Implementing FTA/FRA Noise & Vibration Assessment Methods on FRA Tier I NEPA Projects

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Federal stimulus-funded high speed intercity passenger rail projects were proposed across the nation.

Stimulus funding covered preliminary/conceptual engineering and environmental review under NEPA.

Environmental review didn't need to be very rigorous, so FRA developed Tiered NEPA approach for these high-speed projects.
FRA Tiered NEPA

- **Tier I, Service-Level (or programmatic)**

- A broader, less detailed NEPA review

- Intended to indicate the location and magnitude of potential/likely impacts and problems to help guide decisions.

- Not intended to be a rigorous review.
FRA Tiered NEPA

- **Tier II, Project-Level**
- Project-specific NEPA review
- Standard level analytical rigor in a Federal EIS
- (take a “hard look”)
The first step in the NEPA review of one of these stimulus-funded high speed inter city passenger rail projects is a Tier I NEPA review, usually an EIS.
Implementing FTA/FRA Methods

- FTA/FRA methods commonly used to address noise and vibration on transit projects in metro areas.

- They can also be used to evaluate train noise and vibration on very large corridors (i.e. Chicago to Omaha).

- There are some drawbacks.
Drawbacks of FTA/FRA on Large Projects

- It could be very time consuming to complete a general noise assessment on approximately 500 miles of rail line.

- Challenges include numerous changes throughout the corridor in: rail traffic density and speed, land uses, existing noise levels, etc.

- No convenient way to account for these factors on a 500-mile long project using FTA/FRA methods.
HDR’s Hybrid Approach

- HDR developed a hybrid of the FTA/FRA General Noise Assessment for use on FRA Tier I NEPA studies.

- Was implemented, and refined on high speed inter-city passenger rail projects.

- Chicago to Iowa City, Baton Rouge to New Orleans, the Knowledge Corridor (MA), Chicago to Omaha, and will be used on Milwaukee to Minneapolis.
HDR’s Hybrid Approach

- It’s a screening application of the FTA General Noise Assessment for use on FRA Tier I NEPA reviews.

- Simplifies noise assessments on very large rail corridors (i.e. Chicago to Omaha).

- Also provides a high level of refinement and objectivity.
HDR’s Hybrid Approach

- First step is to summarize rail traffic in the project corridor.
- Divide the corridor into rail segments with unique traffic volume or speed.
- These are labeled Traffic Conditions.
HDR’s Hybrid Approach

- Second step is to evaluate Development Density using the three land use categories in the FRA locomotive horn noise model.
  - Urban, Suburban, Rural

- These labels are assigned a shielding value based on the values used in the FRA locomotive horn noise model.
HDR’s Hybrid Approach

- Third step is to identify the unique combinations of Traffic Conditions and Development Density.
- These are called **Noise Conditions**.
HDR’s Hybrid Approach

- The background noise levels are evaluated using methods in FTA Table 5-7 and GIS.
  - Population centers are outlined using polygons in GIS
  - Rural and suburban areas are outlined using polygons in GIS
  - Areas in close proximity to major transportation corridors are outlined using polygons in GIS
  - Census data is also imported into GIS.
HDR’s Hybrid Approach

- Background Noise Levels
  - HDR uses GIS to calculate background noise levels using each of these methods, they select the highest value.
  - Each polygon is assigned a unique background noise level based on the results of this exercise.
HDR’s Hybrid Approach

- Background Noise Levels
- Then using GIS, HDR calculates an area-weighted average noise level for each Noise Condition.
  - (rail segment with unique traffic, unique shielding [development density], and one or more background noise level polygons that are used to calculate an area-weighted average noise level).
- This establishes the existing noise level, which is then used to identify the noise impact threshold.
## HDR’s Hybrid Approach

<table>
<thead>
<tr>
<th>Noise Condition</th>
<th>Traffic Condition</th>
<th>Development Density (shielding)</th>
<th>Area-weighted Average Existing Ldn (dBA)</th>
<th>Noise Impact Threshold</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>urban</td>
<td>50</td>
<td>&gt;53</td>
</tr>
<tr>
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<tr>
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<td>B</td>
<td>suburban</td>
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<td>&gt;56</td>
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<td>B</td>
<td>rural</td>
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<td>&gt;50</td>
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<td>&gt;53</td>
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<td>Rural</td>
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<tr>
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<td>&gt;55</td>
</tr>
<tr>
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<td>Suburban</td>
<td>56</td>
<td>&gt;55</td>
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<tr>
<td>10</td>
<td>G</td>
<td>Rural</td>
<td>43</td>
<td>&gt;53</td>
</tr>
</tbody>
</table>
Using this approach, the noise analyst simply prepares 10 unique spreadsheet models to calculate the wayside and locomotive horn (grade crossing) contour distances. This dramatically simplifies the modeling effort.

HDR uses a combination of FTA and FRA methods to calculate horn noise contours.
HDR’s Hybrid Approach

- The GIS analyst takes the contour distances and buffers the rail segments (draws noise contours).

- Then the GIS analyst puts dots on the rooftops of noise-sensitive receptors inside the contours.

- In some projects, HDR limited the assessment to residences only (no other noise-sensitive land use category). This satisfied FRA Tier I NEPA.
HDR’s Hybrid Approach

- Then the GIS analyst runs a query to count the number of impacts (dots on rooftops) within the contours for each Noise Condition.

- On some projects HDR did not distinguish moderate and severe noise impacts, only the moderate noise impact contour was plotted. This also satisfied FRA Tier I NEPA.
Summary - HDR’s Hybrid Approach

- These hybrid methods satisfy FRA Tier I NEPA requirements, simplify analysis of large-scale rail corridors, and maintain a refined and objective level of analytical rigor.

- HDR’s hybrid methods have been endorsed by FRA.
Thank you

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