

a fraction of the value of avoiding a fatality. FRA rates collisions that occur at train speeds in excess of 25 mph as an AIS level 5 (\$2,287,500) and injuries that result from collisions involving trains traveling under 25 mph as an AIS level 2 (\$46,500). About half of grade crossing collisions occur at speeds greater than 25 mph. Therefore, FRA estimates that the value of preventing the average injury resulting from a grade crossing collision is \$1,167,000 (the average of an AIS-5 injury and an AIS-2 injury.)

Notice that the quantity $PC \cdot P(FC|C)$ represents the expected number of fatal collisions. Similarly, $\{PC \cdot [P(CC|C) - P(FC|C)]\}$ represents the expected number of injury collisions. These are then multiplied by their respective average number of fatalities and injuries (from the table above) to develop the number of expected casualties. The final parts of the expressions attach the dollar values for these casualties.

The Risk Index for a Crossing is the integer sum of the Predicted Cost of Fatalities and the Predicted Cost of Injuries.

Nationwide Significant Risk Threshold

The Nationwide Significant Risk Threshold is simply an average of the risk indexes for all of the gated crossings nationwide where train horns are routinely sounded. FRA identified 33,879 gated non-whistle ban crossings for input to the Nationwide Significant Risk Threshold.

The Nationwide Significant Risk Threshold rounds to 15,424. This value is recalculated annually.

Crossing Corridor Risk Index

The Crossing Corridor Risk Index is the average of the risk indexes of all the crossings in a defined rail corridor. Communities seeking to establish 'Quiet Zones' should initially calculate this average for potential corridors.

Quiet Zone Risk Index

The Quiet Zone Risk Index is the average of the risk indexes of all the public crossings in a Quiet Zone. It takes into consideration the absence of the horn sound and any safety measures that may have been installed.

Appendix E to Part 222—Requirements for Wayside Horns

Minimum requirements for wayside horn use at highway-rail grade crossings:

1. Highway-rail crossing must be equipped with constant warning time device, if reasonably practical, and power-out indicator;
2. Horn system must be equipped with an indicator or other system to notify the locomotive engineer as to whether the

wayside horn is operating as intended in sufficient time to enable the locomotive engineer to sound the locomotive horn for at least 15 seconds prior to arrival at the crossing in the event the wayside horn is not operating as intended;

3. The railroad must adopt an operating rule, bulletin or special instruction requiring that the train horn be sounded if the wayside horn indicator is not visible approaching the crossing, or if this, or an equivalent system, does not indicate that the system is operating as intended;

4. Horn system must provide a minimum of 96 and a maximum of 110 dB(A) when measured 100 feet from the horn in the direction it is installed;

5. Horn system must sound at a minimum of 15 seconds prior to the train's arrival at the crossing and while the lead locomotive is traveling across the crossing. It is permissible for the horn system to begin to sound simultaneously with activation of the flashing lights or descent of the crossing arm; and

6. Horn shall be directed toward approaching traffic.

Appendix F to Part 222—Diagnostic Team Considerations

For purposes of this part, a diagnostic team is a group of knowledgeable representatives of parties of interest in a highway-rail grade crossing, organized by the public authority responsible for that crossing, who, using crossing safety management principles, evaluate conditions at a grade crossing to make determinations or recommendations for the public authority concerning safety needs at that crossing. Crossings proposed for inclusion in a quiet zone should be reviewed in the field by such a diagnostic team composed of railroad personnel, public safety or law enforcement, engineering personnel from the public agency with responsibility for the roadway that crosses the railroad, and other concerned parties.

This diagnostic team, using crossing safety management principles, should evaluate conditions at a grade crossing to make determinations and recommendations concerning safety needs at that crossing. The diagnostic team can evaluate a crossing from many perspectives and can make recommendations as to what safety measures authorized by this part might be utilized to compensate for the silencing of the train horns within the proposed quiet zone.

All Crossings Within a Proposed Quiet Zone

The diagnostic team should obtain and review the following information about each crossing within the proposed quiet zone:

1. Current highway traffic volumes and percent of trucks;
2. Posted speed limits on all highway approaches;
3. Maximum allowable train speeds, both passenger and freight;
4. Accident history for each crossing under consideration;
5. School bus or transit bus use at the crossing; and
6. Presence of U.S. DOT grade crossing inventory numbers clearly posted at each of the crossings in question.

The diagnostic team should obtain all inventory information for each crossing, and should check while in the field to see that inventory information is up-to-date and accurate. Outdated inventory information should be updated as part of the quiet zone development process.

When in the field, the diagnostic team should take note of the physical characteristics of each crossing, including the following items:

- Can any of the crossings within the proposed quiet zone be closed, or consolidated with another adjacent crossing? Crossing elimination should always be the preferred alternative, and it should be explored for crossings within the proposed quiet zone.

- What is the number of lanes on each highway approach? Note the pavement condition on each approach, as well as the condition of the crossing itself.

- Is the grade crossing surface smooth, well graded and free draining?

- Does the alignment of the railroad tracks at the crossing create any problems for road users on the crossing? Are the tracks in superelevation (are they banked on a curve?) and does this create a conflict with the vertical alignment of the crossing roadway?

- Note the distance to the nearest intersection or traffic signal on each approach (if within 500 feet or so of the crossing, or if the signal or intersection is determined to have a potential impact on highway traffic at the crossing because of queuing or other special problems).

- If there is a roadway that runs parallel to the railroad tracks, and it is within 100 feet of the railroad tracks when it crosses an intersecting road that crosses the tracks, the appropriate advance warning signs should be posted as shown in the MUTCD.

- Is the posted highway speed (on each approach to the crossing) appropriate for the alignment of the roadway, and the configuration of the crossing?

- Does the vertical alignment of the crossing create the potential for a "hump crossing" where long, low-clearance vehicles might get stuck on the crossing?

- What are the grade crossing warning devices in place at each crossing? Flashing lights and gates are required for each public crossing in a New Quiet Zone. Are all required warning devices, signals, pavement markings and advance signing in place, visible and in good condition for both day and night time visibility?

- What kind of train detection is in place at each crossing? Are these systems old or outmoded; are they in need of replacement, upgrading, or refurbishment?

- Are there sidings or other tracks adjacent to the crossing that are often used to store railroad cars, locomotives, or other equipment that could obscure the vision of road users as they approach the crossings in the quiet zone? Clear visibility may help to reduce violation of automatic devices.

- Are motorists currently violating the warning devices at any of the crossings at an excessive rate?

- Do accident statistics for the corridor indicate any potential problems at any of the crossings?