

THE USE OF SHRUBS AND TREES FOR TRAFFIC NOISE ATTENUATION

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Introduction

Shrubs and trees are planted in narrow and dense strips along some highways. The primary purpose is to beautify the landscape. Another desired goal is to reduce the traffic noise. The purpose of this report is to discuss the effectiveness of “vegetative barriers.”

Strip of Oleander Shrubs

Hendricks, in Reference 1, measured the sound attenuation of a continuous strip of oleander shrubs. The shrubs were at least 2.4 meters high and 4.5 to 6 meters wide, planted along the edge of a highway shoulder. He found that these shrubs provided sound attenuation of 1-3 dBA at a distance of 15 meters from the rear edge of shrubs.

Single Line of Pine Trees

Hendricks also measured the sound attenuation of a single line of pine trees. The trees were planted about 7.5 meters from the edge of a highway shoulder, 12 meters tall, 9 meters in diameter. The trees were spaced 3-6 meters apart, with low branches intertwined and touching the ground. These trees provided sound attenuation of 0-1 dBA at a distance of 18 meters from the rear edge of trees.

Wide Belt of Trees

Data from the Federal Highway Administration shows that a 30-meter belt of dense trees can provide 5 dBA of attenuation. Furthermore, a 60-meter belt gives 10 dBA of attenuation. This data is given in Reference 2.

Soil Attenuation

Sound waves travel through the ground as well as the air. The roots from trees and shrubs help keep the soil porous. The ground waves are thereby attenuated, as discussed in Reference 2.

Psychological Effects

Sound is a physical parameter. On the other hand, noise depends on human perception. Dense foliage can provide a visual barrier between the traffic and the nearby residents. A narrow vegetative barrier may not provide significant sound attenuation, but it may serve to reduce complaints about traffic noise.

Complaints are particularly common after an existing vegetation barrier is removed.

The Florida Sun-Sentinel newspaper reported on March 22, 1998 that the removal of thick holly trees from Interstate 95 exposed Deerfield Beach condominium residents to interstate noise.

The Florida Department of Transportation removed the thick shield of holly because they are considered an “invasive exotic species.”

Mr. Joe Heimowitz, a spokesman for residents, reported that he could no longer open the windows in his condominium nor sit next to the pool and visit with a neighbor. “You really don't want to live here on a Friday when people leave work early for the weekend. It's like the Indy 500, including the dust and fumes.”

The article did not mention whether any acoustical measurements were taken before or after the tree removal. Interestingly, Mr. Heimowitz was seeking the construction of a concrete noise barrier as well as the replanting of trees, according to the article.

Conclusion

Unfortunately, adequate right-of-way is seldom available for a 60-meter belt of dense trees. A simple wall, 5 meters high, can provide greater attenuation than this belt, as discussed in Reference 2.

The optimum solution in many cases may be a “green” or “living” barrier that incorporates vegetation and structural materials for noise abatement.

References

1. R. Hendricks, Traffic Noise Attenuation as a Function of Ground and Vegetation, TD100:CA 95-23, CALTRANS, office of Materials Engineering and Testing, Sacramento, CA. 95819, July 1995.
2. C. Harris, Handbook of Acoustical Measurements and Noise Control, McGraw-Hill, New York, 1991.