



FDM 23-20-1 Introduction

July 28, 2011

Existing sound levels must be determined in order to establish a base level to which future levels can be compared.

Existing sound levels may be determined either by measurement or by computer modeling. Computer modeling using the latest version of the FHWA Traffic Noise Model (TNM) should be used when there is an existing highway and where no other noise sources are present that would override the effects of the existing highway. When an outside noise source would affect the noise levels from the highway or where no highway presently exists, sound levels should be measured. Existing levels, whether predicted or measured should be in terms of hourly Leq.

FDM 23-20-5 Measurement

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Existing sound levels obtained by measurements with a sound level meter should incorporate the sound from existing roadways, as well as other sounds that constitute the existing sound level. Existing sound levels incorporate all background sound audible within a specific area at a particular time, including those natural and mechanical, highway and non-highway sounds. The chief concern in determining existing noise levels is to select locations and times for measurement that will provide values that are truly representative of the existing conditions.

5.1 Site Selection

Each highway improvement project is unique in regard to the location of the sound level measurement sites. The characteristics of the project and surrounding area should be evaluated to determine the general location or vicinity of individual measurement points.

On-site conditions must be considered in determining the exact location. Readings should be avoided within ten feet of large reflective surfaces such as billboards, cut or fill embankments, the sides of buildings, or automobiles or trucks.

Land use maps can be useful in identifying existing noise sources and noise sensitive land uses. Schools, parks, nursing homes, hospitals, and places of worship are especially sensitive to noise impact since these areas require quiet for communication. Each Land use Category of the Noise Level Criteria for Considering Barriers listed in Table 1 (see [FDM 23-30-1](#)) applicable in the study area should be included in a sound level survey. One measurement site representative of each applicable Land Use Category near the existing or proposed highway route may be used to represent the sound levels at similar land uses along the route. If traffic conditions or topography vary significantly, sound level measurements at many locations may be required. A number of sites should be specifically located near existing highways or other noise sources in the study area to provide data representative of the existing sound levels in the community.

5.2 Sampling Periods

Since prediction of future sound levels is based on traffic volumes approximating the worst case traffic flow of the design year, any comparison of future with existing sound levels is only meaningful if traffic conditions for the two situations are equitable. It is, therefore, desirable that measurements be obtained during periods of peak hour traffic (see [FDM 23-15-1](#)).

Unfortunately, it is simply not practical to obtain all field measurements during periods when the above traffic conditions exist, so they must be measured at other times. The time of day during which ambient sound level measurements should be made is determined by the characteristics of the project and surrounding area. On-site conditions may dictate that readings not be taken at certain times. Readings should be avoided during the following conditions:

1. Wind Velocity - Usually when the wind speed is greater than ten mph and absolutely when above 12 mph.
2. Precipitation - When it is raining or snowing, or when there is wet pavement or snow on the ground.

The selection of measurement sites and time periods must permit the normal background sound levels to be quantified as accurately as possible. Measurements should be avoided at times when temporary, nonrecurring

noise sources are present (i.e., construction equipment). The frequency of recurrence is important. If, for instance, sound levels from a fire truck siren are measured near a fire station, it probably represents very well the normal occurrence of the area; but if found in a quiet residential area, it is probably not representative, and a measurement should not be taken at a time when it is present. The same principle holds true for aircraft sound levels. If it is customary for the area, it should be recorded; if not, the noise level should be measured when aircraft are not present. If possible, the sound level meter should be placed in the "stand-by" mode or readings should be suspended, and the extraneous sound will be omitted from the readings. Certain types of areas, such as playgrounds, will be difficult to evaluate. If a noise source exists for a significant amount of time (approximately ten percent or more) during the desired time period, the source can significantly affect the Leq level, and it should be included in at least a portion of the readings.

If existing noise levels are measured along an existing roadway, the traffic should be counted and classified during the measurement period. The estimated speed of the traffic as well as all site or terrain conditions should be noted. This traffic data should then be modeled in the latest version of TNM to adjust the computer model specific to the project.

5.3 Equipment

An ANSI Type 1 or Type 2 integrating sound level meter shall be used for measuring existing sound levels.

FDM 23-20-10 Computer Modeling

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Existing sound levels can be predicted by computer modeling when field measurements are either impractical or unnecessary. Modeled levels should be validated through field measurements whenever possible though.

The computer modeling of the existing sound levels must be done by utilizing the latest version of TNM (see [FDM 23-25-10](#)).

Similar to the measurement procedure, the computer modeling of the existing levels must incorporate the sound levels from the existing project roadways as well as other roadways that constitute the existing sound level. If there is any non-traffic noise that contributes substantially to the existing level, it is recommended that measurements be taken in the field since the TNM program cannot model non-traffic sound.

When determining existing and future sound levels, it is always better to have too many receivers than too few, and this can easily be accomplished when using the computer model.