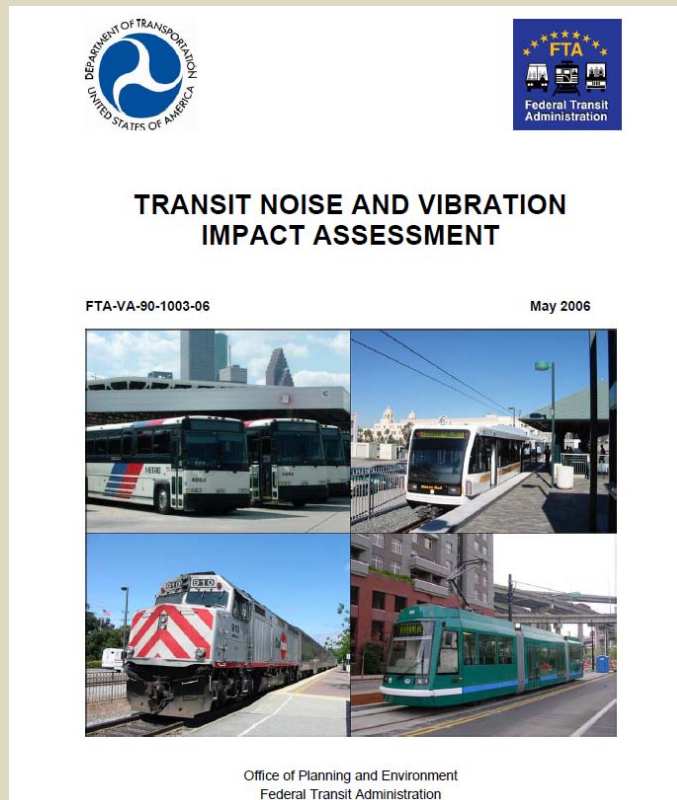


Applying the FTA Detailed Noise Analysis: Some Questions and Comments



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Outline

- Speed adjustment for low speeds
- Ground absorption
- Horn and crossing bell noise predictions
- Mitigation design
- Applying FTA Criteria to indoor-only land uses and multi-story buildings

Noise Predictions at Low and High Speeds

- FTA Speed adjustment: $+30 * \log\left(\frac{speed}{speed_{ref}}\right)$
- Does the speed adjustment apply to predictions for trains travelling at low speeds?
- If we have a reference level measured at low speeds, can we use it to predict train noise at high speeds?



2-Slope Speed Adjustment

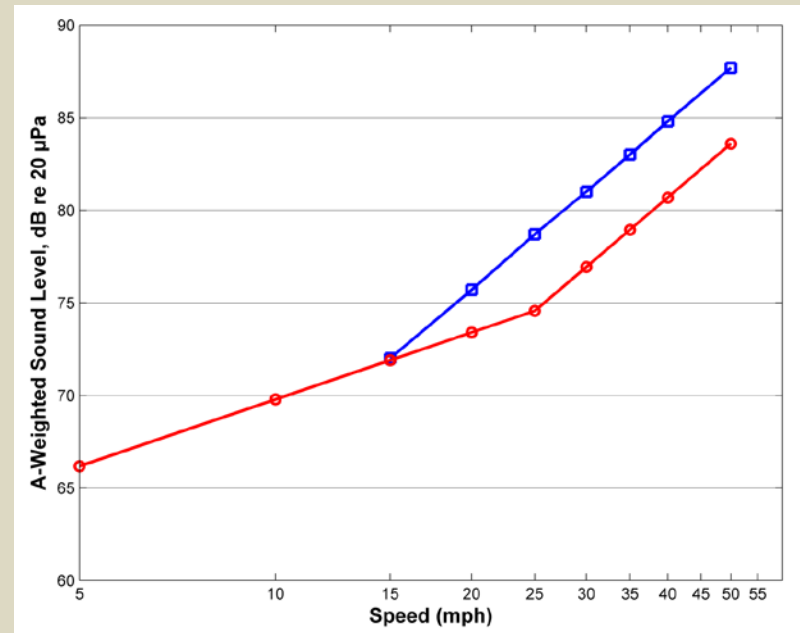
Speed Adjustments:

Speeds <25mph:

$$12 * \log\left(\frac{speed}{speed_{ref}}\right)$$

Speeds >25mph:

$$30 * \log\left(\frac{speed}{speed_{ref}}\right)$$



- Benefits of using a two-slope speed adjustment:
 - If we have a measured reference level at low speeds, we will not over-predict the noise levels for trains traveling at high speeds
 - If we have a measured reference level at high speeds, we will not under-predict noise levels for trains traveling at low speeds

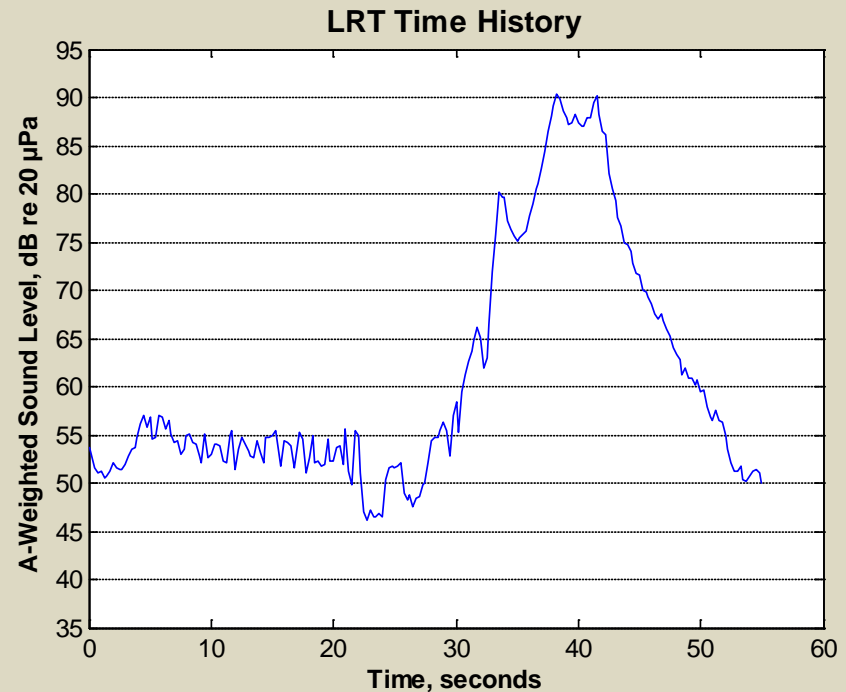
Horn Noise

- Is there sufficient information to make reasonable predictions?
 - Horn noise reference level?
 - When/where LRVs are required to sound horns?
 - How long do LRV operators sound the horn?
- Do horns need to be sounded if there are crossing bells?
- Are residents going to be more sensitive to bell or horn noise than to train noise?



Horn Noise

- Horn noise often adds *less than 1 dB* to the noise exposure caused by LRT operations at speeds greater than 35 mph
 - Does horn noise always need to be included in predictions?
- Complaints are often received about bell noise, even if impact isn't predicted
 - Should bells be assessed for mitigation even if impact isn't predicted?



Ground Absorption

$$= (L_{dn} \text{ or } L_{eq}) \Big|_{at 50 \text{ ft}} - 10 \log \left(\frac{D}{50} \right) - 10G \log \left(\frac{D}{42} \right) \quad \text{for fixed-guideway rail car passbys}$$

Ground Factor

For soft ground:

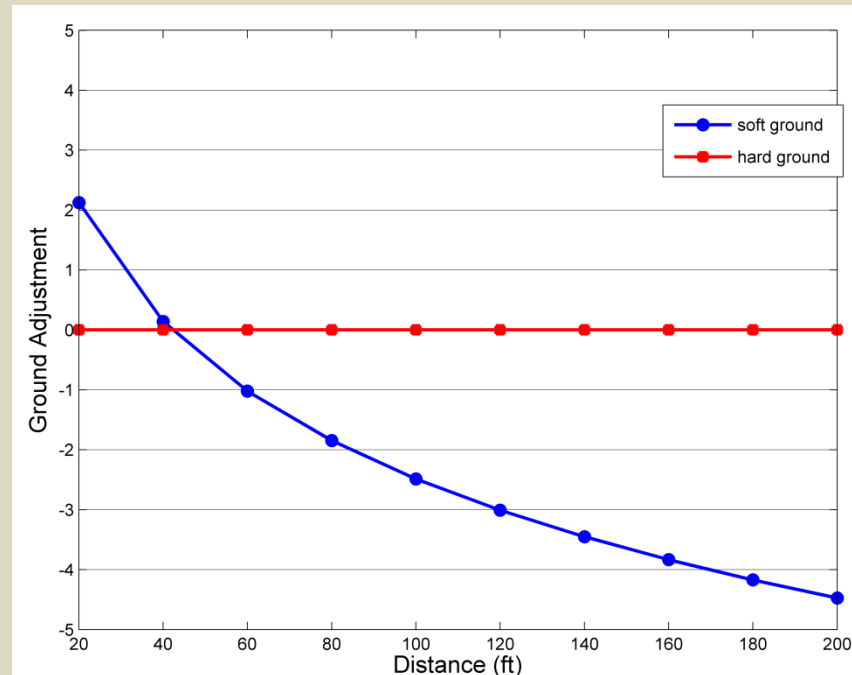
$$G = \begin{cases} 0.66 & H_{eff} \leq 5 \\ 0.75 \left(1 - \frac{H_{eff}}{42} \right) & 5 \leq H_{eff} \leq 42 \\ 0 & H_{eff} \geq 42 \end{cases}$$

For hard ground:

$$G=0$$

- How do we distinguish between hard and soft ground? How soft is soft?
- Do we need to take into account whether there was hard or soft ground at the location of the reference level measurement?

Ground Absorption vs Distance



- Assuming soft ground, we *increase* the predicted noise level at close distances
- Compare FTA Manual ground absorption to TNM ground absorption?

Changes in traffic noise levels

- Does any change in the roadway configuration or traffic patterns require a TNM model?
- Is the TNM software appropriate for dense, local city streets with stop-and-go traffic?

“If sufficient evidence shows that highway noise dominates, the methods of FHWA, including the latest authorized version of the Traffic Noise Model (TNM) should be used. Otherwise both FHWA and FTA prediction and impact assessment procedures should be used...”



Barrier Analysis and Design

“Cost is an important consideration in reaching decisions about noise mitigation measures. One guideline for gauging the reasonableness of the cost of mitigation is the state DOT’s procedures on the subject.”

- Do transit agencies have a procedure for evaluating cost effectiveness for barriers?
- Should cost effectiveness of mitigation measures be part of the EIS process?
- Do agencies have explicit policies for evaluating moderate vs. severe noise impacts and providing mitigation?

Indoor-Only Land Uses

“... for locations where land use activity is solely indoors, noise impact may be less significant if the outdoor-to-indoor reduction is greater than for typical buildings (about 25 dB with windows closed). Thus, if the project sponsor can demonstrate indoor activity only, mitigation may not be needed.”

- Should noise barriers be constructed for buildings with indoor-only use?
- Should guidelines be adopted to assess the sound insulation of buildings with only-indoor use? Are measurement always necessary?



Multi-Story Impact Assessment

- Is it necessary to provide sound insulation to second-stories of single-family residences?
- How should high rise buildings be assessed for noise impact?
 - If they have no outdoor use, what mitigation should be considered?
 - How many stories should be assessed for impact or considered for sound insulation?



Questions and Comments