

# The Myths and Realities of Traffic Noise

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# Myth or Reality?

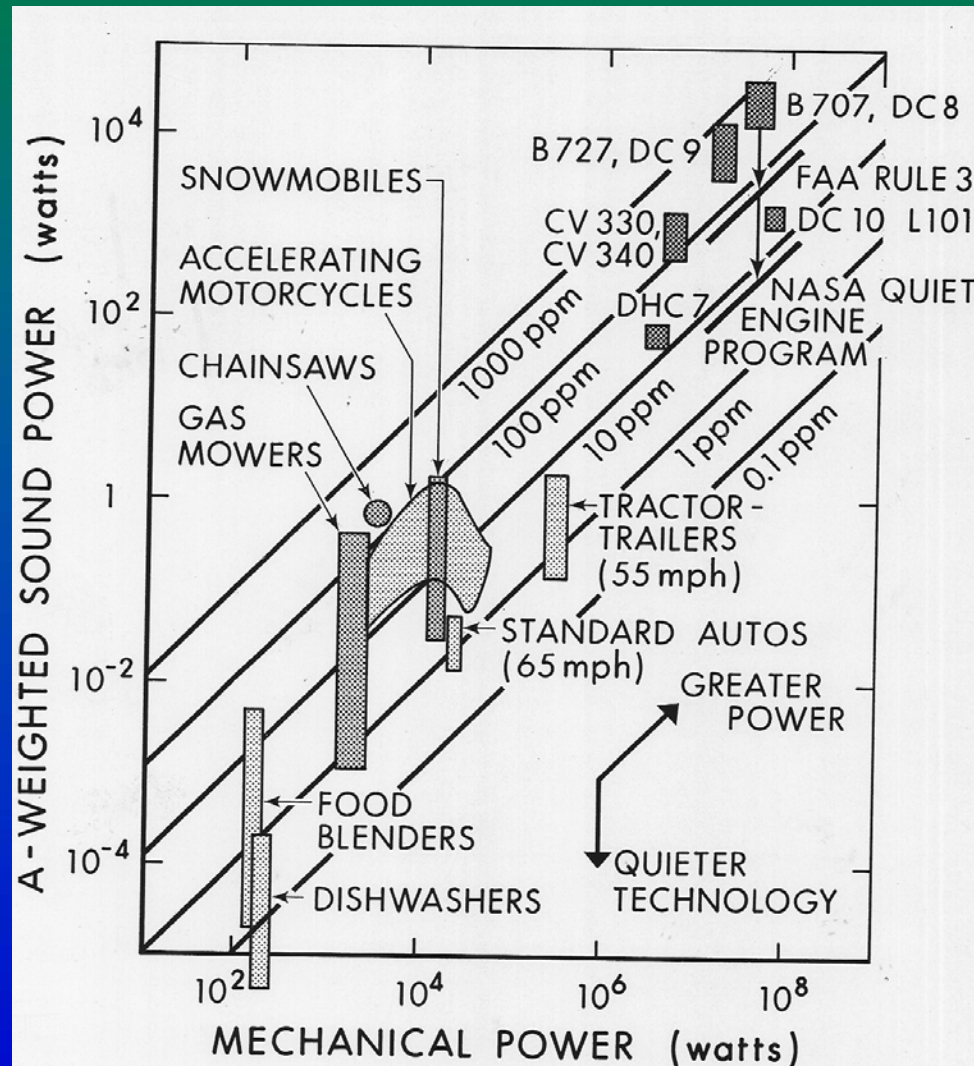
People will believe  
anything  
if you  
whisper it!



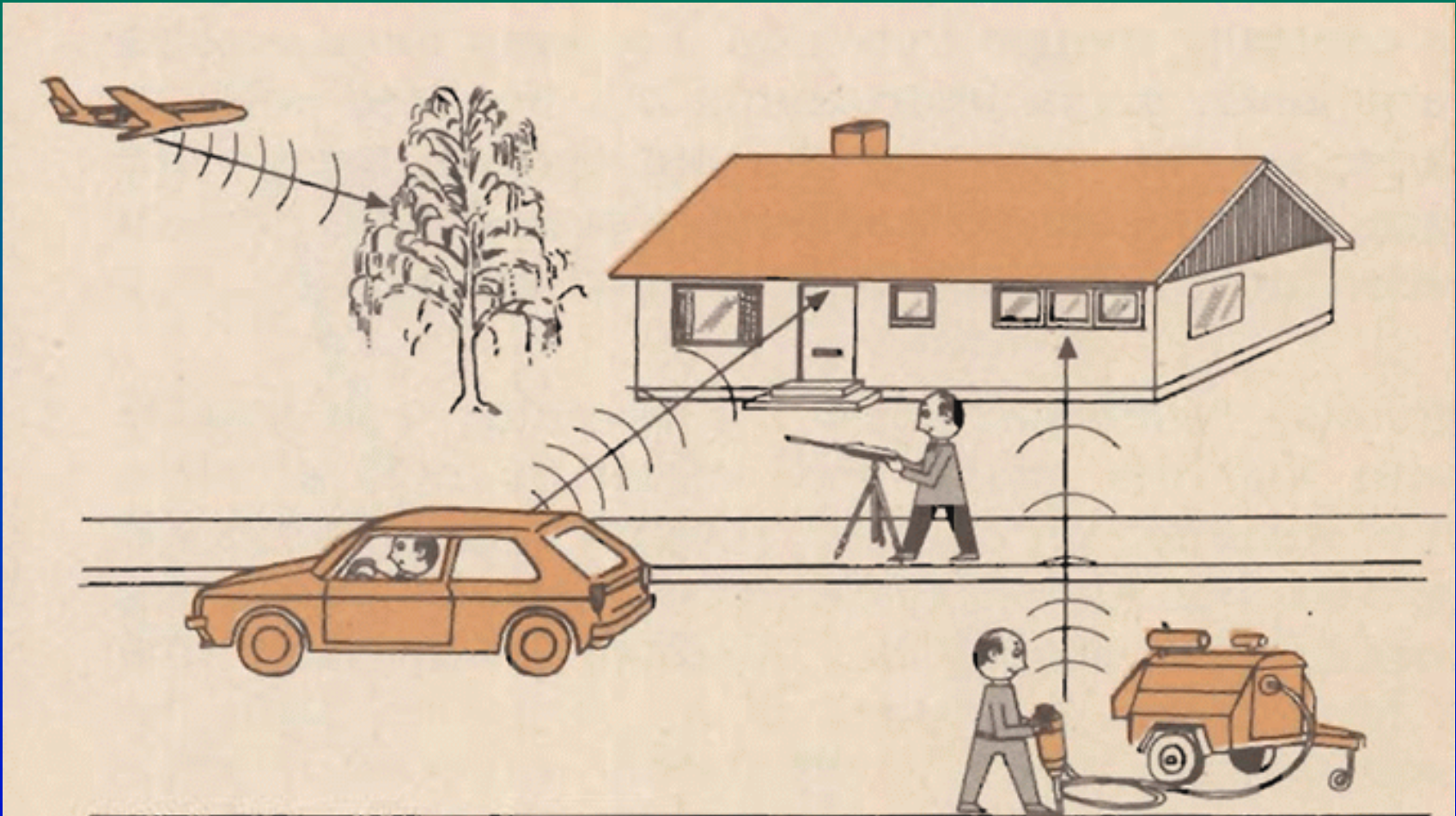
# Outline of Presentation

- **Acoustics 101**
  - What is sound?
  - How do we measure sound?
  - Sound propagation
- **Road Noise**
  - Sources
  - Effects of speed, composition
- **Noise Barriers**
  - Locations, Effectiveness, Materials, Reflections

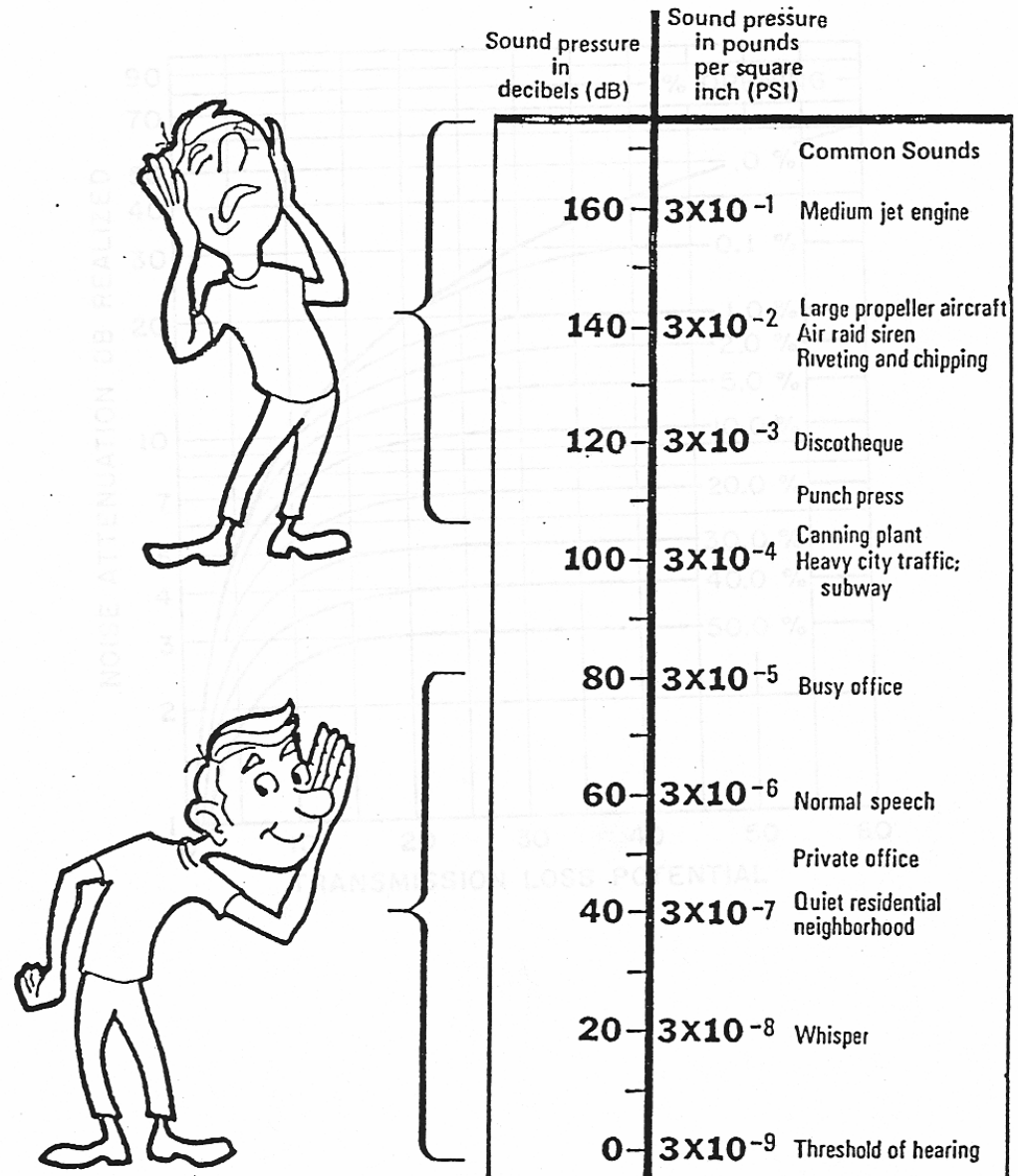
# Where Does Noise Originate?



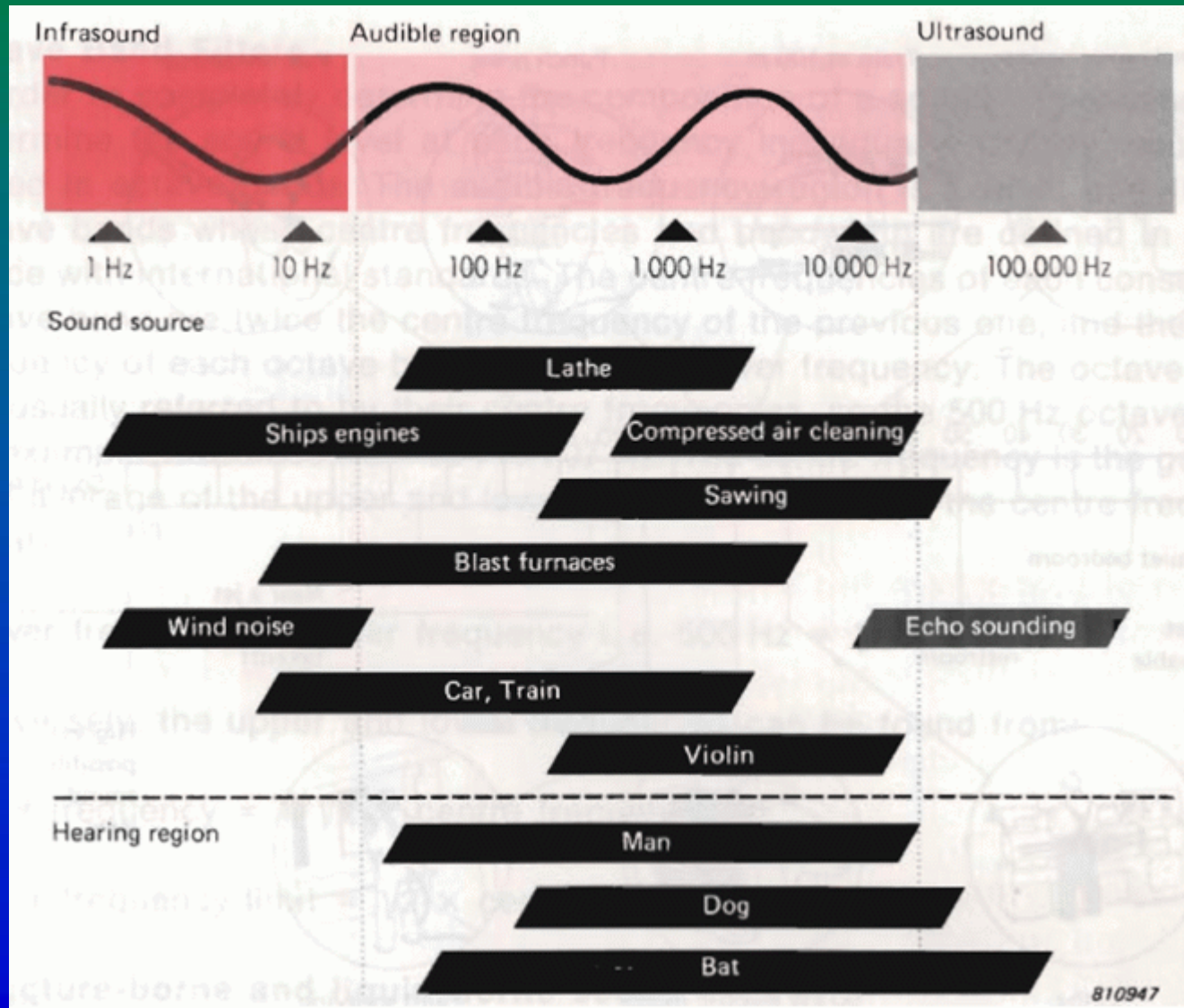
# How is Noise Measured?



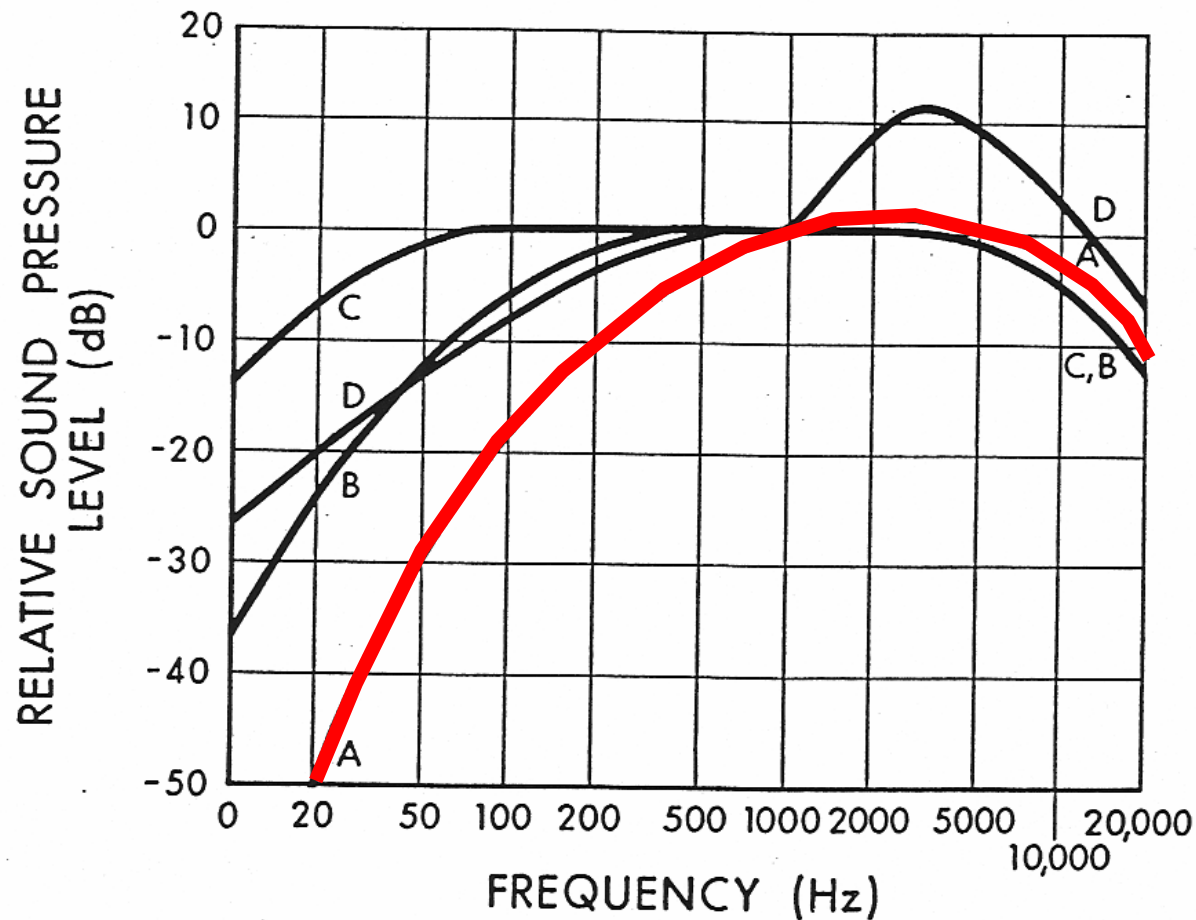
## Range of Sounds



# Frequency Range of Audible Sounds



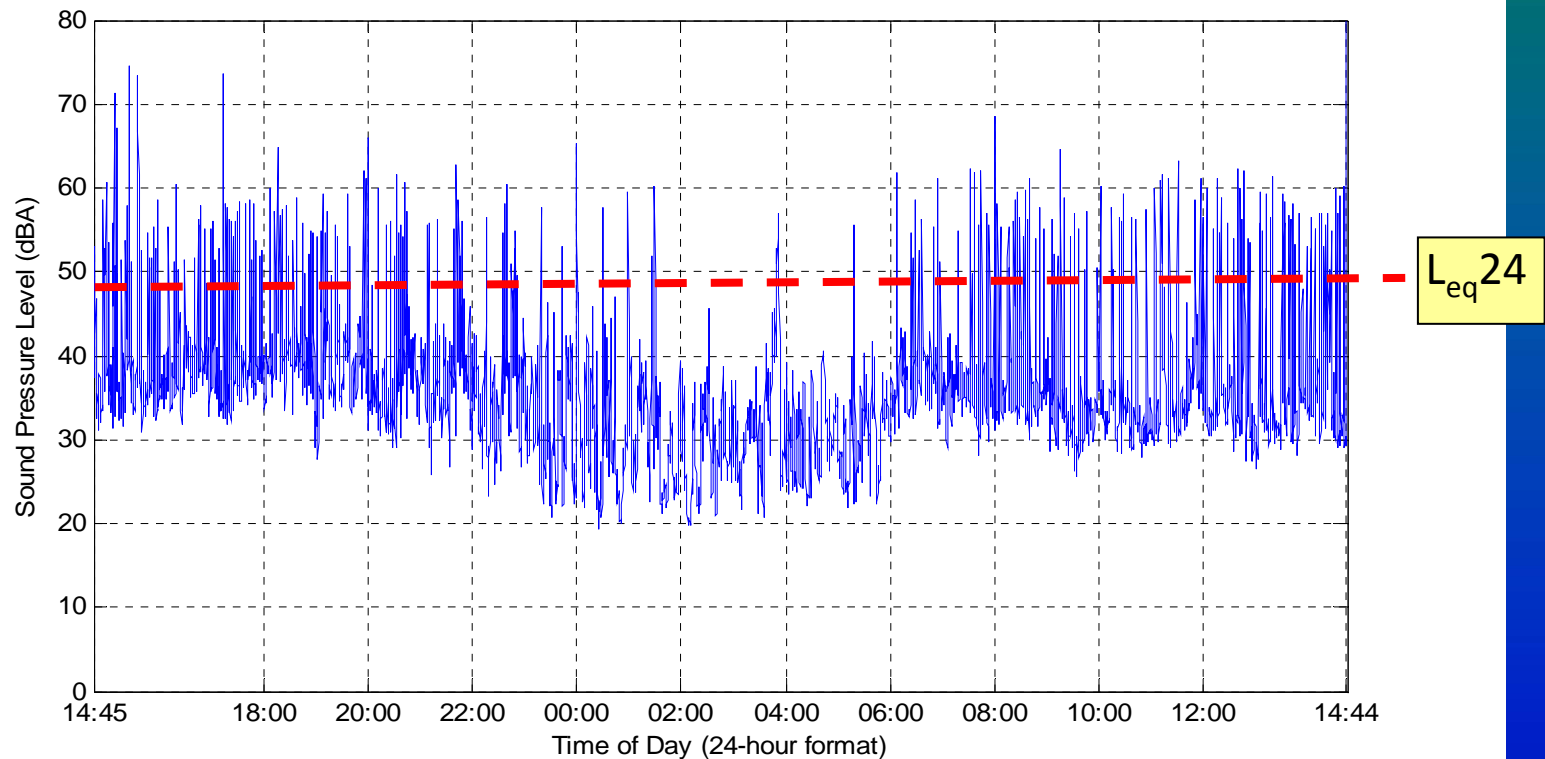
# Weighting Networks for Human Response



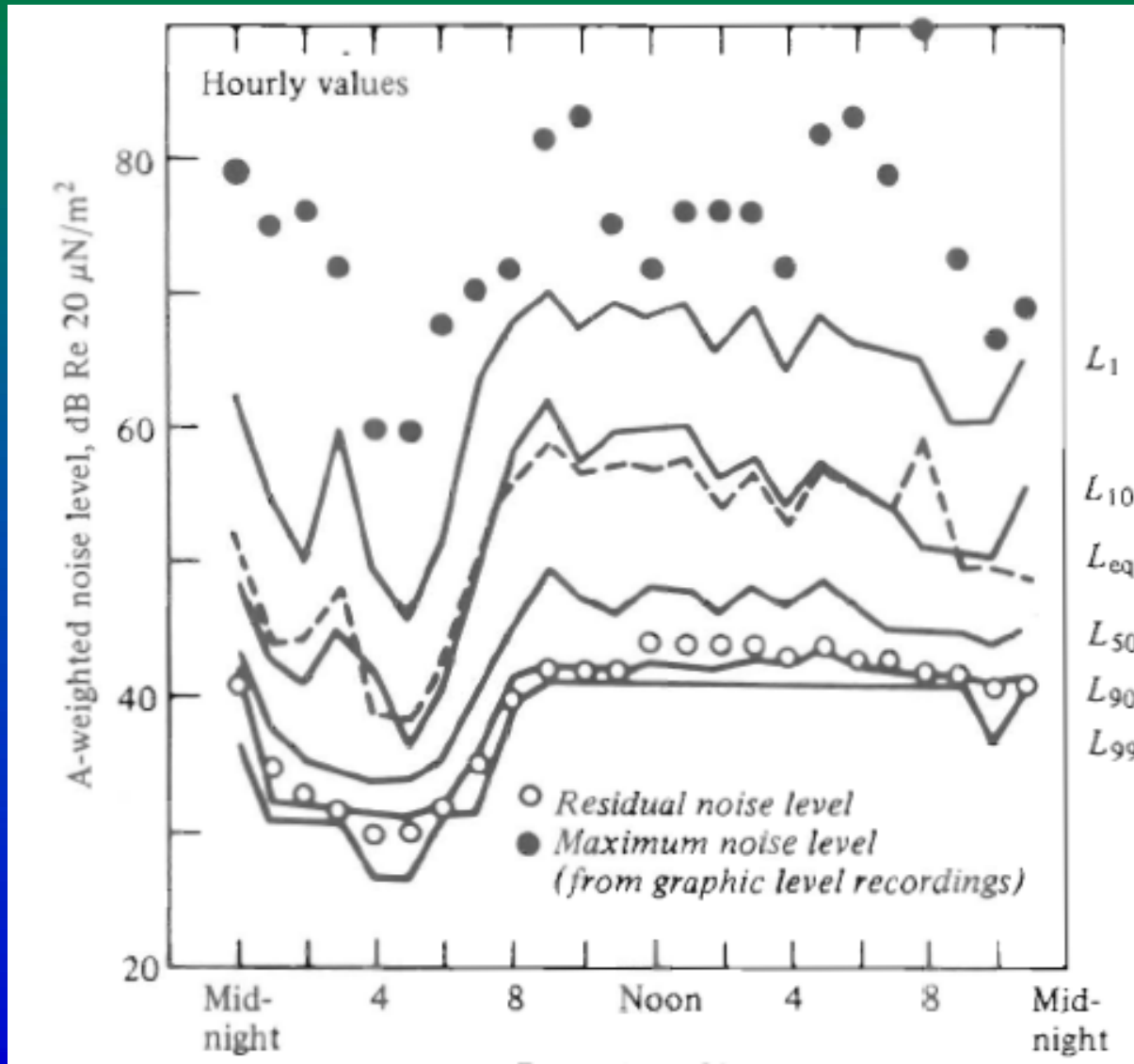
# Energy Equivalent Level - $L_{eq}$

- Accounts for the Fluctuating Levels
- Is Sensitive to the Peak Sounds
- Is NOT the Average Sound Level
- Is Used in the Majority of Sound Regulations (City of Edmonton UTPNP)

# Energy Equivalent Level ( $L_{eq}$ )



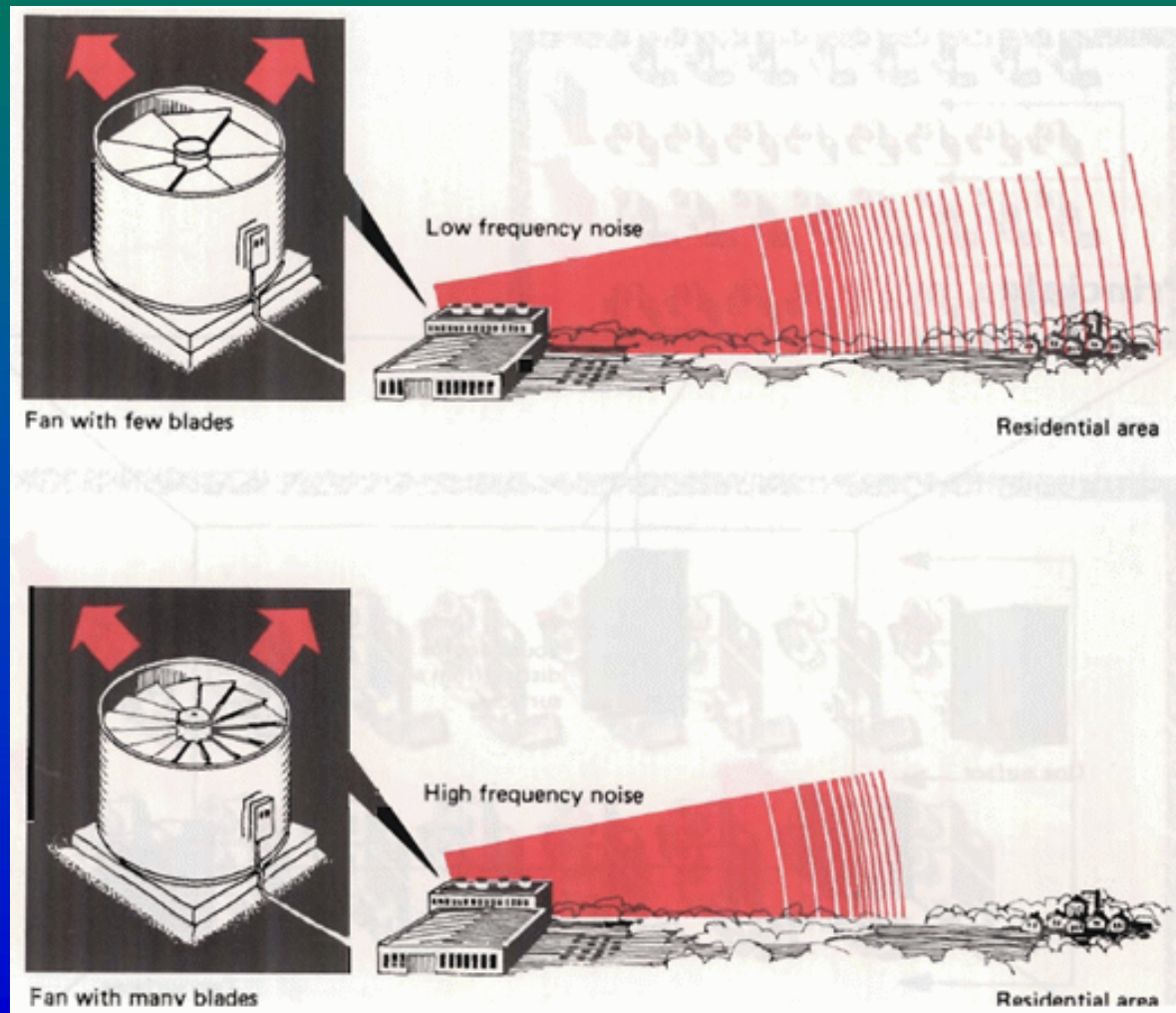
# Energy Equivalent Level ( $L_{eq}$ )



# Reality of Noise Measurement

- Use crude approximations to measure complex human reaction to noise
- Noise levels must be taken in a specific context and at a certain position.
- Noise measurements must account for fluctuating levels – use  $L_{eq}$

# Sound Propagation (Frequency)



# Sound Propagation

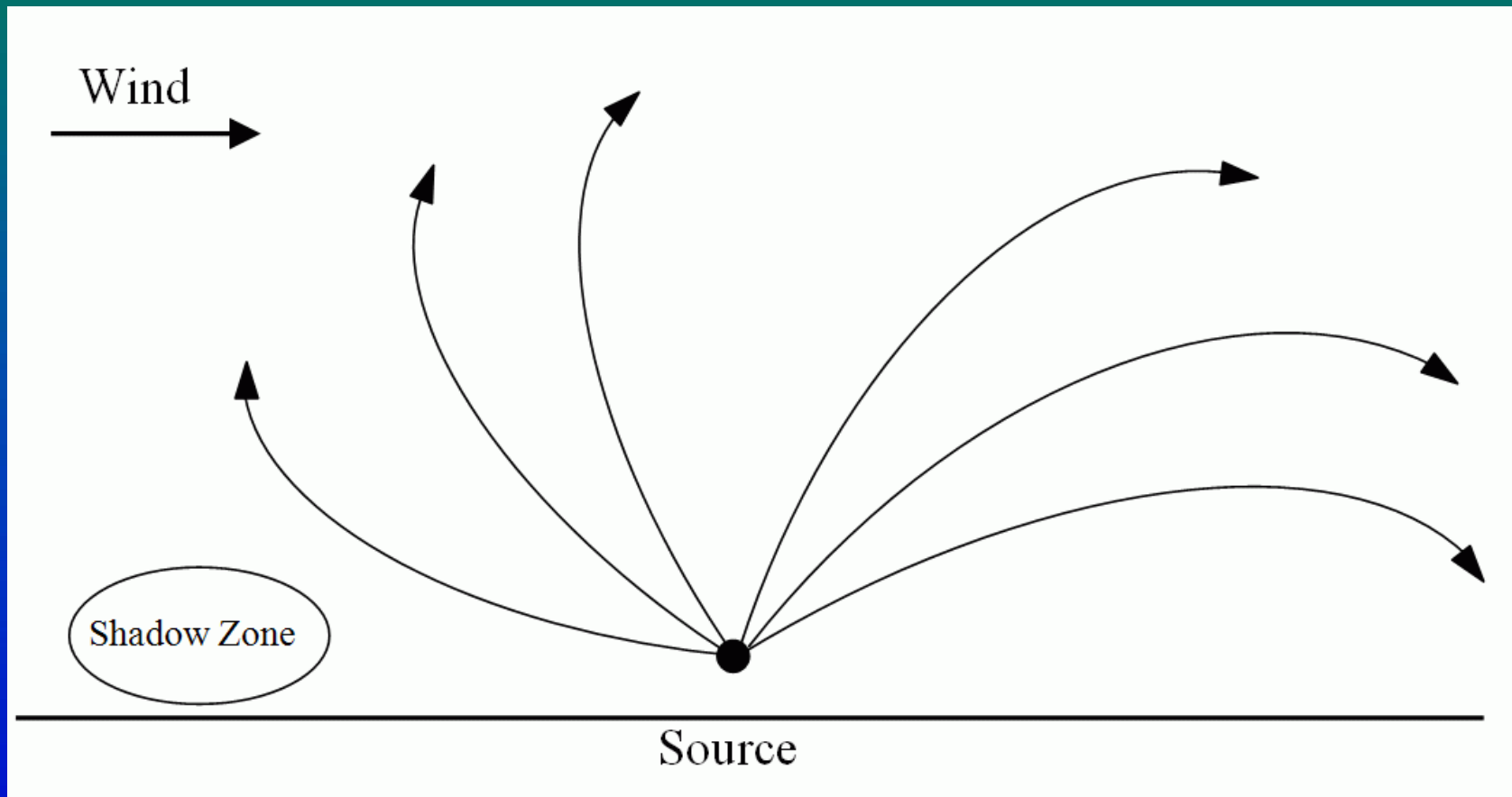
**Myth:**

**“Some days the noise seems way louder than other days”**

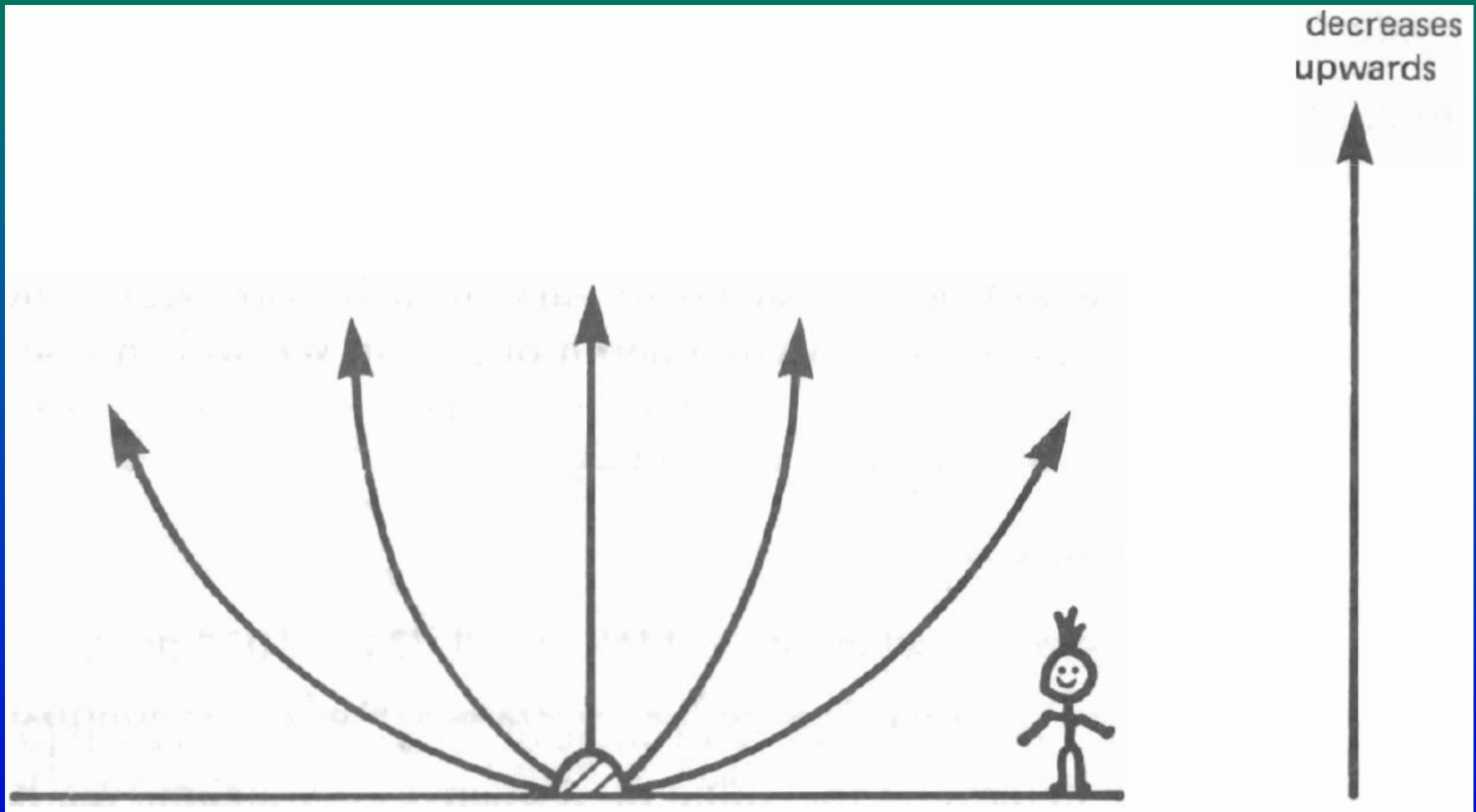
**Reality:**

**Absolutely. This is caused by environmental effects. The small variations in traffic volumes from day-to-day have minimal impact**

# Sound Propagation (Wind Effects)

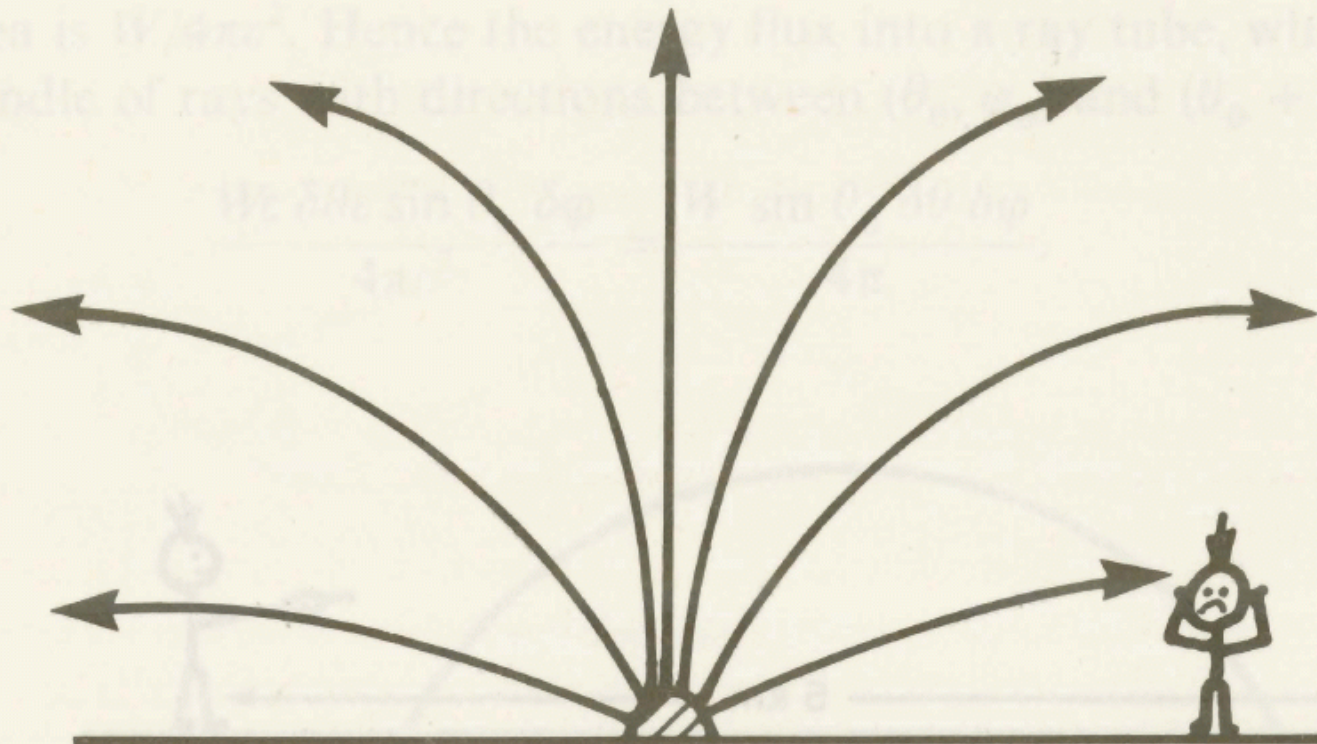


# Sound Propagation (Temperature Effects)

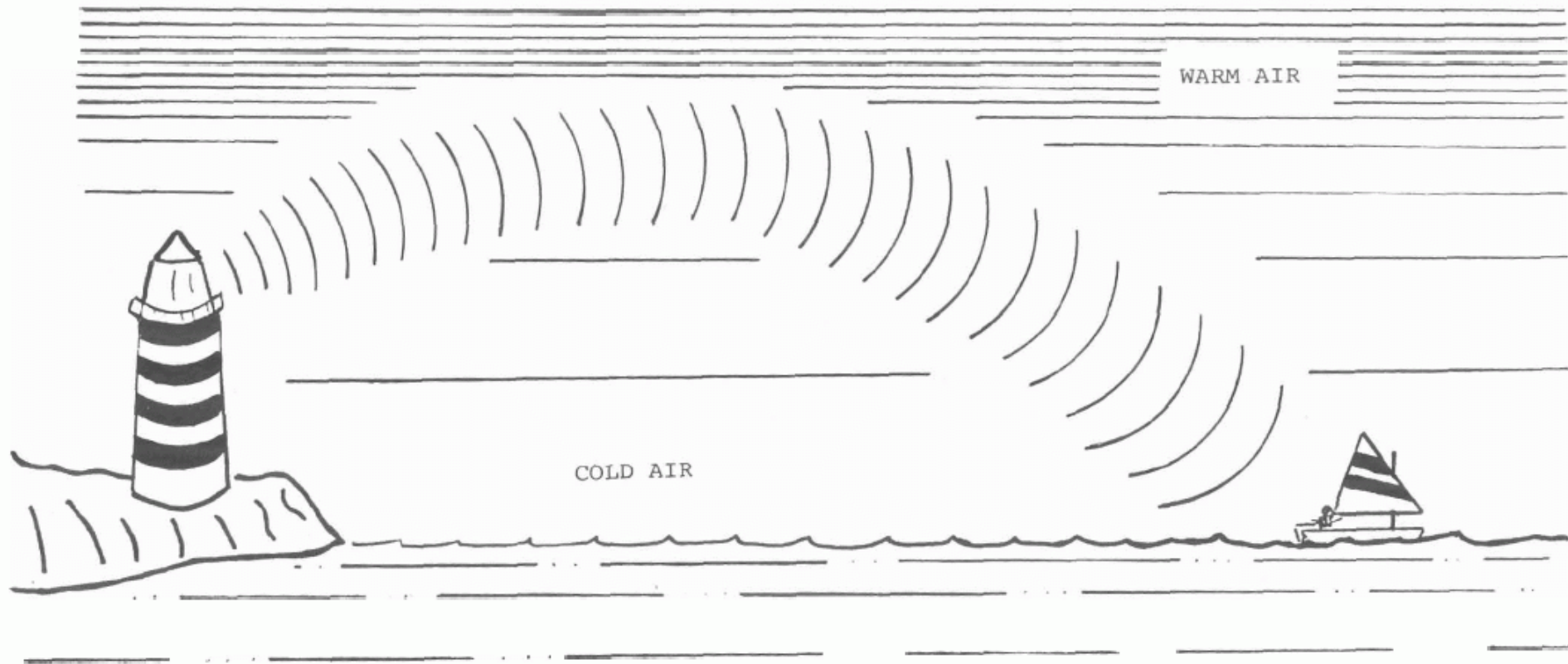


# Sound Propagation (Temperature Effects)

## Temperature Inversion



# Sound Propagation (Temperature Effects)



# Sound Propagation (Vegetation Effects)

**Myth:**

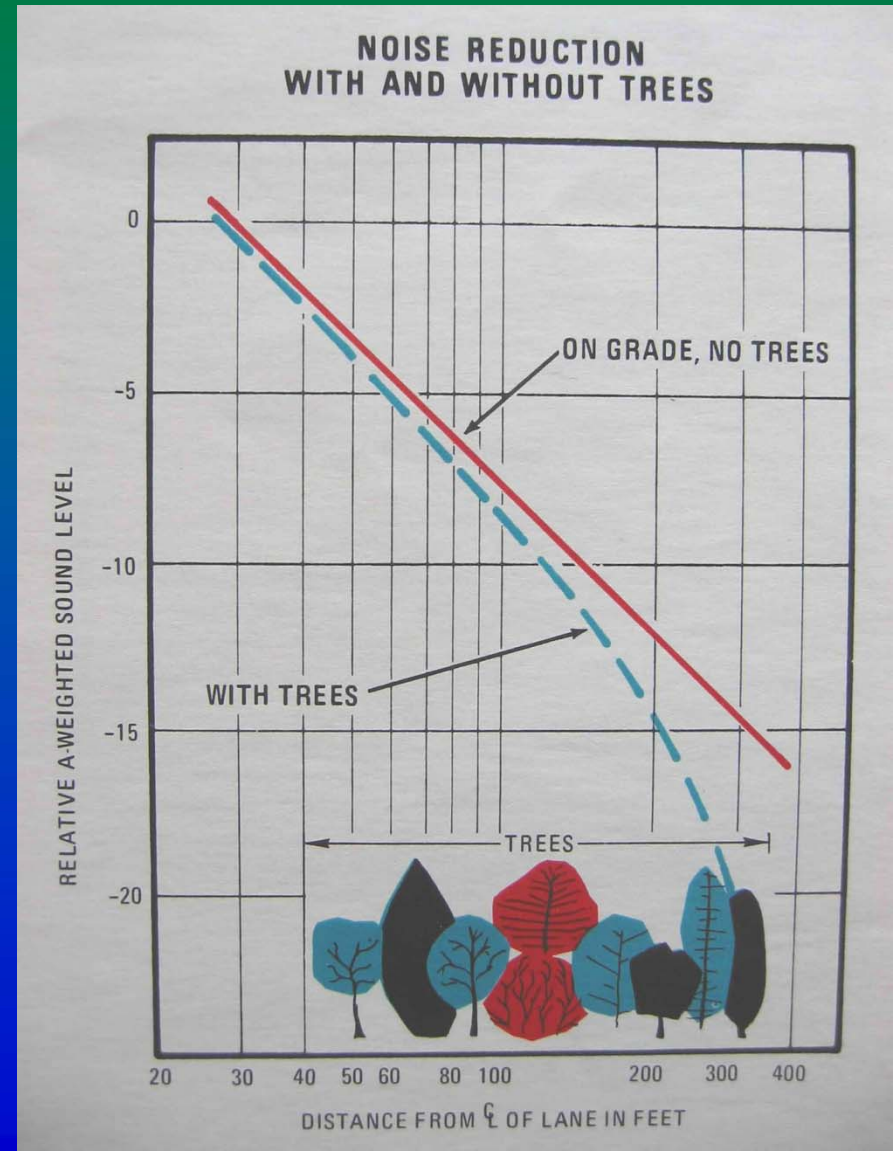
**“Let’s just put in some trees to block the noise”**

# Sound Propagation (Vegetation Effects)

**Reality:**

Trees/bushes are a very ineffective means of noise mitigation

Trees act as an acoustical placebo  
'out of sight – out of mind'

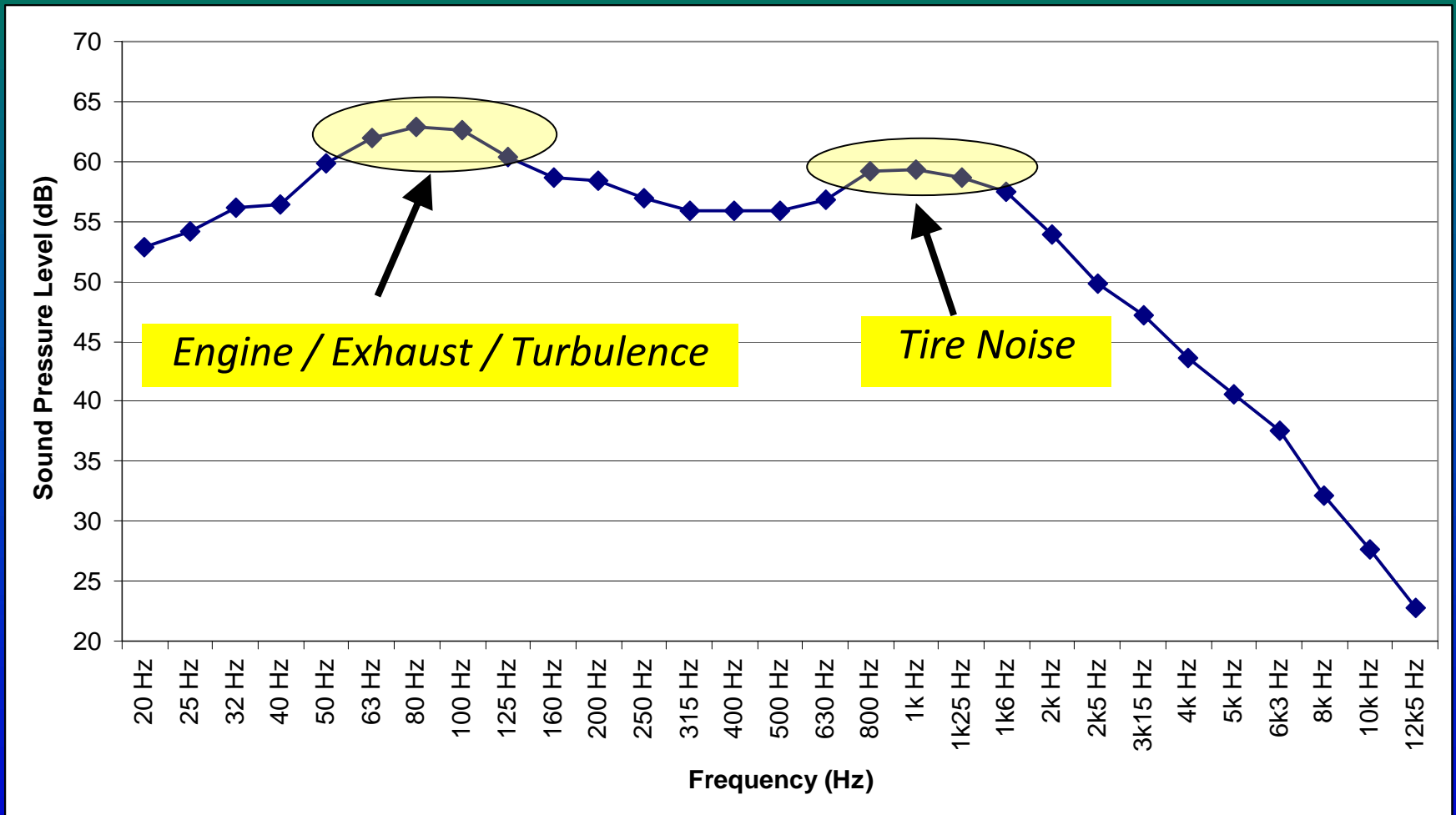


# Traffic Noise

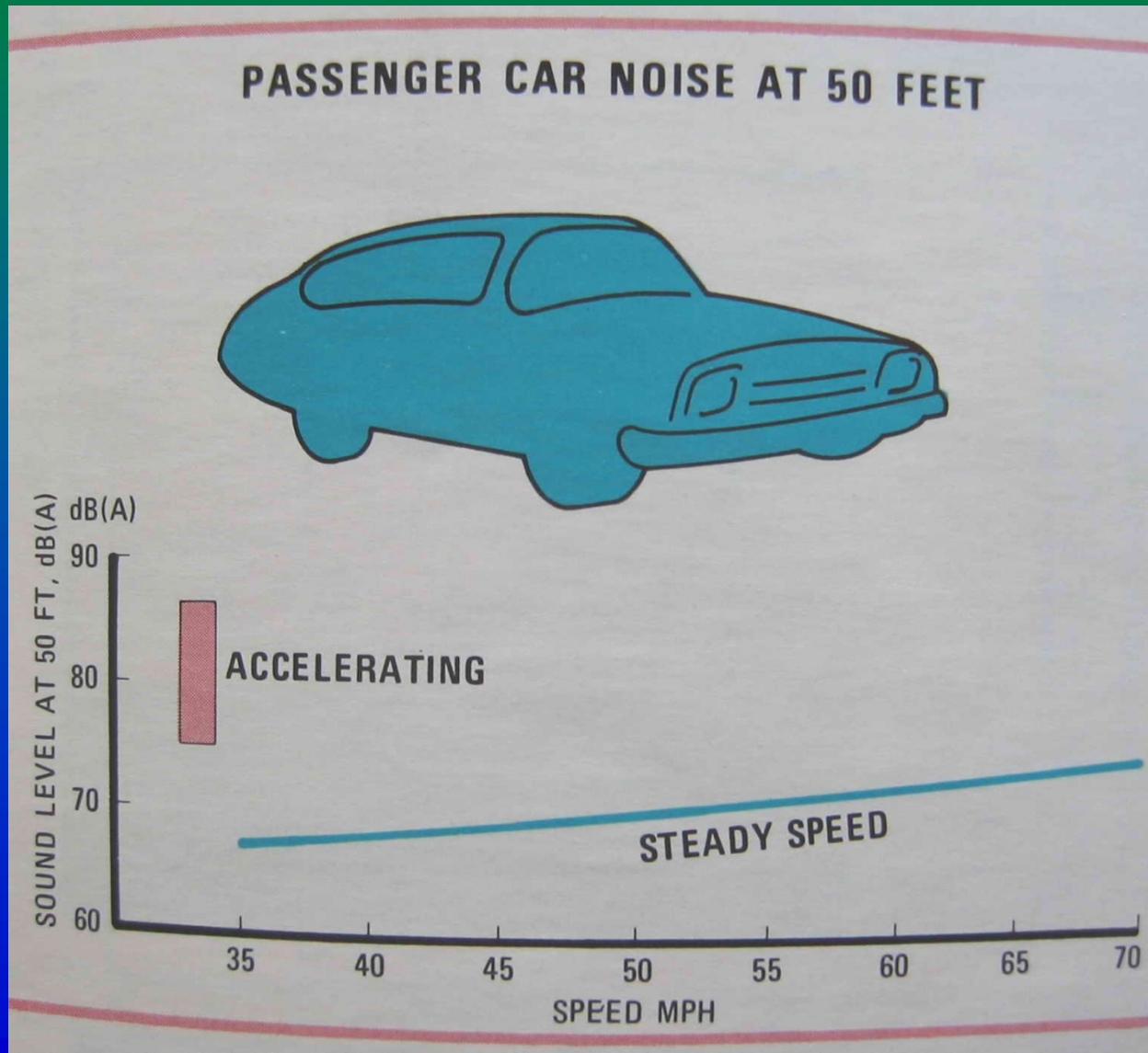
## (Sources)

- **Tire Noise (dominant above  $\approx 50$  km/hr)**
- **Engine Noise (more prevalent in heavy trucks)**
- **Exhaust Noise (more prevalent in heavy trucks)**
- **Turbulent Noise (dependent on vehicle geometry)**

# Traffic Noise (Frequency Content)

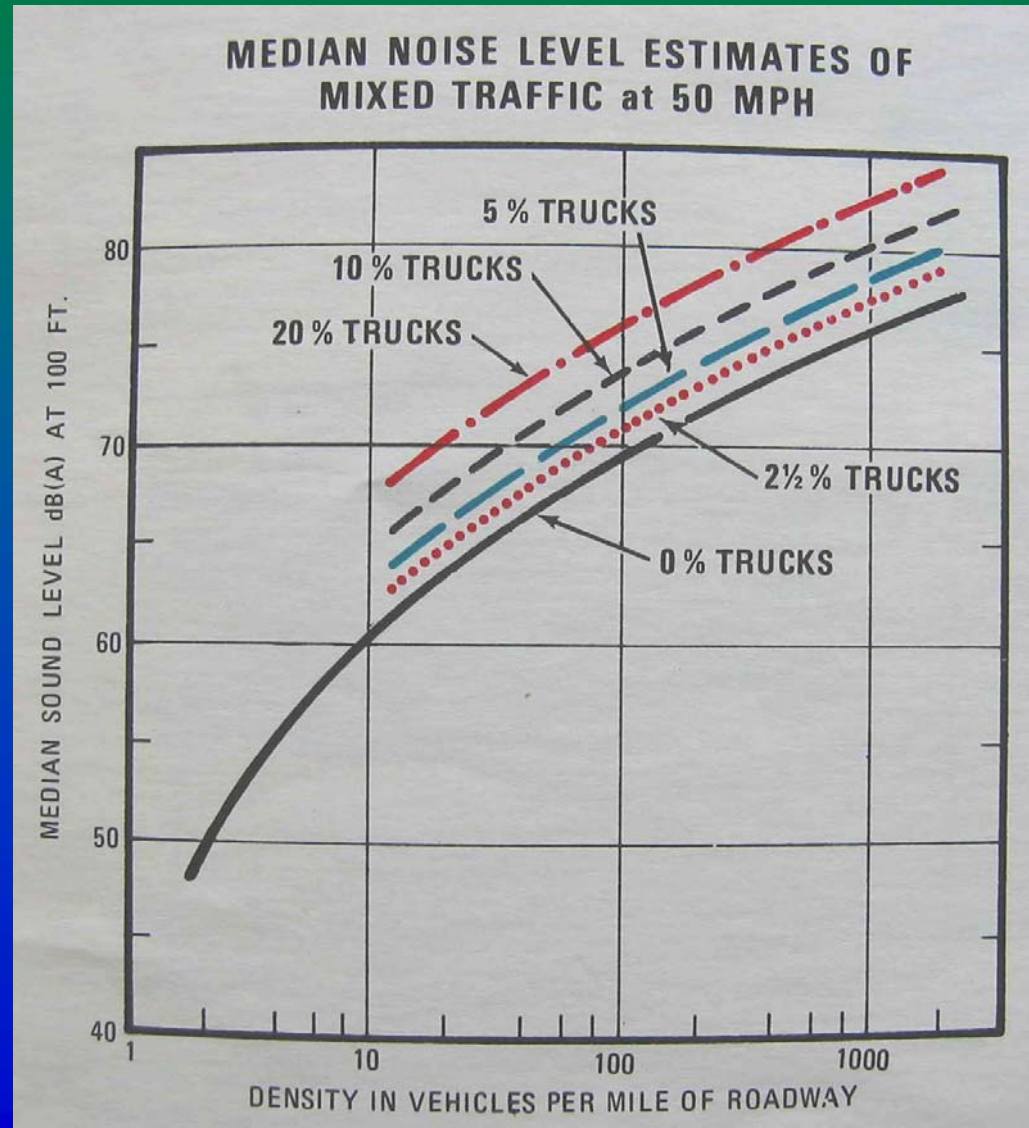


# Traffic Noise (Effects of Speed)



# Traffic Noise (Heavy Trucks)

8% Heavy Trucks  
on Whitemud Drive

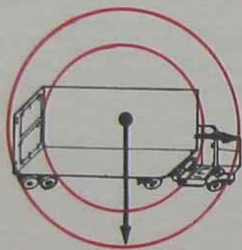


# Traffic Noise (Propagation)

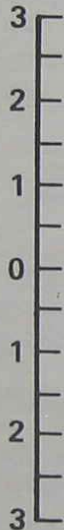
- Traffic noise is essentially a Line Source (v.s. point source)
- Geometric Spreading (3 dBA per doubling distance)
- 3 dBA increase per doubling of traffic volumes

## SOUND PROPAGATION COMPARISON

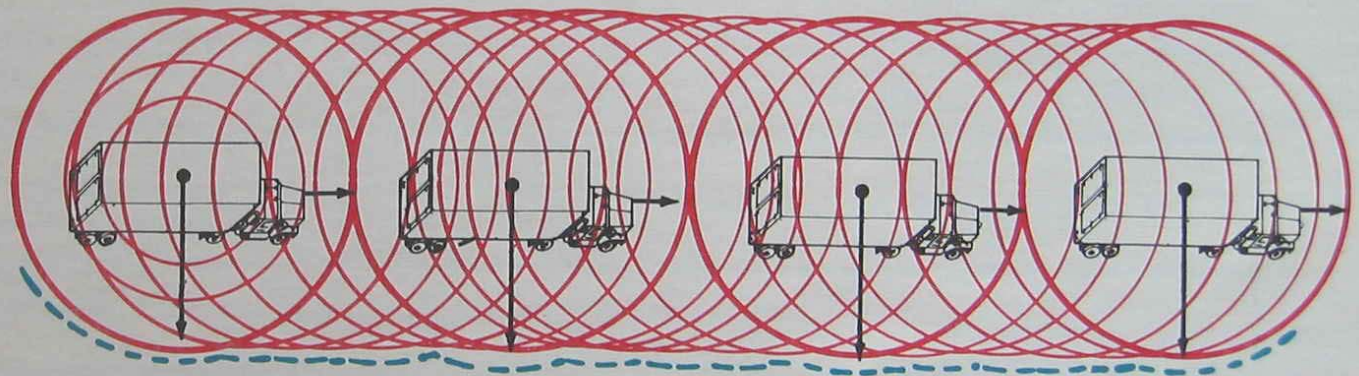
POINT SOURCE



PROPAGATION FIELD



LINE SOURCE



# Traffic noise

## (Tire noise)

### Myth:

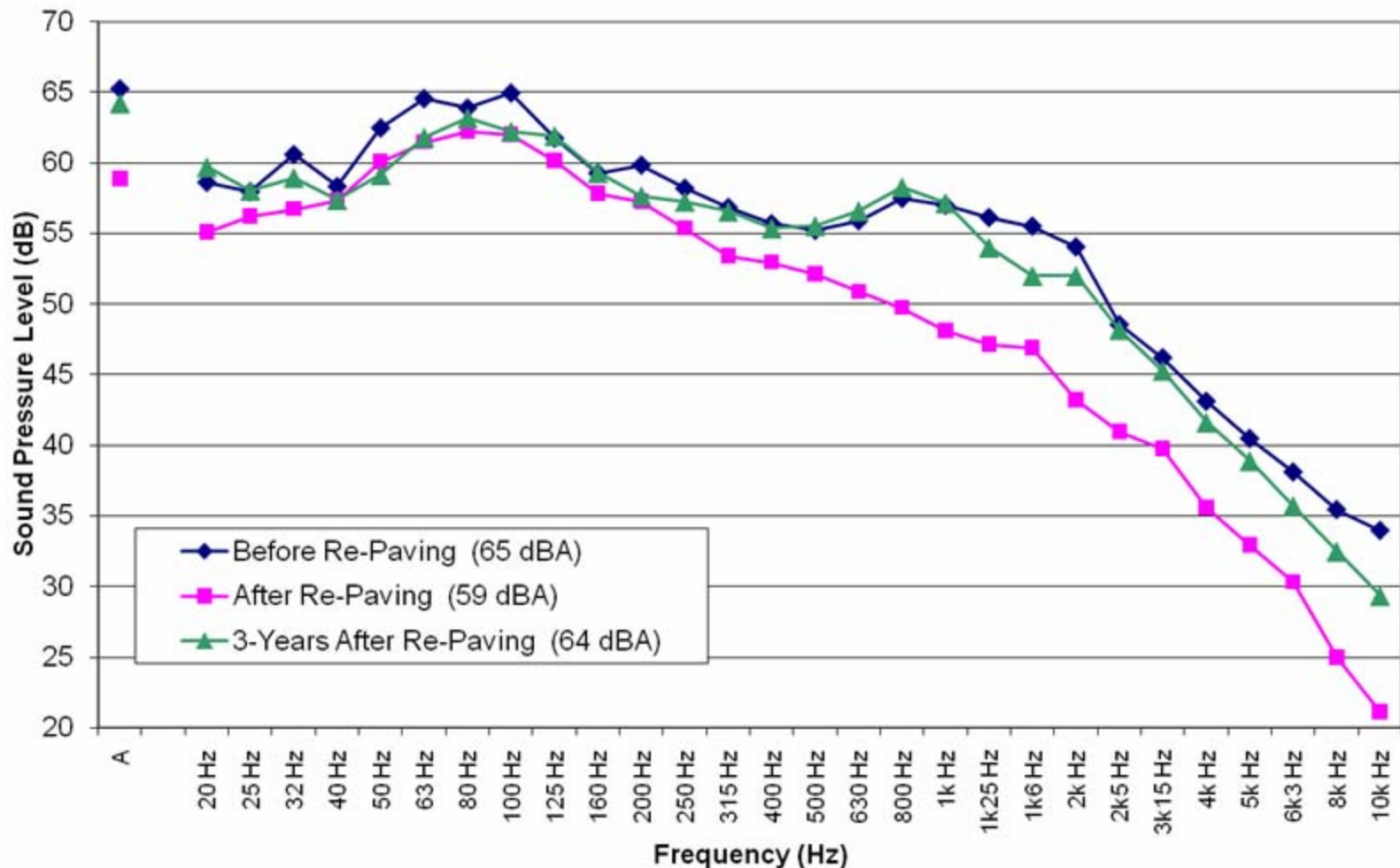
“Let’s just pave the road with ‘whisper’ asphalt”

### Reality:

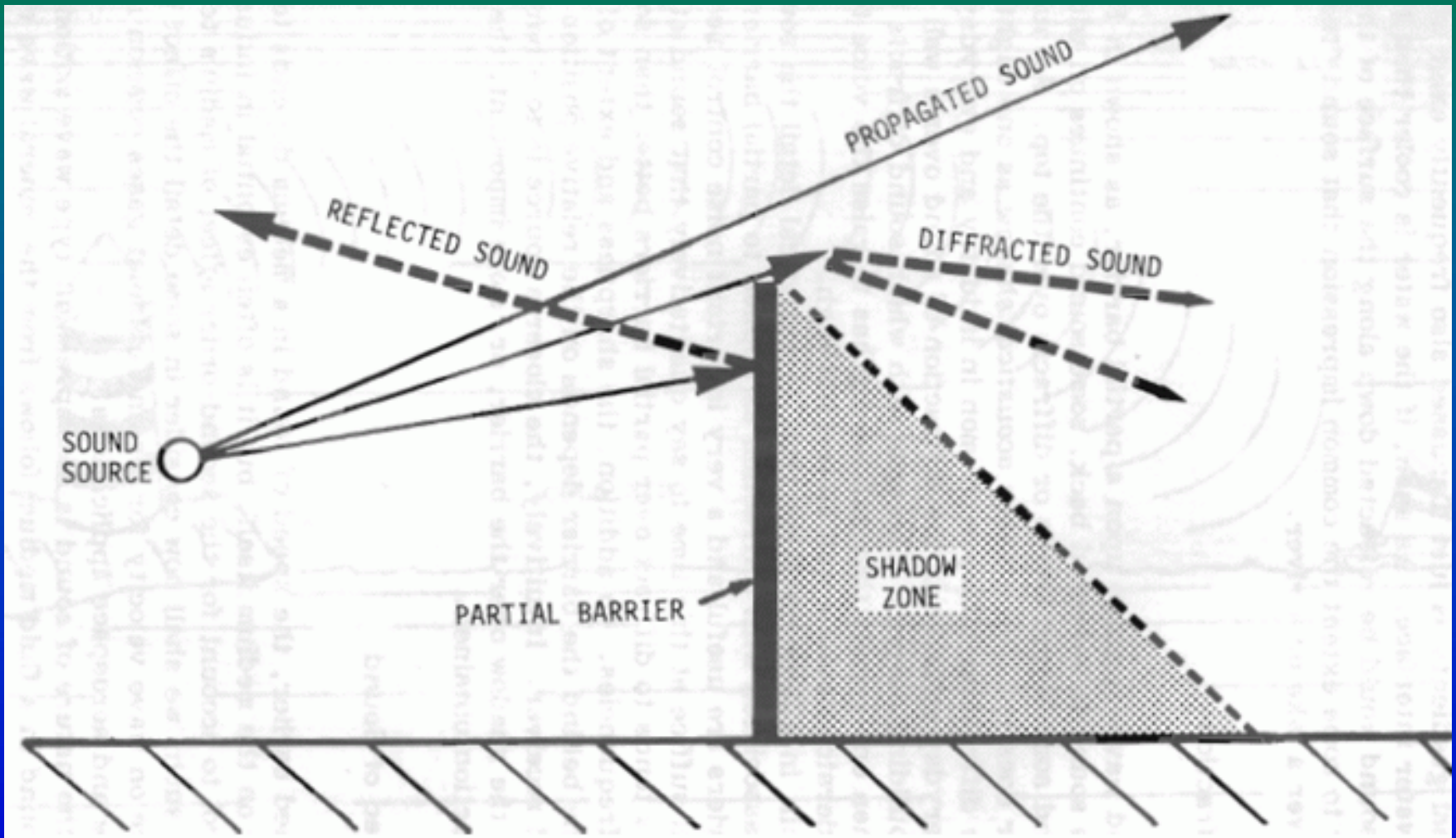
While there are notable benefits with rubber asphalt in the short term, several years of local studies indicate the effects fade quickly

# Traffic noise

## (Asphalt Rubber Crumb Noise Profile)



# Barriers Can Reduce Noise Propagation



# Barriers

## Myth:

**“Just put up a wall/fence and the noise levels will be reduced”**

## Reality:

**There are many factors which impact the effectiveness of a noise barrier. All need to be considered prior to implementation**

# Effectiveness of Barriers

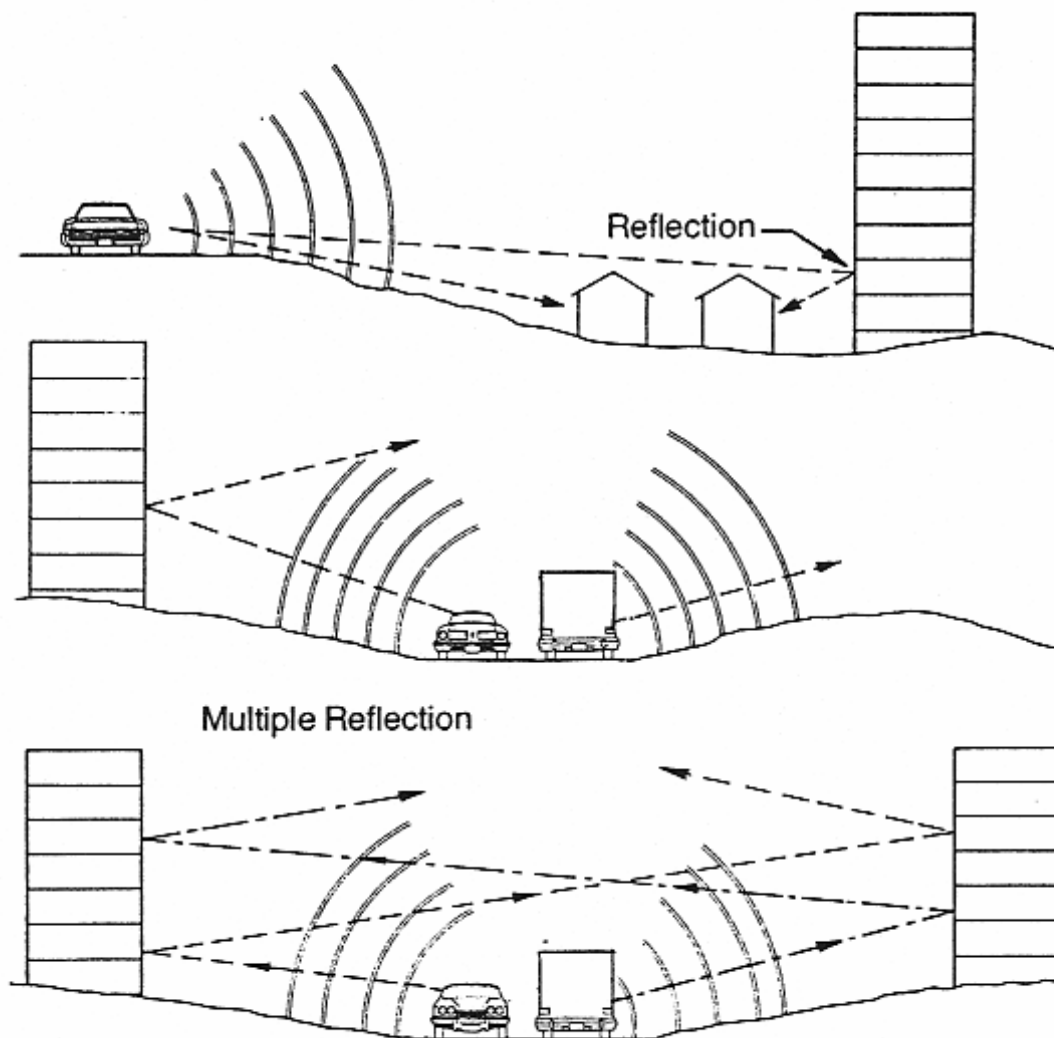
## Factors to consider

1. Frequency of sound – low frequencies “step over” barriers
2. Path length difference – the larger the better
3. Construction materials (need mass)
4. Reflections

# Reality of Barriers

- Potential limited by frequency and path length difference
- Can be negated by environmental factors when used outdoors
- Practical attenuation limit of 10 – 15 dBA

# Reality of Barriers



## Myth or Reality

Why is the person who snores always the first one to fall asleep in my class (and always sits in the first row)?



# Questions & Comments

**When you come to a fork  
in the road – take it.**

**Yogi Berra**

