CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Ryan D. Yoon

Project Number
31145

Project Title
Noise Barrier Efficiency: Concrete Wall vs. Earth Berm

Abstract

Objectives/Goals
The purpose of this experiment is to research and decide which material would work best as a noise barrier to prevent noise pollution. The materials that will be tested include earth mounds, concrete walls and without any noise barriers.

Methods/Materials
The materials include: three Extech 407730 Decibel Meter, Decibel Calibrator ND9B, a 30 meter tape measure, and a stop watch. To test the noise barrier, arrive along a highway with the noise barrier being tested; concrete wall and earth berm. Calibrate decibel meters and set up the three decibel meter at their designated locations, in front of the noise barrier, 1m behind the noise barrier, and 5m behind the noise barrier. Record the noise level in decibels on a data sheet every 30 seconds for 10 minutes for each decibel meter simultaneously. Repeat steps 1 to 7 for each noise barrier.

Results
The earth berm noise barrier proved to be the most effective by reducing an averaged total of 19.31815 decibels and the concrete noise barrier reduced an averaged total of 17.10903 decibels. The highway alone without any noise barrier reduced an average total of 9.18185 decibels.

Conclusions/Discussion
The reason why the design of an earth berm worked better than a concrete wall is mostly because of the angle that it is at. If an earth berm is steeper than approximately 22 degrees, it will work efficiently. Wall. Concrete walls are based on their height. For every meter added to the height of the noise barrier, 1.5 decibels will be reduced. Because it's easier to make an earth berm slightly steeper than it is to add a meter of concrete, earth berms are in general much more efficient. Another reason is because of the material. The earth berm is made of loosely packed soil so therefore, when sound waves make contact, it is not able to vibrate because there is so much air in between. Because the concrete is a much more rigid material with very little air, the sounds waves can easily vibrate and transmit through to the other side.

Summary Statement
By testing the decibel level of several locations by highways with different noise barriers and observing the results, we can see which noise barrier is the most effective.

Help Received
Mother helped by providing transportation to different testing locations