



# I-5/SR 56 Interchange Project

## Traffic Noise Basics

### What Creates Traffic Noise?

Traffic noise is created by highway vehicles' exhaust systems, engines, and contact points between tires and the road. Of these, tire/road noise accounts for 75-90% of the overall roadway noise.

Generally, traffic noise is increased by heavier traffic volumes, higher speeds, and large trucks. Steep grades or faulty vehicle equipment can cause vehicle engines to strain, both of which increase traffic noise.

### What Traffic Noise Can Caltrans Address?

Of the primary noise sources created from highway vehicles, the noise generated from the interaction between the tire and road is the only variable that Caltrans can partly control or affect. Exhaust noise is typically controlled by mufflers, assuming they are in place and functioning properly. Engine noise is another noise that Caltrans cannot control.

### How Noisy Is Traffic?

Traffic noise levels are dependent on the number of traffic lanes, traffic volume and speed, and topography. To help associate traffic noise with other sounds people experience, Figure 1 shows decibel levels for other noise generators.

Common Outdoor Activities	dBA	Common Indoor Activities
Jet Engine, 300m (100ft)	110	Rock Band
Gas Lawn Mower, 1m (3ft)	100	
Diesel Truck, 15m (50ft) at 80km/hr (50 mph)	90	Food Blender, 1m (3ft)
Noisy Urban Area, Daytime	80	Garbage Disposal, 1m (3ft)
Gas Lawn Mower, 30m (100ft) Commercial Area	70	Vacuum Cleaner, 3m (10ft)
Heavy Traffic, 90m (300ft)	60	Normal Speech, 1m (3ft)
Quiet Urban Daytime	50	Large Business Office
Quiet Urban Nighttime	40	Dishwasher Next Room
Quiet Suburban Nighttime	30	Theater, Large Conference Room (Background)
Quiet Rural Nighttime	20	Library
	10	Bedroom at Night, Concert Hall (Background)
	0	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Figure 1

Source: Caltrans, District 11

People generally can perceive a noise level change that is 3 decibels or greater.

### When Is Traffic the Noisiest?

Free-flowing traffic just before or just after peak traffic periods is often the noisiest. Peak traffic periods generally result in lower noise levels due to congestion which lowers traffic speeds.

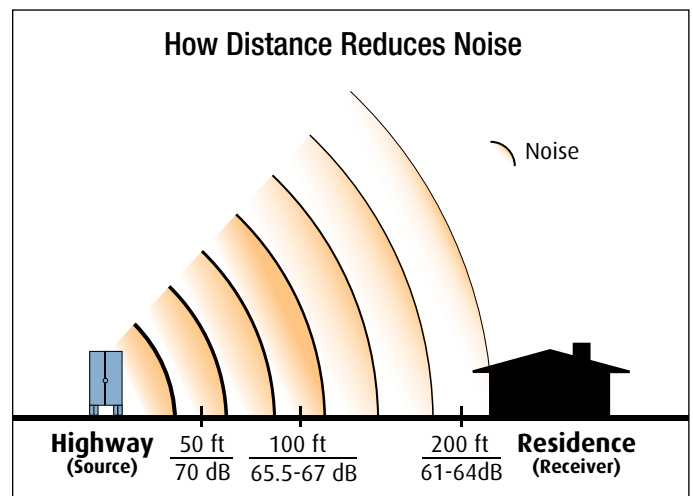


Figure 2

Source: Caltrans, District 11

### Can Environmental Factors Change Traffic Noise Levels?

Yes, environmental conditions can have a profound effect on noise levels between the source and a receiver that is within 200 feet of a highway. Wind is the single most important meteorological factor within 500 feet of a highway. Other factors such as air temperature, humidity and turbulence have significant effects on noise levels.

Also, the distance between a highway and a residence affects noise. Doubling the distance between the source and receiver will result in a noise level reduction of 3 to 4.5 decibels depending on the surface composition over which the noise is traveling. "Hard sites," or reflective surfaces, like parking lots or smooth bodies of water, typically reduce noise by 3 decibels when the distance between the source and receiver is doubled. "Soft sites," or absorptive surfaces, like dirt, grass or scattered bushes and trees typically reduce noise by 4.5 decibels when the distance between the source and receiver is doubled. (See Figure 2).

### Besides Distance, What Else Can Reduce Noise?

Noise can be reduced at a residence or other location by using a noise barrier. For the noise barrier to be effective, it needs to be located so it breaks the line of sight between the noise sources and the residence or other structure. This break is usually created by constructing a physical barrier, such as a wall or earthen berm, depending on the site conditions (See Figure 3).

### What Environmental Factors in the I-5 North Coast Corridor Could Affect Noise?

The hills, mesas and canyons in the I-5 North Coast Corridor make reducing noise with a noise barrier between the highway and adjacent structures a challenge. These factors can reduce the effectiveness of noise barriers. Noise barriers only effectively reduce noise for residences

and buildings if they block, absorb, or redirect the noise. Many times residences up or down hill from a noise barrier will not experience a reduction in noise.

### Can Trees Block Traffic Noise?

Generally, no. To reduce traffic noise by 5 decibels, a row of trees must extend at least 16 ft. above the line of sight between source and receiver, must be at least 100 ft. wide, and must be dense enough to completely obstruct a visual path to the source. It is not practical to plant enough trees along a highway to use this approach as an abatement strategy (See Figure 4).

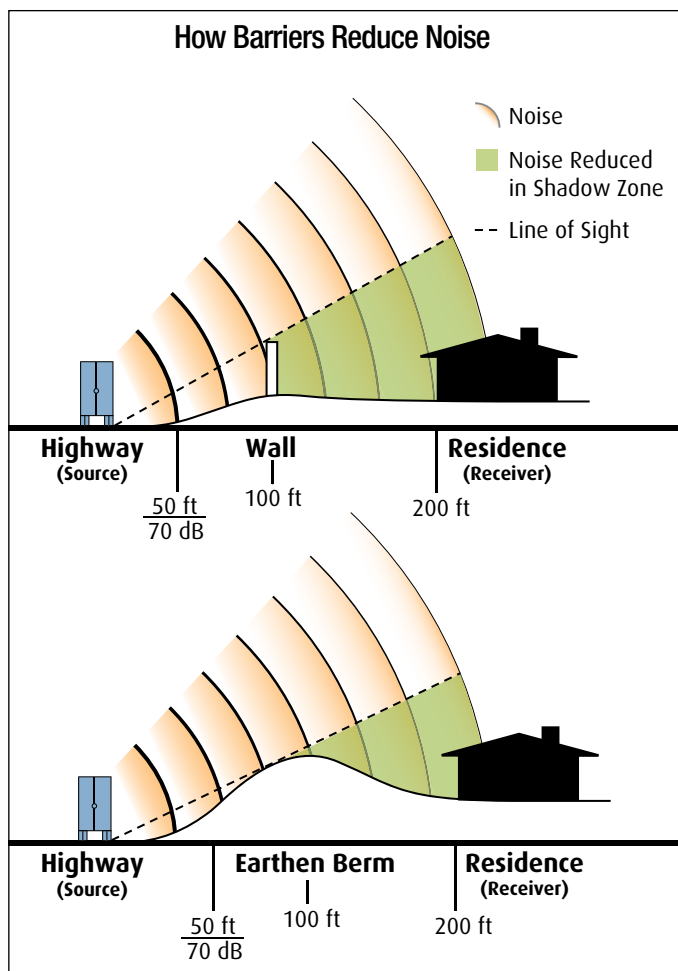


Figure 3

Source: Caltrans, District 11

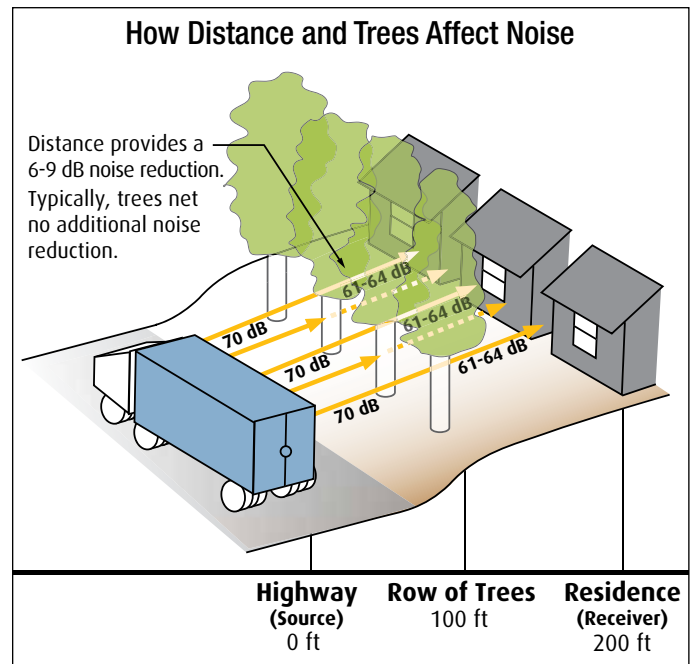


Figure 4: Generally, a row of trees nets no significant noise reduction beyond the reduction that occurs as sound dissipates over distance. Source: Caltrans, District 11

### Will Doubling Traffic Result in Double the Traffic Noise?

No. Doubling traffic volumes generally increases noise by only 3 decibels. For comparison, the human ear perceives each 10-decibel increase in noise level as a doubling in loudness.

For more information, log-on to:  
<http://www.keepsandiegomoving.com>

For questions, call:  
Caltrans Public Affairs: 619-688-6670