

# TRAFFIC NOISE LEVELS AT THE SOURCE DEPEND ON THREE MAIN FACTORS

Highway noise generation is dependent on three main factors, including:

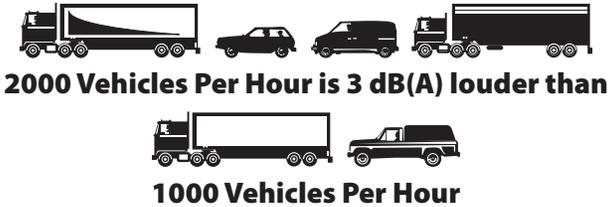
1. Traffic Volume
2. Traffic Speed
3. Number of trucks in the traffic

Each of these varies at any given moment.

## HOW TRAFFIC VOLUMES AFFECT NOISE

Doubling the traffic volume (e.g. from 1,000 to 2,000 vehicles per hour) will increase the sound level by 3 dB(A).

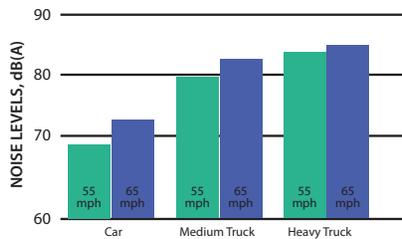
### How Traffic Volumes Affect Noise



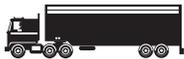
Source: FHWA Highway Traffic Noise, Fact Sheet, <http://www.fhwa.dot.gov/environment/noise>

### How Speed Affects Traffic Noise

As speed increases, noise levels increase as illustrated below:



### How Trucks Affect Traffic Noise



**One truck at 55 miles per hour sounds as loud as**



**28 cars at 55 miles per hour**

# FREQUENTLY ASKED QUESTIONS

## 1. At what level will hearing damage occur?

Generally, 120 dB(A) is recognized as the threshold of pain and considered a dangerous noise level. Noise levels less than 120 dB(A) can damage hearing if the listener is exposed to the noise for an extended time period. Noise levels less than 90 dB(A) are generally not recognized as noise levels that can cause hearing damage.

Typically, traffic noise levels in areas of frequent human use do not approach these noise levels. A 90 dB(A) traffic noise level would occur if a person stood 10 to 20 feet from a roadway carrying approximately 1,000 trucks per hour. It is unlikely that residents would be exposed to this level of noise, and therefore it is unlikely residents experience hearing damage due to traffic noise.

## 2. What is Leq?

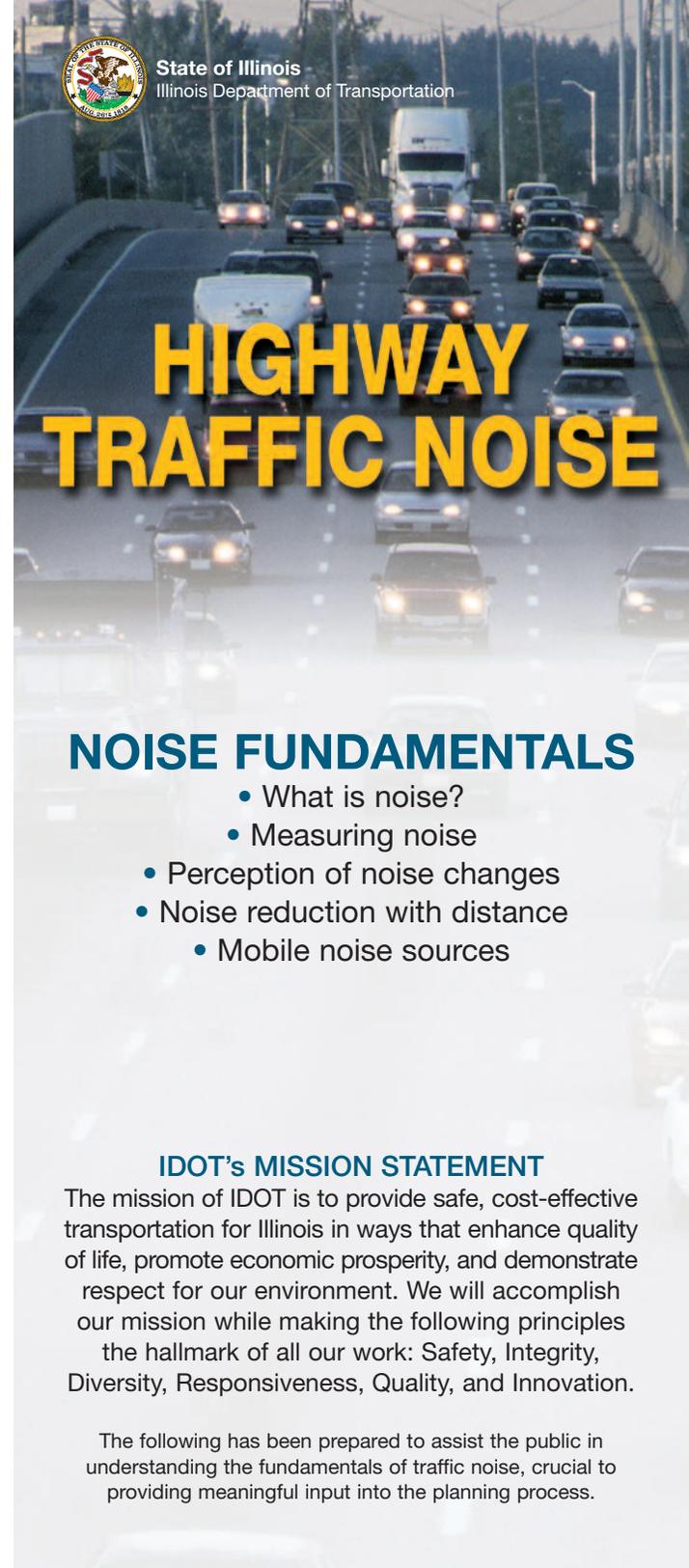
Leq is the equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as a time-varying sound level during the same period.

## 3. How loud is 67 dB(A)?

A sound level of 67 dB(A) is associated with normal speech at 3 ft. Some common sound levels are shown in the chart within this pamphlet.

For additional information regarding noise issues and a listing of frequently asked questions visit:

[www.dot.il.gov/environment/HTNAManual.pdf](http://www.dot.il.gov/environment/HTNAManual.pdf)



# HIGHWAY TRAFFIC NOISE

## NOISE FUNDAMENTALS

- What is noise?
- Measuring noise
- Perception of noise changes
- Noise reduction with distance
- Mobile noise sources

### IDOT's MISSION STATEMENT

The mission of IDOT is to provide safe, cost-effective transportation for Illinois in ways that enhance quality of life, promote economic prosperity, and demonstrate respect for our environment. We will accomplish our mission while making the following principles the hallmark of all our work: Safety, Integrity, Diversity, Responsiveness, Quality, and Innovation.

The following has been prepared to assist the public in understanding the fundamentals of traffic noise, crucial to providing meaningful input into the planning process.

## WHAT IS NOISE?

**SOUND** – A vibratory disturbance capable of being detected by the ear.

**NOISE** – Unwanted sound that may interfere with normal activities.



**NOISE IS AN UNINVITED GUEST.**

## MEASURING NOISE

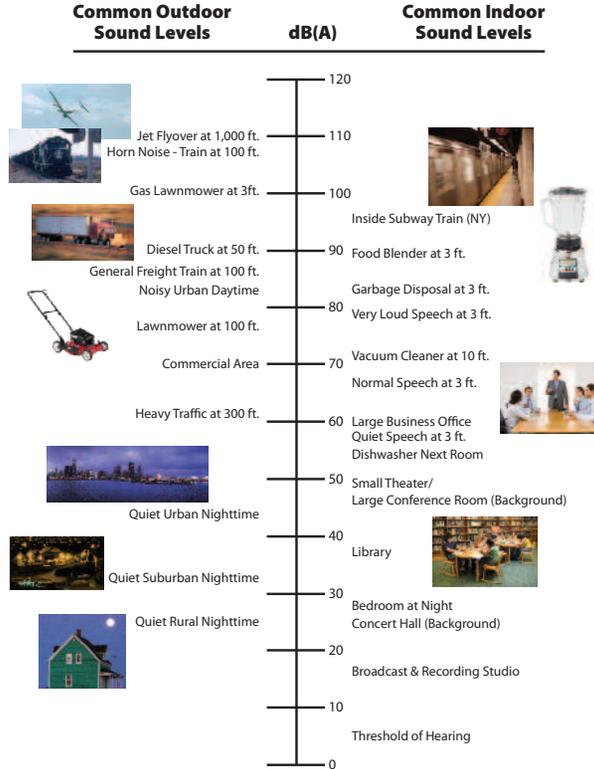
- Noise is measured in decibels (dB).
- Decibels are established on a logarithmic scale.
- A 10 dB increase represents a doubling in noise to the human ear. For example, 60 dB is perceived to be twice as loud as 50 dB.

## A-WEIGHTED NOISE MEASUREMENTS

- The unit of measure is dB(A).
- Humans do not hear all noise frequencies equally.
- The A-weighted scale indicates sound is filtered similar to the human ear, which reduces the strength of very low and very high frequencies. Without A-weighting, a noise monitor would respond to noise events people cannot hear, such as a dog whistle.

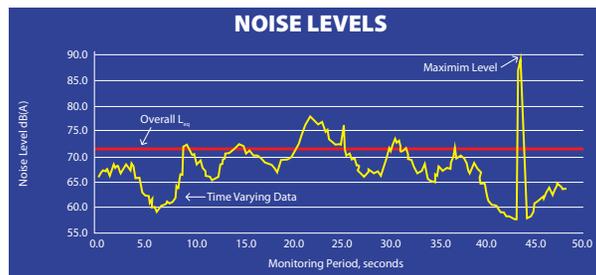
The chart below shows common outdoor and indoor sound levels with associated dB(A).

### COMMON SOUND LEVELS



## EQUIVALENT SOUND LEVEL (Leq)

The Leq is used to describe the period as an overall noise level. The graph below represents the time-varying data for a 50-second monitoring period. For this period, the approximate Leq is 72 dB(A).



## PERCEPTION OF NOISE CHANGES

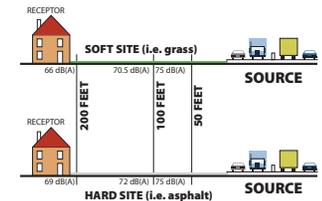
- Changes less than 3 dB(A) are not typically perceived by a human listener with average hearing.
- Changes from 3 to 5 dB(A) will be perceived by humans with sensitive ears.
- Changes greater than 5 dB(A) are readily perceived by humans with average hearing.

## NOISE REDUCTION WITH DISTANCE

Highway noise is generated by a line of vehicles closely spaced. This gives a listener the perception of a line noise source rather than a single, identifiable point of noise. As distance increases from the highway, noise is reduced. Generally, every time the distance doubles, the noise level will decline 3 dB(A) when it travels over hard surfaces. Over soft surfaces, the noise level will decline 4.5 dB(A) for every doubling of distance.

For example, assume traffic produces a noise level of 75 dB(A) measured 50 feet from the highway:

**Soft Site** If grass is the predominant cover, then at 200 ft, the noise level will be 9 dB(A) lower, or 66 dB(A).



**Hard Site** If asphalt is the predominant cover, the resulting noise level at 200 ft will be 6 dB(A) lower, or 69 dB(A).

## NOISE FROM MOBILE SOURCES

**Primary Sources:**

**Low Speeds**

- Engine
- Gear Box and Transmission
- Exhaust

**High Speeds**

- Tire/Road Noise
- Aerodynamics of vehicle