Train horn noise and potential solutions
FRA Locomotive Horn Final Rule

- Horn rule
  - Issued 4/27/05
  - effective 6/24/05
  - Amended 8/17/06
- Requires horns to be sounded to warn motorists at public crossings
- Provides exceptions where risk is minimized
- Enables communities to establish quiet zones by reducing the risk caused by lack of horns
Train Horn Requirements

• Sound locomotive horn approaching every public crossing (replacing state law)
  • 15 to 20 seconds before locomotive enters crossing and not greater than ¼ mile
  • Train horn decibel levels minimum and maximum train (96dB-110dB)
FRA rules do not apply to rapid transit.....

- Unless the rapid transit line shares a highway crossing with the freight system
- Rule now requires LRT system to sound horns
  - San Jose
  - San Diego
  - Utah (commuter rail)
- FRA exempts rapid transit from the same horn decibel levels (min and max).
  - Left to state agency (ODOT Rail)
Portland-Milwaukie

• Two groups of intersections where LRT would share crossing with freight
  • Southeast Portland
  • Milwaukie
• Frequency of daily trains (freight + LRT) would increase
  • Portland 16 daily to more than 150 daily
  • Milwaukie 10 daily to more than 150 daily
Potential solutions identified

• Train horn waiver
• Quiet Zones
• Wayside horn
Project investigations

• Railroad Controls Limited (RCL) – quite zones and wayside train horns
  • Community meeting – Milwaukie and Portland
  • Wayside horn demonstration

• Kevin Sheys, attorney – train horn waiver

• Met with Union Pacific and ODOT rail
What is a Train Horn Waiver?

A waiver could allow lower sound levels for Light Rail Trains at gated crossing.

- FRA stipulates that rapid transit trains are not subject to the min and max decibel levels for train horn noise
- Could include use of bells

More investigation is required – Kevin Sheys Portland visit on April 17th
What is a Quiet Zone?

A quiet zone is a section of a rail line that contains one or more consecutive public crossings at which locomotive horns are not routinely sounded.
How are Quiet Zones Created?

• Local governments will have two ways of creating a quiet zone:
  
  – Show that the lack of the horn does not pose a significant safety risk
  
  – Implement safety measures to reduce excess risk associated with no horn
Terminology

- Supplemental Safety Measure
- Wayside Horn
- Alternative Safety Measure
- Nationwide Significant Risk Threshold
- Risk Index With Horns
- Quiet Zone Risk Index
Supplementary Safety Measure

A device that is determined by the FRA Associate Administrator to be an effective substitute for the locomotive horn in the prevention of highway-rail casualties
SSM - Supplemental Safety Measures

• Temporary Closures (not applicable)
• 4-Quadrant Gates
• One-way Streets with Gates
• Gates with Medians or Channelization Devices
• Permanent Closure (SE Clinton Street)
Four-Quadrant Gates
What are Four-Quadrant Gates?

• Gates designed to eliminate the opportunity to drive around a single lowered gate.

• Two types of gates:
  - Entrance Gates
  - Exit Gates
Standard Two Quadrant Crossing

Entrance Gates Shown in Red
Standard Four Quadrant Crossing

Exit Gates shown in Red
Typical Vehicle Detection System Using Loop Detectors

Loop Detectors shown in Red
One Way Street with Gate(s)
One Way Street with Gate(s)

- Gate arm should extend to within one foot of the far edge of pavement
- Two foot Maximum from Gate Tip to Gate Tip
Gates with Medians or Channelization Devices

Channelization Device

Non-traversible Curb
Gates with Medians or Channelization Devices

No intersections or commercial driveways within 60' of gate arm. Access to residences (4 units or less) allowed if exiting motorists can not move against the flow of traffic.
Gates with Medians or Channelization Devices Near Parallel Roadways

60’ Minimum Length

100’ Median
Gates with Medians or Channelization Devices

1' Maximum from tip of gate to edge of median

Median must be 6” or greater
Curb must be six inches or greater
Channelization device must include a raised curb
Permanent street closures
Alternative Safety Measures (ASM)

A safety system or procedure, other than an SSM, which, after individual review and analysis by the Associate Administrator, is determined to be an effective substitute for the locomotive horn in the prevention of highway-rail casualties at specific highway-rail grade crossings.
Median is less than 60 feet in length
Nationwide Significant Risk Threshold

The Nationwide Significant Risk Threshold is an average of the risk indexes for all of the gated crossings nationwide where train horns are routinely sounded.

FRA identified 35,803 gated crossings
Risk Index With Horns

The Risk Index With Horns is a measure of risk to the motoring public when locomotive horns are routinely sounded at every public highway-rail grade crossing within a quiet zone.
Quiet Zone Risk Index

The Quiet Zone Risk Index is the average of the risk indexes of all the public crossing in a Quiet Zone.

Considers:
• The absence of the horn sound
• Installation of safety measures
Update and Verify Crossing Information

Create New Zone
Zone: SE CLINTON ST
Quiet Zone Type: New 24-hour Quiet Zone

Manage Existing Zones
Log Off

Step by Step Instructions:

Step 1: To add more crossings to the zone Click the ADD CROSSING.

Step 2: To Make changes to the default information, select the crossing from list. Enter the changes in the appropriate box, then click the UPDATE button.

Step 3: To permanently remove a crossing from the zone, select Crossing from list. Click the DELETE CROSSING button.

Step 4: Verify All Crossing Information Provided is correct. Then Click the Check Box, then CONTINUE button.

* Note: To see a list of SSMs, click on "Pre-Existing SSM".

Note: Updating Crossing Information on the Quiet Zone Calculator DOES NOT update the crossing inventory. Be sure that an updated current and accurate inventory form is also submitted.
Who Can Establish a Quiet Zone?

- Public Authority with jurisdiction for the roadway at the crossing
- Quiet Zones may be established irrespective of state law
How is a Quiet Zone Established?

- Public Authority Designation
- Public Authority Application to FRA
How is a Quiet Zone Established?

• Public Authority Designation
  – Implement safety measures or Wayside Horn at every public crossing within Quiet Zone

  – Quiet zone risk index has to be equal to or less than the risk index with horns or

  – Quiet zone risk index has to be equal to or less than the national average index.
    – This requires annual review
How is a Quiet Zone Established?

• Public Authority Application to FRA
  – Required if using ASMs or a combination of SSMs and ASMs (monitoring plan required)
  – Same relation between risk indexes
Quiet Zone Procedures

1. Submit a Notice of Intent to Create a New Quiet Zone.

2. Notice to be sent to
   - all affected railroads,
   - the state regulatory agency for highway-rail grade safety and
   - the associate administrator of the FRA.
Quiet Zone Procedures

4. 60-day comment period for all railroads and state regulatory agencies.

5. Diagnostic Team Review of all crossings to discuss treatments (ALL NEED TO AGREE).

6. Install Advance Warning Signs conforming to MUTCD requirements.

7. Update the National Grade Crossing Inventory to reflect the current conditions at each public crossing within the Quiet Zone.
Quiet Zone Procedures

8. The City will be required to submit a Notice of Quiet Zone Establishment to:
   – all affected railroads
   – state regulatory agency for highway-rail grade safety and
   – associate administrator of the FRA.

9. The City will be required to submit periodic updates to FRA every 4.5-5 years.
Wayside Horn
Wayside Horn

92dB Minimum at 100’ from centerline of track

Wayside Horn
What is a Wayside Horn?

• Stationary horn system located at the crossing
• Sounds like a locomotive horn
• Reduces noise pollution in neighborhoods located near grade crossings
• Improves safety for motorists and pedestrians
How does a Wayside Horn work?

• Activated by railroad warning circuitry
• Directs the sound toward oncoming motorists
• Warning sounded until train reaches the crossing
• Quiet Zone Indicator notifies train crew that the Wayside Horn is working properly and it is not necessary to sound the locomotive horn
Quiet Zone Indicator

Wayside Horn
Sound Contour for Train Horn and Wayside Horn

The following slides show a sound contour of a train horn compared to the Wayside Horn.

**Red area** is the 92dB sound contour
**Blue area** is the 80dB sound contour
Wayside Horn Sound Contour
Next steps

• Continue to learn more about train horn waiver and quiet zones
• Consider trade offs
• Share with community