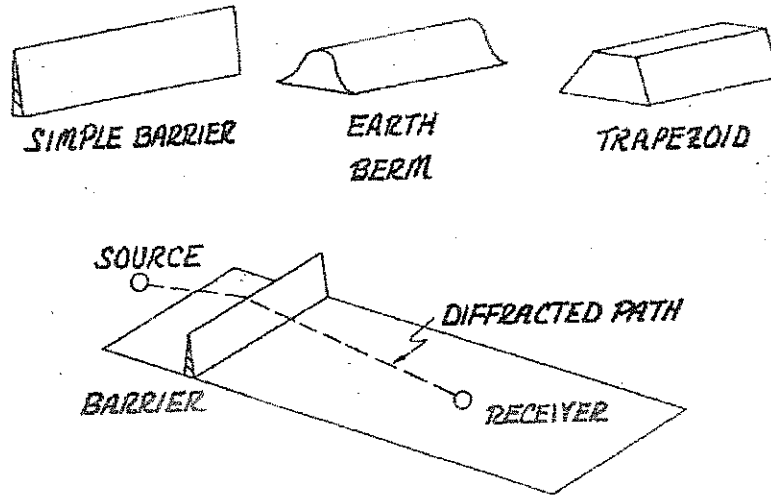


Abstract

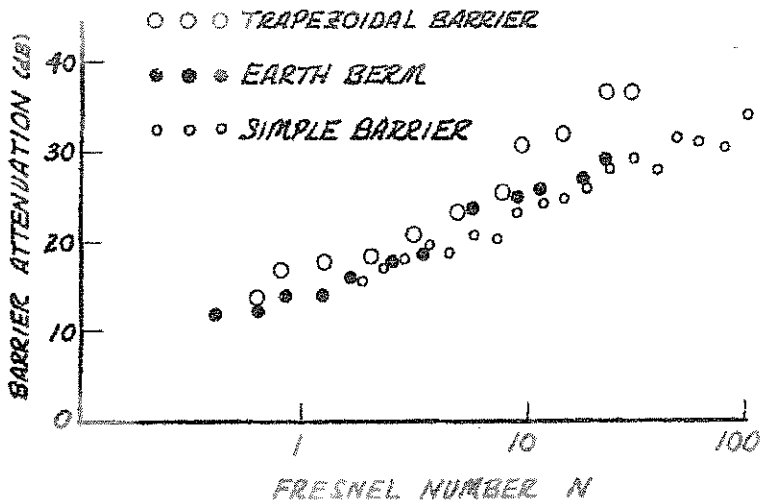
Model Studies of Acoustical Barriers

An experimental study was conducted to validate analytical models in the use of acoustical barriers to reduce noise from a source to a receiver. A 64:1 ratio scale model was used evaluate the noise reduction of several physical barriers. The barrier set-up is shown below with the barriers that were evaluated.



The range of performance of these barriers was different, with a barrier having a **trapezoidal cross-section** being the most effective. The performance of this barrier resulted in a noise reduction of 15 to 30 decibels at the receiver. The level of noise reduction required is a function of the level of noise generated by the noise source and the required level of sound at the receiver. A larger barrier is required for either a higher source level (e.g. high volumes of traffic at high speeds) or lower levels of sound at the receiver (e.g. sound level in a bedroom).

The research also demonstrated that trees and shrubs placed on top of these barriers **reduce** their effectiveness, as the sound is scattered and redirected over the barrier. Landscaping may be placed on either side of the barrier for aesthetic reasons.



The amount of noise reduction is a function of the separation between the source and receiver, the height of the barrier, and the frequency of the noise source (Fresnel number). A Fresnel number between one and ten is typical for an expressway and residential layout.

A high-speed expressway is considered a line source of noise as the moving traffic generates a line of noise sources that is emitted perpendicular to the line of traffic flow. An acoustic barrier must be erected between the source of noise (automotive traffic) and the receiver (residential homes) along the expressway, to reduce the noise to acceptable levels during all periods of the day and night. Many prediction models exist to aid in solving these noise problems and are available from Department of Transportation or private sources.