  
Villas On Town Lake

March 18, 2015

To Whom It May Concern:

The Rainey Neighbors Association Board represents the almost 2,000 residents in the Rainey neighborhood with the borders of Waller Creek, Cesar Chavez, I-35 and Lady Bird Lake. Construction has become a way of life for us with the building in recent years of the Milago, the Shore, Windsor, SkyHouse, Millennium Rainey (ongoing), Van Zandt Hotel (ongoing), Kimber Modern Hotel (ongoing) and other developments in the works. The 1000 plus room Fairmont Hotel recently broke ground and Waller Park Place which is the largest private real estate development in Austin is slated to begin construction shortly. Waller Park Place is in our neighborhood on the west side of Red River Street and the Fairmont is just across the street on the north side of Cesar Chavez.

We provided input on the late night concrete pour issue last November 20<sup>th</sup> in which we supported the DANA position regarding the establishment of measurable sound and light limits for late night concrete pour activities. Additionally, we supported the use of an application for construction activities during non-peak hours similar to the application for an amplified sound permit along with proper notification to affected areas. However, we indicated we would like to hear more input from other stakeholders before making a comment regarding a limit on construction activities to the hours of 6:00 A.M. to 10:00 P.M. and allowing concrete pouring outside of these hours only for extraordinary circumstances.

We have now had an opportunity to attend additional stakeholder meetings and to further refine our thinking regarding this issue.

First, we would like to make the observation that with 13,000 residents now living downtown and an objective to increase that number towards a diverse population totaling 25,000 people it is vital that the City Council begin to consider what steps are required to ensure a high quality of life for those residents in light of other, potentially conflicting priorities. These include how to continue the rapid build out of new residential buildings, the ever increasing demand for more cocktail lounge based amplified music permits to support our brand image of "the live music capital of the world", and the desire to market the city for multiple festivals and special events involving numerous street closings and additional temporary amplified music permits. Over time we are likely to see other quality of life impacts resulting from high density and rapid growth. This discussion about how to allow late night/overnight concrete pours to take place with a minimal impact to the residents already downtown is perhaps the catalyst to generate a larger discussion going forward.

That said we have the following comments to make regard the concrete pour ordinance:

- Allowing late night/overnight concrete pours and other construction activities will result in shorter construction schedules – the chaos ends sooner – and minimizes the traffic congestion that would otherwise be increased if concrete trucks were required to deliver during normal business hours.
- The quality of life for downtown residents must be protected during late night/overnight concrete work through the establishment of a reasonable sound and light limits. Further research needs to be conducted to establish the number value for such limits, but in the case of a sound limit the measurement standard to be used must be the C weighting scale because it better reflects the potential disruption associated with low frequency impact noise. Further, it should be recognized and accepted that whatever the numerical value that is selected for the limit there will be some small portion of the residential community who are more sensitive than the norm and will find the concrete pour activity to be personally disruptive. (It is important to note that in the Rainey neighborhood we have a 75 decibel limit for amplified music instead of the 85 decibel level in much of downtown. Also the hours for amplified music are until 10:30 P.M. on Sunday to Wednesday, until 11:00 P.M. on Thursday, and midnight on Friday and Saturday. We mention this because some in the construction industry have recommended the standard used in the entertainment districts of 85 decibel level allowed until 2:00 A.M.).
- There must be an effective, reliable, and consistent assessment of compliance by those groups requesting a late night/overnight concrete pour permits and when violations are found there must be a penalty that is severe enough to be a credible incentive to stay in compliance. It should be recognized that the City of Austin has very limited resources with expertise in acoustical testing and light pollution and the enforcement of limits for those characteristics. We suggest that the cost for the late night/overnight concrete pour permit be set at a dollar value that would fund an independent third party to measure limit compliance. When limits are exceeded, the penalties should be similar to the following:
  - First penalty: permits suspended/denied for 21 days.
  - Second penalty: permits suspended/denied for 45 days.
  - Third penalty: permits suspended/denied for the remainder of the project.
- The new Concrete Pour ordinance should be piloted for 6-12 months. If quality of life continues to be seriously impacted for downtown residents, then hour limits such as the 10 P.M. cutoff recommended by the DANA should be established.

We understand that protecting downtown residential quality of life is a complex process. The Rainey Neighbors Association welcomes the opportunity to participate in the process of developing a final Concrete Pour ordinance.

Sincerely,



Bonita White, President  
Rainey Neighbors Association



## Austin Chapter of the Associated General Contractors

609 S. Lamar  
Austin, TX 78704  
(512) 442-7887

March 16, 2015

Mr. Greg Guernsey  
Planning & Development Review  
City of Austin  
505 Barton Springs Road  
Austin, Texas 78704

Dear Greg:

On behalf of the Austin Chapter of the Associated General Contractors of America (AGC), I am writing to express support for the proposed language attached to this letter offering improvements to the City of Austin Ordinance §99-2-21 and related ordinances. After participating in many outreach meetings with other stakeholders on this issue, the Austin AGC believes this proposal offers a balanced, compromise solution that addresses concerns of industry, downtown residents, and all who come downtown for work or social activities.

As our colleagues at the Texas Aggregate and Concrete Association (TACA) have noted in separate correspondence to you, this language achieves a practical balance of viewpoints with the following:

- Creates a performance based ordinance that is not focused on a specific activity, but rather the root cause of the issues, the noise;
- Allows for complete disclosure to the downtown residents of what is occurring, when it is occurring, and whom to contact should there be any issues;
- Allows for the business community to find best practice solutions to mitigating issues of sound and light, without overly prescriptive requirements;
- Allows for construction timelines to continue without a massive disruption to current construction practices;
- Does not decrease the safety of the workers by placing them in a more stressful work environment, increase traffic congestion, or decrease air quality if the concrete work had to shift to daytime hours.

Thank you for your consideration of our views. I am happy to answer any questions you may have.

Sincerely,

*Phil Thoden*

Phil Thoden  
President and CEO



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**DRAFT DOCUMENT – FOR DISCUSSION PURPOSES ONLY**

**§ 9-2-1 - DEFINITIONS.**

"Construction Activity" means any commercial or individual activity designed to build, construct, demolish, erect, any portion of a building, residence, municipal, civil, or other structure, object, or item.

**§ 9-2-3 - GENERAL RESTRICTIONS.**

(A) A person may not:

(3) conduct Construction Activity ~~operate a machine that separates, gathers, grades, loads, or unloads sand, rock, or gravel within 600 feet of a residence, church, hospital, hotel, or motel between 7:00 p.m. and 6:00 a.m., except for the installation of concrete as authorized under Section 9-2-21~~ Section 9-2-15 (Permit for Construction Activity Concrete Installation During Non-Peak Hour Periods);

**§ 9-2-14 - RESTRICTIONS ON PERMITS IMPACTING RESIDENTIAL PROPERTIES.**

(B) The accountable official may not issue a permit for use of sound equipment within 100 feet of property zoned and used as residential, except as authorized under ~~Section 9-2-21 (Permit for Concrete Installation During Non-Peak Hour Periods);~~ Chapter 8-1, Article 4 (Restrictions on Amplified Sound), or Section 14-8-34 (Permit Required for the Use of Sound Equipment).

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**§ 9-2-21 - ~~PERMIT FOR CONSTRUCTION ACTIVITY~~ CONCRETE INSTALLATION DURING NON-PEAK HOUR PERIODS.**

(A) Subject to the limitations in Subsections ~~[subsections]~~ (B), ~~and (C) and (D)~~ of this section, a person may conduct Construction Activity ~~the director may issue a permit authorizing an applicant to deliver, finish, place, or pour concrete during the non-peak hour period of 7:00 p.m. to 6:00 a.m. at property that is located within:~~

(1) the Downtown Density Bonus area identified in Section 25-2-586(B) (Downtown Density Bonus Program) and one of the following zoning districts:

(a) the Central Business District (CBD) base zoning district; ~~or [and]~~

(b) the Public (P) zoning district; and

(2) 600 feet of a residence, church, hospital, hotel, or motel.

# WINSTEAD

ATTORNEYS

(B) ~~The director may issue a permit under subsection (A) of this section only if the director determines that the delivery, finishing, placement, or pouring of concrete during non-peak hour periods is in the interest of public health, safety, or welfare or is justified by urgent necessity.~~

(C) ~~A permit issued under this section must state the duration during which the authorized activity may occur, which may not exceed 72 hours.~~

(D) ~~In addition to information required by Section 9-2-12 (Application Requirements), a person intending to conduct Construction Activity an application to deliver, finish, place, or pour concrete during non-peak hour periods must notify the director of the proposed activity and provide under Section 9-2-22 (Restrictions on Permit) must include:~~

- (1) ~~the name, address, and telephone number of the person intending to conduct Construction Activity applicant;~~
- (2) ~~the address or a description of the location of the property where the work will be performed; and~~
- (3) ~~the amount of time, up to 72 hours, needed to complete the work and the reason why the work cannot be completed during normal business hours.~~

(C) ~~To mitigate possible impacts and minimize disruptions to adjacent residential and commercial uses, the director shall require the person intending to conduct Construction Activity to:~~

- (1) ~~contact adjacent property owners located next door or across the street, and representatives of property owners or residents within 600 feet, to inform them when the non-peak Construction Activity will occur and the duration of the project;~~
- (2) ~~provide 24-hour contact information for the individual with primary responsibility for the project to adjacent property owners located next door or across the street, to representatives of property owners or residents within 600 feet, and to city staff; and~~
- (3) ~~provide a sound and light mitigation plan, which must:~~
  - (a) ~~identify where vehicles related to Construction Activity will queue to ensure minimal disruption to adjacent residences and businesses and, if necessary, relocate them to a location that will minimize disruption to adjacent residential uses;~~
  - (b) ~~shield after-hour lighting associated with Construction Activity from adjacent residential uses; and~~
  - (c) ~~require such other actions as the director determines are reasonably necessary to protect public health, safety, and welfare and to ensure reasonable expectations of a sound environment that does not preclude sleep.~~



(D) In no event shall this section authorize a person to conduct Construction Activity between 2:00 a.m. and 6:00 a.m. in excess of 75 decibels, as measured at the property line of the work site except in special circumstances of limited duration.

(E) If an application for a building permit was submitted prior to December 1, 2014, the director shall:

(1) permit the Construction Activity associated with that building during the non-peak hour period of 7:00 p.m. to 6:00 a.m. under the ordinances in effect when the application for building permit was submitted; and

(2) require a sound and light mitigation plan, as provided in Subsection (C)(3) of this section.

*\*\*Note, these changes are shown as compared to the permanent ordinance that will be in place when the 120-day ordinance expires.*

## Auzenne, Viktor

---

**From:** Barry Lewis <bclewis1940 [REDACTED]>  
**Sent:** Wednesday, March 11, 2015 10:32 AM  
**To:** Guernsey, Greg; Auzenne, Viktor  
**Cc:** Harden, Joi; Julie Fitch; Kathy Marcus; Clif Steed; Jeanette Auerbach; Bonita White  
**Subject:** Revision of COA 9-2-21  
**Attachments:** OSHA\_SoundStandards.pdf

Mr. Guernsey and Mr. Auzenne,

First, thank you for your time and patience last evening and your work on this contentious issue.

Attached is a scan of an informative piece from the OSHA website: <https://www.osha.gov/SLTC/noisehearingconservation/#loud>.

The fourth paragraph on page two states the OSHA standard as a time weighted average noise level of 85 dBA. Also on page two is a tabulation of sound levels for different conditions and occupancies. Please note that per OSHA the acceptable level for an Urban Residence is 50. Therefore, I respectfully suggest that the revised ordinance provide for 85 dBA, or the lesser equivalent on the dBC scale, until 10PM, with all activities after that time limited to not more than 50 dBA, or the lesser equivalent on the dBC scale.

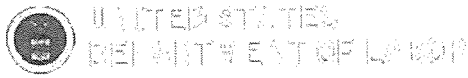
Respectfully,

Barry C. Lewis

DANA Board member







## Occupational Safety &amp; Health Administration We Can Help

## SAFETY AND HEALTH TOPICS

## Occupational Noise Exposure

Every year, approximately 30 million people in the United States are occupationally exposed to hazardous noise. Noise-related hearing loss has been listed as one of the most prevalent occupational health concerns in the United States for more than 25 years. Thousands of workers every year suffer from preventable hearing loss due to high workplace noise levels. Since 2004, the Bureau of Labor Statistics has reported that nearly 125,000 workers have suffered significant, permanent hearing loss. In 2009 alone, BLS reported more than 21,000 hearing loss cases.

Exposure to high levels of noise can cause permanent hearing loss. Neither surgery nor a hearing aid can help correct this type of hearing loss. Short term exposure to loud noise can also cause a temporary change in hearing (your ears may feel stuffed up) or a ringing in your ears (tinnitus). These short-term problems may go away within a few minutes or hours after leaving the noisy area. However, repeated exposures to loud noise can lead to permanent tinnitus and/or hearing loss.

Loud noise can also create physical and psychological stress, reduce productivity, interfere with communication and concentration, and contribute to workplace accidents and injuries by making it difficult to hear warning signals. Noise-induced hearing loss limits your ability to hear high frequency sounds, understand speech, and seriously impairs your ability to communicate. The effects of hearing loss can be profound, as hearing loss can interfere with your ability to enjoy socializing with friends, playing with your children or grandchildren, or participating in other social activities you enjoy, and can lead to psychological and social isolation.

- How does the ear work?
- What are the warning signs that your workplace may be too noisy?
- How loud is too loud?
- What can be done to reduce the hazard from noise?
- How can OSHA help?

## How does the ear work?

When sound waves enter the outer ear, the vibrations impact the ear drum and are transmitted to the middle and inner ear. In the middle ear three small bones called the malleus (or hammer), the incus (or anvil), and the stapes (or stirrup) amplify and transmit the vibrations generated by the sound to the inner ear. The inner ear contains a snail-like structure called the cochlea which is filled with fluid and lined with cells with very fine hairs. These microscopic hairs move with the vibrations and convert the sound waves into nerve impulses—the result is the sound we hear.

Exposure to loud noise can destroy these hair cells and cause hearing loss!

## What are the warning signs that your workplace may be too noisy?

Noise may be a problem in your workplace if:

- You hear ringing or humming in your ears when you leave work.
- You have to shout to be heard by a coworker an arm's length away.
- You experience temporary hearing loss when leaving work.

## How loud is too loud?

Noise is measured in units of sound pressure levels called decibels, named after Alexander Graham Bell, using A-weighted sound levels (dBA). The A-weighted sound levels closely match the perception of loudness by the human ear. Decibels are measured on a logarithmic scale which means that a small change in the number of decibels results in a huge change in the amount of noise and the potential damage to a person's hearing.

OSHA sets legal limits on noise exposure in the workplace. These limits are based on a worker's

## Highlights

- Protecting Yourself from Noise in Construction - Pocket Guide (PDF\*). OSHA Publication 3498, (2011).
- Stakeholder Meeting on Preventing Occupational Hearing Loss: Summary Report. OSHA, (2011, November 3).
- **NEW** OSHA Technical Manual (OTM) Chapter - Noise. OSHA Directive TED 01-00-015, (2013, August 15).

## What is noise?

Noise and vibration are both fluctuations in the pressure of air (or other media) which affect the human body. Vibrations that are detected by the human ear are classified as sound. We use the term 'noise' to indicate unwanted sound.

Noise and vibration can harm workers when they occur at high levels, or continue for a long time.



time weighted average over an 8 hour day. With noise, OSHA's permissible exposure limit (PEL) is 90 dBA for all workers for an 8 hour day. The OSHA standard uses a 5 dBA exchange rate. This means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half.

The National Institute for Occupational Safety and Health (NIOSH) has recommended that all worker exposures to noise should be controlled below a level equivalent to 85 dBA for eight hours to minimize occupational noise induced hearing loss. NIOSH has found that significant noise-induced hearing loss occurs at the exposure levels equivalent to the OSHA PEL based on updated information obtained from literature reviews. NIOSH also recommends a 3 dBA exchange rate so that every increase by 3 dBA doubles the amount of the noise and halves the recommended amount of exposure time.

*Here's an example: OSHA allows 8 hours of exposure to 90 dBA but only 2 hours of exposure to 100 dBA sound levels. NIOSH would recommend limiting the 8 hour exposure to less than 85 dBA. At 100 dBA, NIOSH recommends less than 15 minutes of exposure per day.*

In 1981, OSHA implemented new requirements to protect all workers in general industry (e.g. the manufacturing and the service sectors) for employers to implement a Hearing Conservation Program where **workers are exposed to a time weighted average noise level of 85 dBA** or higher over an 8 hour work shift. Hearing Conservation Programs require employers to measure noise levels, provide free annual hearing exams and free hearing protection, provide training, and conduct evaluations of the adequacy of the hearing protectors in use unless changes to tools, equipment and schedules are made so that they are less noisy and worker exposure to noise is less than the 85 dBA.

What can be done to reduce the hazard from noise?

Noise controls are the first line of defense against excessive noise exposure. The use of these controls should aim to reduce the hazardous exposure to the point where the risk to hearing is eliminated or minimized. With the reduction of even a few decibels, the hazard to hearing is reduced, communication is improved, and noise-related annoyance is reduced. There are several ways to control and reduce worker exposure to noise in a workplace.

**Engineering controls** that reduce sound exposure levels are available and technologically feasible for most noise sources. Engineering controls involve modifying or replacing equipment, or making related physical changes at the noise source or along the transmission path to reduce the noise level at the worker's ear. In some instances the application of a relatively simple engineering noise control solution reduces the noise hazard to the extent that further requirements of the OSHA Noise standard (e.g., audiometric testing (hearing tests), hearing conservation program, provision of hearing protectors, etc...) are not necessary. Examples of inexpensive, effective engineering controls include some of the following:

- Choose low-noise tools and machinery (e.g., Buy Quiet Roadmap (NASA) ).
- Maintain and lubricate machinery and equipment (e.g., oil bearings).
- Place a barrier between the noise source and employee (e.g., sound walls or curtains).
- Enclose or isolate the noise source.

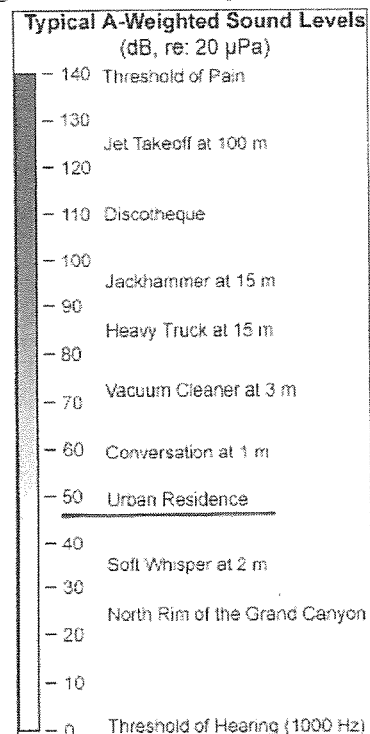
**Administrative controls** are changes in the workplace that reduce or eliminate the worker exposure to noise. Examples include:

- Operating noisy machines during shifts when fewer people are exposed.
- Limiting the amount of time a person spends at a noise source.
- Providing quiet areas where workers can gain relief from hazardous noise sources (e.g., construct a sound proof room where workers' hearing can recover – depending upon their individual noise level and duration of exposure, and time spent in the quiet area).
- Restricting worker presence to a suitable distance away from noisy equipment.

Controlling noise exposure through distance is often an effective, yet simple and inexpensive administrative control. This control may be applicable when workers are present but are not actually working with a noise source or equipment. Increasing the distance between the noise source and the worker, reduces their exposure. In open space, for every doubling of the distance between the source of noise and the worker, the noise is decreased by 6 dBA.

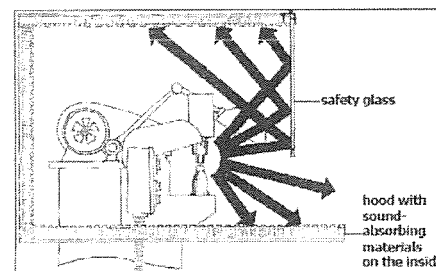
**Hearing protection devices (HPDs)**, such as earmuffs and plugs, are considered an acceptable but less desirable option to control exposures to noise and are generally used during the time necessary to implement engineering or administrative controls, when such controls are not feasible, or when worker's hearing tests indicate significant hearing damage.

An **effective hearing conservation program** must be implemented by employers in general

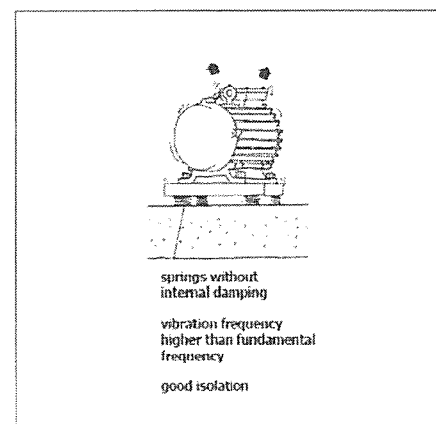


A wide variety of noise sources may exist in the workplace. The NIOSH Noise Meter provides examples of some common sources and their expected noise levels.

A more detailed explanation of common terms, good program elements, and implementation steps can be found in NIOSH Document: Preventing Occupational Hearing Loss - A Practical Guide, Publication No. 96-110, (1996, October).

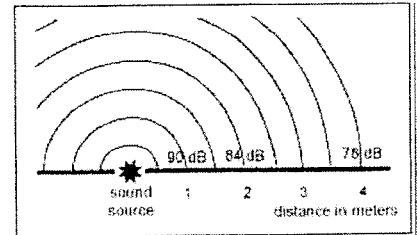


Example of Engineering Controls

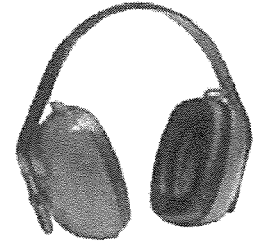


Example of Engineering Controls

industry whenever worker noise exposure is equal to or greater than 85 dBA for an 8 hour exposure or in the construction industry when exposures exceed 90 dBA for an 8 hour exposure. This program strives to prevent initial occupational hearing loss, preserve and protect remaining hearing, and equip workers with the knowledge and hearing protection devices necessary to protect them. Key elements of an effective hearing conservation program include:



- Workplace noise sampling including personal noise monitoring which identifies which employees are at risk from hazardous levels of noise.
- Informing workers at risk from hazardous levels of noise exposure of the results of their noise monitoring.
- Providing affected workers or their authorized representatives with an opportunity to observe any noise measurements conducted.
- Maintaining a worker audiometric testing program (hearing tests) which is a professional evaluation of the health effects of noise upon individual worker's hearing.
- Implementing comprehensive hearing protection follow-up procedures for workers who show a loss of hearing (standard threshold shift) after completing baseline (first) and yearly audiometric testing.
- Proper selection of hearing protection based upon individual fit and manufacturer's quality testing indicating the likely protection that they will provide to a properly trained wearer.
- Evaluate the hearing protectors attenuation and effectiveness for the specific workplace noise.
- Training and information that ensures the workers are aware of the hazard from excessive noise exposures and how to properly use the protective equipment that has been provided.
- Data management of and worker access to records regarding monitoring and noise sampling.



Each of these elements is critical to ensure that workers are being protected where noise levels are unable to be reduced below the OSHA required levels.

### How do I find out about employer responsibilities and worker rights?

Workers have a right to a safe workplace. The law requires employers to provide their employees with working conditions that are free of known dangers. The OSHA law also prohibits employers from retaliating against employees for exercising their rights under the law (including the right to raise a health and safety concern or report an injury). For more information see [www.whistleblowers.gov](http://www.whistleblowers.gov) or worker rights.

OSHA has a great deal of information to assist employers in complying with their responsibilities under the OSHA law.

OSHA can help answer questions or concerns from employers and workers. To reach your regional or area OSHA office, go to OSHA's Regional & Area Offices webpage or call 1-800-321-OSHA (6742).

Small business employers may contact OSHA's free and confidential on-site consultation service to help determine whether there are hazards at their worksites and work with OSHA on correcting any identified hazards. On-site consultation services are separate from enforcement activities and do not result in penalties or citations. To contact OSHA's free consultation service, go to OSHA's On-site Consultation webpage or call 1-800-321-OSHA (6742) and press number 4.

Workers may file a complaint to have OSHA inspect their workplace if they believe that their employer is not following OSHA standards or that there are serious hazards. Employees can file a complaint with OSHA by calling 1-800-321-OSHA (6742), online via eCompliant Form, or by printing the complaint form and mailing or faxing it to your local OSHA area office. Complaints that are signed by an employee are more likely to result in an inspection.

If you think your job is unsafe or you have questions, contact OSHA at 1-800-321-OSHA (6742). It's confidential. We can help. For other valuable worker protection information, such as Workers' Rights, Employer Responsibilities, and other services OSHA offers, visit OSHA's Workers' page.

**\*Accessibility Assistance:** Contact OSHA's Directorate of Technical Support and Emergency Management at (202) 693-2300 for assistance accessing PDF materials.

All other documents, that are not PDF materials or formatted for the web, are available as Microsoft Office® formats and videos and are noted accordingly. If additional assistance is needed with reading, reviewing or accessing these documents or any figures and illustrations, please also contact OSHA's Directorate of Technical Support and Emergency Management at (202) 693-2300.

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Tuesday, February 16, 2015

## **By Electronic Transmission**

Greg Guernsey, Director  
Planning and Development Review Department  
City of Austin  
One Texas Center  
505 Barton Springs Rd.  
Austin, Texas

RE: *Non-Peak Hour Concrete Pours in Downtown Density Bonus Area*

Dear Mr. Guernsey:

Thank you for forming and participating in the consensus-building process regarding non-peak hour concrete pours. The two-hour session last Wednesday evening was very productive.

As owners of a residential unit at 360 Nueces Street since 2008, my wife and I are in residence usually one week a month and longer during holidays and the summer. When we bought our condo, we knew there would be more noise than in most neighborhoods. We did not expect so many nights of sleeplessness due to excessive noise from construction. We are pleased the City is taking a hard look at strengthening protections for those who invested in downtown Austin.

Here are my key takeaways from last week's meeting:

- There seemed to be strong support for all construction noise in the Downtown Density Bonus Area being regulated with objective standards, rather than addressing only the hours for concrete pours. Given the irritating sounds generated by pile driving and other construction activities, this is a wise and prudent move, and I hope staff will recommend it.
- While we did not focus on the specific noise standards that should be imposed, there was strong support for graduated noise standards based on time-of-day. A reasonable noise standard for 5 PM in the afternoon is not necessarily reasonable at 10 PM at night, and a reasonable standard at 10 PM at night is not necessarily reasonable at 2 AM.

Letter to Greg Guernsey  
Tuesday, February 16, 2015  
Page 2 of 3

I like Houston's standard. As shown by Mr. Rich Szechy's research (available on the City's website), it requires "68db(A) between 8:01 p.m. and 6:59 a.m. on the nonresidential property on which the sound is generated." (e.a.) Austin should adopt such a reasonable standard.

- In the two entertainment districts—one is two blocks from my home—some of us would be willing to rely upon the existing limits on amplified music until 2 AM, however, industry representatives seemed unwilling to accept the otherwise applicable standard of "audible" noise after that. In my view, whether this approach to construction in entertainment districts can be accepted by the community will depend upon a stringent standard after 2 AM.
- There seemed to be broad acceptance of the idea that any permitted construction at night must be contingent upon a noise and light mitigation plan as a condition of permit issuance. Such a plan should be reasonably likely to meet noise standards and be enforceable. I believe downtown residents should receive notice of and be allowed to comment on a mitigation plan during review of applications for nearby downtown construction jobs.

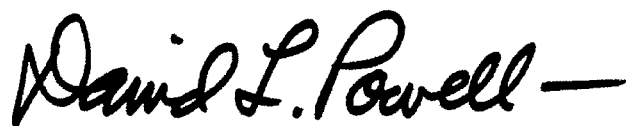
We did not have time to discuss the suggestion to "distinguish between unique pours (library) & other pours." As one who experiences these nighttime disturbances, I do not believe a reasonable distinction can be made based on the ownership or character of the structure (such as the new library or the proposed county courthouse at Republic Square). As industry representatives argued repeatedly at our meeting, "Noise is noise." I agree.

Lastly, I want to address back-up alarms. The attached paper, "Effective Noise Control During Night-time Construction" by the Federal Highway Administration (FHWA), addresses backup alarms on page 5. FHWA's recommendation for ambient-sensitive self-adjusting backup alarms and manually adjusted backup alarms is especially noteworthy, in light of the recurring complaints about the piercing *beep-beep-beep* sound that disturbs so many of us at night.

I appreciate the contractors' liability and safety concerns, but do not believe they are a legitimate excuse to disturb our sleep if there are mitigative measures that can minimize these irritating sounds. I encourage you to investigate the legal and practical issues regarding these recommended controls on backup alarms to see if they can be part of the City's response.

Thank you for your consideration. Please let me know if I can assist further.

Sincerely,

A handwritten signature in black ink that reads "David L. Powell" followed by a horizontal line.

David L. Powell

Hopping Green & Sams  
Attorneys and Counselors

Letter to Greg Guernsey  
Tuesday, February 16, 2015  
Page 3 of 3

Attachment

cc: Terry Arterburn  
Viktor Auzenne  
Downtown Commission





# Effective Noise Control During Nighttime Construction

[Workshops > Reduced Demand](#)

## Introduction

In recent years there have been fundamental changes in the types of projects that Departments of Transportation (DOT) are constructing. Today a significant number of projects are urban widening/rehabilitation work where daylight construction closures of the routes cause unacceptable congestion problems. Therefore, because of the high traffic volumes during the normal workday on these major urban transportation corridors, it is usually only possible to perform construction operations during the nighttime.

Departments of Transportation are writing into the specifications for these projects severe restrictions on when a contractor can execute the work. Typically the work must be performed at night. In turn, these nighttime work requirements precipitated disturbances to adjacent property owners'. When residents complain the path of their complaints is often through their local government. Additionally, the resulting complaints are coming during a climate of national concern about the adverse effects of environmental noise.

In the conduct of their construction and rehabilitation programs agencies struggle with three interested and impacted parties that must be satisfied.

- The driving public both commercial and private
- The community through which the transportation corridor traverses
- The construction contractors

This is a compilation of methods and techniques for mitigating nighttime construction nuisances. Mitigation is a critical requirement for serving the traveling public, for conducting DOT business in a responsible manner, and for preparing valid contract documents.

## Problems

The major nuisances associated with the nighttime construction are noise, vibration, and illumination. Noise problems are normally caused by the operation of heavy equipment and specifically by vehicle and machine backup-alarms, Table 1. Vibration problems are primarily a result of pile driving, blasting operations, or the use of vibratory rollers. While good illumination is necessary for the work to proceed at night and for the safety of the traveling public, proper work zone illumination can be very intrusive to project neighbors. There is also concern by Departments about exposure to possible contractor claims if noise objectives are not properly presented in the contract documents.

A telephone survey of state DOTs found that many require adherence to certain noise (decibel) limits during nighttime construction. In many cases these limits are the consequence of specific local ordinances. Some Departments indicated that they could receive local ordinance waivers rather easily. Other Departments stated that they had jurisdiction over the local municipalities in

these matters, but they tried to abide by the local ordinances.

TABLE 1. Critical Nighttime Construction Noise Generators

Noise Generator	Percent of DOTs Identifying as Cause of Problems*
Back-up Alarms	41%
Slamming Tailgates	27%
Hoe Rams	24%
Milling/Grinding Machines	16%
Earthmoving Equipment	14%
Crushers	6%

\*As rated by the 50 State DOTs

## Sound

The human ear does not judge sound in absolute terms, but instead senses the intensity of how many times greater one sound is to another. A decibel is the basic unit of sound level; it denotes a ratio of intensity to a reference sound. Most sounds that humans are capable of hearing have a decibel (dB) range of 0 to 140. A whisper is about 30 dB, conversational speech 60 dB, and 130 dB is the threshold of physical pain, Fig. 1.

Figure 1. Representative Noise Levels

Noise levels tested (in increasing decibel level) include: sound studio (20 dB), quiet office (40 dB), conversation (60 dB), noisy restaurant (75 dB), chain saw (120 dB), jet plane (148 dB), and saturn rocket (200 dB).

Sound and noise are not the same thing, but sound becomes noise when:

- It is too loud
- It is unexpected
- It is uncontrollable
- It occurs unexpectedly
- It has pure tone components

Noise is any sound that has the potential to annoy or disturb humans, or cause an adverse psychological or physiological effect on humans. In the case of the general population a 5 dBA change is required before most people realize there is a perceptible sound difference.

The noise levels generated during the construction process vary depending on the type of equipment and the nature of the work being performed. It should be recognized that noise impacts can be severe, especially during nighttime activities, and that in many cases simple noise mitigation strategies will not suffice.

Noise generation on most construction projects is the result of equipment operation with diesel engines being the primary generators. Equipment components that generate noise include: the engine, cooling fan, air intake, exhaust, transmission, and tires. In assessing noise generation, construction equipment can be grouped into two categories, stationary and mobile. Equipment

noise can also be categorized as being either continuous or impulse in nature. Stationary equipment is considered to operate in one location for one or more days at a time; pumps, generators, compressors, screens, are typical examples of stationary equipment. In addition, pile drivers and pavement breakers are sometimes categorized as stationary equipment. Mobile equipment includes machinery that performs cyclic processes such as: bulldozers, scrapers, loaders, and haul trucks.

## Equipment Noise

Construction equipment is a major noise generator on nearly all nighttime construction projects. The equipment type, specific model, equipment condition and the operation performed influence equipment noise. Equipment manufacturers began attacking machine noise problems in the late '60s and today because of design improvements and technological advances new machines have been quieted to an acceptable level for almost every situation. *Newer equipment is noticeably quieter than older models* due primarily to better engine mufflers, refinements in fan design and improved hydraulic systems. Noise levels as generated by typical equipment are shown in Table 2.

How equipment noise will be perceived is also a function of use duration. On a monitored project in New Jersey the highest noise levels resulted from pile driving; but, because the driving was completed in a short period of time, the activity did not draw any complaints.

One of the conclusions from the U.S. Department of Transportation's 1979 construction equipment noise study was that 88 dBA is a reasonable noise level to expect for *used* equipment with an engine horsepower of 400 or less. It should be noted that the USDOT tests were made in the field under actual operating conditions at road construction sites, mines and quarries.

In 1994 and 1995 Harris Miller Miller & Hanson Inc. performed noise studies for the Central Artery/Tunnel project in Boston. The first study sought to quantify an *average* noise level while the second defined a *typical* noise level. It would seem that a typical value is better to use in developing specifications or project restrictions. That data delineates the most commonly occurring level.

Table 2. Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 ft., U. S. Dept. of Trans. study 1979	Average Noise Level (dBA) 50 ft., CA/T Project study 1994	Typical Noise Level (dBA) 50 ft., U. S. Dept. of Trans. study 1995	Lmax Noise (dBA) 50 ft., CA/T Project Spec. 721.560
Air Compressor	84	85	81	80
Backhoe	84	83	80	80
Chain Saw				85
Compactor	82		82	80
Compressor	90	85		80
Concrete Truck		81		85
Concrete Mixer			85	85
Concrete Pump			82	82

Concrete Vibrator		76	80
Crane, Derrick	86	87	85
Crane, Mobile		87	85
Dozer	88	84	85
Drill Rig		88	85
Dump Truck		84	84
Excavator			85
Generator	84	78	82
Gradall		86	85
Grader	83		85
Hoe Ram		85	90
Impact Wrench			85
Jackhammer*		89	85
Loader	87	86	80
Paver	80		85
Pile Driver, Impact		101	95
Pile Driver, Sonic			95
Pump	80		77
Rock Drill			85
Roller			80
Scraper	89	89	85
Slurry Machine		91	82
Slurry Plant			78
Truck	89	85	84
Vacuum Excavator			85

\* There are 82 dBA @ 7 meter rated jackhammers (90 lb. class) available. This would be equivalent to 74 dBA @ 50 ft. These are silenced with molded intricate muffler tools.

### Equipment Noise Control Options

Listed in Table 3 are the major sources of equipment noise that cause complaints. The Table also lists specific methods for controlling the identified noise problem.

Table 3. Construction Equipment Noise Control Options

Noise Source	Control
Backup alarms	Use manually-adjustable alarms

Slamming tailgates	Use self adjusting alarms
	Use an observer
	Configure traffic pattern to minimize backing movement
	Establish truck cleanup staging areas
Pavement breakers (jackhammers)	Use rubber gaskets
	Decrease speed of closure
	Use bottom dump trucks
	Fit with manufacturer approved exhaust muffler
Prolonged idling of equipment	Prohibit within 200 ft. of a noise sensitive location during nighttime hours
	Enclose with a noise tent
	Reduce idling
	Locate equipment away from noise sensitive areas

**Ambient-sensitive self-adjusting backup alarms** increase or decrease their volume based on background noise levels. These alarms work best on smaller equipment such as backhoes and trucks. The alarm self-adjusts to produce a tone that is readily noticeable over ambient noise levels (a minimum increment of 5 decibels is typically considered readily noticeable), but not so loud as to be a constant annoyance to neighbors. The typical alarm adjustment is 82 or 107 dBA. Close attention must be given to the alarm's mounting location on the machine in order to minimize engine noise interference, which can be sensed by the alarm as the ambient noise level. These alarms should be mounted as far to the rear of the machine as possible. An alarm mounted directly behind a machine's radiator will sense the cooling fan's noise and adjust accordingly, Figure 2. Such a mounting will **negate the purpose of the device**.

**Manually**-adjustable alarms are effective in reducing backup alarm noise nuisance but their use requires that each alarm be set at the beginning of each day and night shift. The manual setting feature eliminates the machine mounting location problem of the ambient-sensitive self-adjusting backup alarms. The manually adjustable alarms typically have an 87 and 107 dBA setting range, with the 87 dBA setting used for nighttime operations.

## Noise Mitigation

Of interest in terms of community noise impact is the overall noise resulting from a construction site. The noise of each individual piece of equipment and sometimes the highest noise source is not always the number one priority. Noise control is directed toward modification of a perceived sound field. It strives to change the impact at the receiver so that the sounds conform to a desired level. Mitigation of undesired sounds should consider source control, path control, and receptor control Figure 3.

Figure 2. A Self-Adjusting Backup Alarm Mounted in the Wrong Position

Figure 3. Noise Transfer Situation

*The Noise Transfer Situation shows the relation between sources, such as a pile driver, loader and truck, and their paths, groundborne vibration and direct sound (which includes a reverberant field) to the receiver. The relation is detailed below.*

*The Pile Driver creates a groundborne vibration path to the receiver. The loader and truck create a direct sound (reverberant field) path to the receiver.*

### Source Controls

Source control is the most effective method of eliminating noise problems. It is a cardinal rule that, where possible, noises control should occur at the source. Source controls, which limit noise emissions, are the easiest to oversee on a construction project. Source mitigation reduces the noise problem everywhere not just along a single path or for one receiver. Consequently, a project's noise mitigation strategy should emphasize noise control at the source.

### Require Construction Operations Planning

Restrict the movement of equipment into and through the construction site. Long-term impacts are generated along haul routes when there are large quantities of materials to be moved. Reroute truck traffic away from residential streets. Impose seasonal limitations on construction noise, the spring or fall are critical times in residential areas because windows are usually open at night.

### Example Specifications

*Where practical and feasible, construction sites shall be configured to minimize back-up alarm noise. For example, construction site access should be designed such that delivery trucks move through the site in a circular manner without the need to back up.*

### Require Modern Equipment

Unions recognize construction noise as a hazard to workers and the first of five things suggested to workers to address the problem is that they "Ask contractors to buy quieter equipment when they buy new equipment." DOT specification of equipment noise emission limits forces the use of modern equipment having better engine insulation and mufflers. The emission levels specified should reflect levels that can reasonably be achieved with well-maintained equipment, see Table 3.

### Equipment Restrictions

Restrict the type of equipment used.

### Example Specifications

*The use of impact pile drivers shall be prohibited during evening and nighttime hours.*

*All jackhammers and pavement breakers used on the construction site shall be fitted with manufacturer's approved exhaust mufflers.*

*The use of pneumatic impact equipment (i.e. pavement breakers, jackhammers) shall be*

*prohibited within 200 feet of a noise-sensitive location during nighttime hours.*

*The local power grid shall be used wherever feasible to limit generator noise. No generators larger than 25 KVA shall be used and, where a generator is necessary, it shall have a maximum noise muffling capacity.*

Call the contractor's attention to the back-up alarm noise problem and require measures to address the issue.

By specification direct the use of only power grid connected or solar powered traffic control devices, Figure 4.

#### Example Specifications

*All variable message/sign boards shall be solar powered or connected to the local power grid.*

Figure 4. Solar Powered Traffic Control Devices

Operate at Minimum Power

Noise emission levels tend to increase with equipment operating power. This is a critical issue with older street sweepers, demolition work using a hoe-ram, and equipment such as vac-trucks, Figure 5. Require that such equipment operate at the lowest possible power levels.

Figure 5. vac-truck working at night

Use Quieter Alternate Equipment

Electric or hydraulic powered equipment is usually quieter than a diesel-powered machine. Encourage contractors to use alternate equipment. Use electric tower cranes, Fig. 6, instead of diesel power mobile cranes

Figure 6. Electric Tower Cranes for Bridge Construction

## Path Controls

Alone, source noise controls are frequently inadequate at adequately minimizing noise impacts on abutting sensitive receptors because of the close proximity to residences and businesses in urban areas and because of the very nature of the construction work. Thus, having exhausted all possible mitigation methods of controlling noise at the source, the second line of attack is controlling noise radiation along its transmission path. Noise path barriers should provide a substantial reduction in noise levels, should be cost effective, and should be implementable in a practical manner without limiting accessibility. Barriers can increase a project's visual impact. This visual change can have either a positive or negative impact. Therefore, aesthetic effects must be considered when designing barrier systems.

#### Path Mitigation Techniques

Once established, only reflection, diffraction insulation or dissipation can modify an airborne sound field. In other words, it is necessary to increase the distance from the source or to use some form of solid object to either destroy part of the sound energy by absorption, or to redirect part of the energy by wave deflection. The three techniques for path mitigation are therefore:

Distance

Reflection

Absorption

Enclose especially Noisy Activities or Stationary Equipment

Enclosures can provide a 10 to 20 dBA sound reduction. Additionally the visual impact of roadway activities has an effect on how construction sounds are perceived. An important noise mitigation issue, therefore, is the audio-visual sensing factor. Enclosures address both the absolute audio and the visual perception issue, Figure 7.

#### Example Specifications

*All jackhammers and pavement breakers used at the construction site shall be enclosed with shields, acoustical barrier enclosures, or noise barriers.*

Figure 7. Slurry Plant Enclosure for Audio-Visual and Dust Control

## Conclusions

A significant number of future construction projects will involve urban work. Therefore, it is important that before contracts are advertised and bid that there be an objective assessment as to the magnitude of noise nuisances. Noise problems are normally caused by the operation of heavy equipment. The identification of methods and techniques for mitigating such nuisances is a critical planning requirement for both owners and contractors.

**Source control** is the most effective method of controlling construction noise. Source controls, which limit noise, are the easiest to oversee on a construction project. Mitigation at the source reduces the problem everywhere not just along one single path or for one receiver. The specification of equipment *noise emission limits* forces the use of modern equipment having better engine insulation and mufflers.

**Path Controls** are the second line of attack in controlling noise. Barriers can provide a substantial reduction in the nuisance effect in some cases. The use of barriers should be examined against other possible measures to prove that they are cost effective. Further, aesthetic effects must be considered when designing barrier systems. Path control measures include:

- Move equipment farther away from the receiver
- Enclose especially noisy activities or stationary equipment
- Erect noise barriers or curtains
- Use landscaping as a shield and dissipater