



A Look at Environmental Noise, Part IV: Predicting Exterior Noise Levels

The previous articles in this series have discussed such issues as acoustics fundamentals, noise standards, and how to obtain accurate noise measurements. If our job consisted only of measuring existing noise sources and determining their compliance or non-compliance with noise standards, it would be comparatively simple. However, most of the time we are asked to provide noise assessments for projects that don't exist yet. How do we do that with any degree of certainty? This article will briefly discuss several of the methods we use to predict exterior noise levels.

Measurements

The easiest way to predict the noise levels that will be produced by a proposed project is to locate and measure the noise at either an identical or a substantially similar existing site. However, chances are the measured data will need to be adjusted in some way to allow for differences in equipment or operation that will occur at the new project site.

Manufacturers' Test Data

Nowadays, many equipment manufacturers recognize that noise is an issue. Therefore, they have had their equipment tested under laboratory conditions and can provide the consultant with valuable acoustical data, such as sound power levels.

Prediction Algorithms

In the absence of available equipment to measure, or the equipment manufacturers' data, it is sometimes necessary to use standardized prediction algorithms to estimate equipment noise levels. These are based on one or more studies that have been conducted over the years. Unfortunately, some of the algorithms are based on measurements of older technologies that may not accurately reflect today's equipment noise levels.

Computer Modeling

Computer modeling is usually employed in predicting transportation noise (e.g., traffic, railroad and aircraft). The noise prediction is calculated by input of many variables, any of which can have a dramatic effect on the result. Computer models can be extremely accurate, but it is essential to base the model on good data, and to calibrate the model with measurements of existing conditions.

Propagation

This is the hard part. Establishing the noise levels of the various sources (as described above) is comparatively simple. But numerous studies have been performed, and volumes written, about noise propagation.

At short distances (100' to 300') propagation can be fairly straightforward. Only intervening barriers need to be seriously considered. But at longer distances, we need to be concerned with ground and atmospheric effects. These can significantly increase or decrease noise levels, often within moments. This issue is very complex, and will be discussed in greater detail in a future article.

The Art of Predicting Noise

As indicated above, there are a number of tools that can be used to predict exterior noise levels. But the most important one, the reason we are hired, is experience. This is the “art” of predicting noise. Knowing when and how to tweak the models, and understanding the relationship between the many variables, is what makes the difference between a “prediction” and a realistic, reasonable estimate.

Next Article

In our next article, which will be the final one in this series, we'll look at how we determine what the interior noise levels will be for a proposed project.

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