



NOISE & VIBRATION MEETING OCTOBER 18, 2007

WELCOME & INTRODUCTIONS

Chris Quinn, RTD FasTracks Project Manager, welcomed the Northwest Rail jurisdictional representatives to the noise and vibration workshop, which the Project conducted in response to the Governments Team's request to learn more about the noise and vibration analysis methodologies.

Note: This meeting summary concentrates on the questions and discussion generated from the consultant's presentation. For the technical detail of the presentation, please refer to the NWR Noise & Vibration Presentation meeting handout.

NOISE ANALYSIS AND METHODOLOGY

Dave Towers, HMMH Principal Engineer and the RTD Noise & Vibration consultant, presented the methodology that was used for the noise and vibration analysis for the Northwest Rail Corridor. He explained the way noise is defined and measured, the initial impact findings for the Northwest Rail, and potential mitigation measures.

During the presentation, participants asked questions and discussed various issues. A summary of this discussion follows below and in the "Discussion of Potential Noise Mitigation Measures" and "Vibration Analysis" sections.

FTA Noise & Vibration Manual and Criteria

The Federal Transit Administration (FTA) mitigation guidance, "Transit Noise and Vibration Impact Assessment Guidance Manual," which includes the methodology and criteria used for the Northwest Rail analysis can be accessed at the following link:

http://www.fta.dot.gov/planning/environment/planning_environment_2233.html

Description of Methodology

Defining Noise

Community response is measured in terms of level of annoyance. It is not only a question of the event being loud, but also the duration, the frequency, and the time of day. Events that are shorter in length, infrequent, and occur during the daytime are less annoying than longer, frequent events that occur at night, for example.

Measuring Noise

The consultant presented four noise measures: dBA, Lmax, LEQ, and Ldn.

A-Weighted Sound Level- dBA



The dBA is the basic unit for environmental noise.

The dBA is the metric unit assigned in the FTA statute in terms of the minimum required horn levels:

- The FTA dBA range for horns is 96 to 110 dBA. The minimum dBA level for locomotives is 96 dBA.
- RTD is asking for exemption to the 96 dBA rule on all commuter rail corridors. The Federal Railroad Administration (FRA) will determine whether RTD will have to comply with the 96 dBA level.
- There are systems (such as the New Jersey commuter rail) where commuter rail systems have been required to follow the 96dBA rule. In other locations, where the rail was defined as rapid rail transit, the minimum dBA level was lower. There are light rail systems with lower dBA levels and in Salt Lake City operators ring a bell at crossings.

Maximum Noise Level- Lmax

Lmax is a single event noise descriptor and is used to set a maximum level of noise for an event.

Equivalent Sound Level-LEQ

The LEQ is an energy average over a period of time, but it is really a noise measure. This is one of the measures used for the FTA guidelines. It is used for areas where there are primarily daytime activities, such as churches and schools, where there is no night noise.

Day-Night Sound Level-Ldn

Ldn is used to establish a 'noise climate' and correlates well to residential annoyance. The average Ldn level in the Northwest Rail corridor is 55 to 65 Ldn. This is largely due to freight trains. 65 Ldn is a common level in urban environments.

Noise Modeling & Analysis

Through a technology developed by HMMH, horn and train noise can be modeled for people to attain a realistic impression of the way it will sound. One can make recordings of the sound of a horn and train and then allow people to listen to the sound through headphones. It is also possible to superimpose the sound of a busy street, neighborhood sounds, etc. to give a realistic impression of the sound levels. It is also possible to adjust it for distance from the track. A similar tool can actually be tested on the web-site of <http://www.hmmh.com>. A kiosk, which is often used for public meetings, is also available.

Review of Initial NW Rail Findings

The preliminary noise analysis for the Northwest Rail Corridor identified a total of 37 moderate impacts and 0 severe impacts. The focus from the public has been on crossings and horns. There are 40 crossings along this corridor. There are 500 households within 100 feet of the rail line. Of these, the analysis identified 37 moderate



impacts. Additional and more comprehensive analyses on noise and vibration will be included in the impacts analysis, which is now underway.

The analyses also measures total future noise. For instance, if the freight trains have to run at night due to the use of rails by commuter rail in the daytime, then this noise impact must be assessed. In any given location, the analysis measures existing noise levels and then superimposes projected project noise and expected noise increases. Additionally, land use plans have to be taken into account. Eventually, one graph will be produced for each affected parcel. RTD does this for every project.

The FTA is a Cooperating Agency in this corridor and the Army Corps of Engineers is the lead agency. However, RTD is utilizing FTA regulations and standards in its noise and vibration analysis so that the same standards will apply to all of the FasTracks corridors.

DISCUSSION OF POTENTIAL NOISE MITIGATION MEASURES

Throughout the presentation, in addition to asking questions about the analysis methodology, participants discussed possible noise mitigation measures for the Northwest Rail Corridor. Representatives from the local jurisdictions expressed a strong desire to coordinate with RTD on Quiet Zone implementation. To help with coordination, they requested information about the schedule for the Quiet Zone analysis, so that they know what kind of information RTD is gathering and when it will be available for the local jurisdictions to review and use. This will also help the jurisdictions avoid doing work that may be redundant with the work that RTD is performing. The jurisdictions would also like to know timeframes for Quiet Zone implementation (if it were to occur), so that they know what kind of schedule they need to be working within to prepare their application(s).

Quiet Zones

- According to FTA guidelines, if Quiet Zones are to be used as a mitigation measure, they must be implemented by a 'drop dead date' before the initiation of operations on the corridor. Should the deadline pass without the Quiet Zone measures in place, then RTD would implement back-up mitigation measures (as specified in the Environmental Evaluation).
- The Quiet Zone process will be initiated during the Environmental Evaluation and continue through the design and construction phase of the project. This provides a good amount of time to work on the Quiet Zone process.
- If Quiet Zones were to be implemented, both commuter and freight trains would have to respect the Quiet Zone restrictions.
- The Environmental Evaluation's safety analysis will review current crossings and determine what kind of infrastructure would be necessary to upgrade them to meet safety regulations for Quiet Zones. At a minimum, Quiet Zone crossings would be required to have gates to ensure safety of pedestrians and vehicles. The FRA will evaluate each crossing to see if it qualifies for consideration as a Quiet Zone.

- In response to the question as to whether trains have to sound horns at private crossings, the consultant explained that it largely depends on safety measures in place at a given crossing. In general, the railroad wants to have consistency across the corridor so they do not have to figure out at which crossings to sound, so the agency would likely require horns at private crossings.
- In some cases, street crossings can be closed. In the case of RTD's West Corridor, a couple of street crossings were closed. The primary concern around closing a crossing is the effect on traffic flows and ensuring access for emergency services.

Wayside Horns

Another way to mitigate the effects of the horns is through the use of wayside horns, which are sounded at the crossings, thus focalizing noise at the crossings. Wayside horns can also be used by freight trains; they simply have to have the ability to activate them. If this option is pursued, RTD would have to secure BNSF agreement to use the wayside horns.

Targeted horns

It is possible to make horns more directional as a mitigation measure, so that noise does not go off to the side.

Limits on Acceleration Rates¹

Limiting acceleration in certain areas is a possibility, but doing so would depend on what speeds the system needs to operate. Essentially, RTD would have to prove how it would make this work in the operational plan and these assumptions would need to be built into the definition of the project.

Another consideration in respect to imposing limits on acceleration speeds is that travel time affects ridership. Also, if trains were to leave the stations at full throttle, there would be passenger comfort considerations to take into account.

Acceleration and de-acceleration is not limited to trains exiting or entering stations; it also occurs on grades or curves. A lot of these factors affect the throttle level of a diesel engine. The distribution of stations is also a factor. On the Northwest corridor, there are ten stations along 41 miles, which allows for the possibility of examining acceleration and de-acceleration rates, whereas in corridors such as the North Metro, this is not viable, as it has more stations concentrated in a shorter distance.

Avoiding Idling

As DMUs can be turned off and on at will, idling becomes unnecessary. In the maintenance facility noise analysis, idling was assumed as a worst case scenario.

¹ Please note that the FTA would not consider limits on acceleration rates as a mitigation measure.



RTD has contracted LTK Engineering Services to develop the operational plan for the corridor. All mitigation measures will be reflected in the operational profile for the corridor.

VIBRATION ANALYSIS

Vibration is less of an issue than noise in the Northwest Rail corridor. There are fewer impacts and fewer options for mitigation of vibration impacts. The vibration impacts are higher in Louisville than anywhere else along the corridor. However, the vibration impacts are not a damage issue. They are, rather, more of an annoyance issue. One can feel the vibration and there would be ground borne noise, similar to that of subways passing under buildings; however, only a very limited impact is likely.

NEXT STEPS

- The Project Team anticipates completing the impacts analysis by January 2008.
- The Project Team will provide a detailed schedule to the jurisdictions for its Quiet Zone analysis, including timeframes for the Environmental Evaluation's analysis of crossings and for the implementation of Quiet Zones along the corridor.
- The Project Team will consider ways to demonstrate noise levels at the public mitigation workshop in Spring 2008.



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