Influence of Weather Conditions on Traffic Noise Levels at Sites With Barriers

Lloyd A. Herman Ph.D., P.E.
Ohio University – Athens, Ohio
Phone: (740) 593-1472
E-mail: herman@bobcat.ent.ohiou.edu

Field measurements were conducted at 8 sites to determine the effect of weather conditions on sound levels for receivers shielded by traffic noise barriers. The study focused on the range of atmospheric variables considered acceptable to determine atmospheric equivalence for noise barrier insertion loss measurements, according to the American National Standards Institute (S12.8). Data was collected for receivers in the range of 30 m to 420 m from the noise barrier. Meteorological instrumentation consisted of three stations located at the beginning middle and end of the receiver range. The three dimensional components of wind speed and temperature were measured at high and low positions. Turbulence, wind shear and lapse rate were calculated from the acquired data. The atmospheric data was analyzed with regression techniques to define the relative magnitude or importance of each atmospheric variable affecting noise attenuation. The results show that cross wind speed, wind shear, lapse rate, and turbulence all influence the attenuation between an unshielded reference microphone and study microphones located in the surrounding community. Wind shear was found to be more significant for the distant receivers. At the farthest distances from the barrier, ray bending due to cross wind speed and wind shear appears to be much more significant than temperature or turbulence. The standard deviation of wind speed perpendicular to the highway at 10 m high above ground level appears to be the most important meteorological factor for receivers located within 120 m of the noise barrier. Overall, the influences of wind speed, turbulence, and temperature lapse increased in magnitude with increasing distance from the highway, even under relatively mild weather conditions.