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

2013 TRB ADC40 Summer Meeting

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FRA and High Speed Passenger Rail

- 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”)

FRA Tiered NEPA

- 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, the selects 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

Noise Condition	Traffic Condition	Development Density (shielding)	Area-weighted Average Existing *L*dn (dBA)	Noise Impact Threshold
1	A	urban	50	>53
2	A	rural	38	>48
3	B	urban	48	>53
4	B	suburban	56	>56
5	B	rural	40	>50
6	C	Urban	49	>53
7	D	Rural	42	>53
8	E	Urban	55	>55
9	F	Suburban	56	>55
10	G	Rural	43	>53

HDR's Hybrid Approach

- 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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