

## **HUMAN SENSITIVITY TO GROUND-BORNE VIBRATION AND NOISE FROM RAIL TRANSIT**

Five North American Cities



### **PROJECT DESCRIPTION**

Many communities located near rail transit rights of way are exposed to ground vibration produced by passing trains. Train induced vibrations can disrupt sleep, interfere with conversation, create rattling noises, distract audiences in lecture and concert halls, and affect vibration sensitive equipment. Community response to rail induced ground vibration has not been extensively researched. While the well-known Schultz dose-response curve is routinely used to predict the prevalence of annoyance produced by airborne transportation noise, no similar relationship has gained widespread acceptance for noise and vibration due to ground vibration.

The National Academy of Sciences awarded a research grant (Transit Cooperative Research Program D-12 Study) to Acentech to develop a dose-response relationship between exposure to ground-borne noise and vibration generated by rail transit systems, and human annoyance.

Acentech's approach included telephone interviews with 1306 individuals in five North American cities: New York, Sacramento, Dallas, Toronto and Boston. The study also included field measurements in each city to estimate vibration and noise exposure at each interview location. The work produced several dose-response relationships between vibration/noise exposure and annoyance. When compared to the current noise and vibration criteria specified by the Federal Transit Administration (FTA), the dose-response analysis predicted a probability of 0.05 to 0.10 that a D 12 respondent would be highly annoyed by vibration and noise at the current FTA criterion levels.

The resulting dose-response curves will help regulating authorities review and revise existing policies and criteria pertaining to ground-borne vibration and noise.

# **Acentech**

### **CONSULTING SERVICES**

- Existing literature review
- Interviews
- On-site measurements
- Data analysis
- Final report

### **REFERENCE**

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*"Acentech and the research team produced a valuable piece of research that explored the relationship between rail transit vibration in buildings and human annoyance. I am confident the results of this study will help shape rail transit noise and vibration policy in the coming years."*

*-- James B. Webb, PE, Chairperson, D-12 Program Panel*