

denying an application for approval of a new SSM or ASM under § 222.55. The petition must be filed within 60 days of the decision to be reviewed, specify the grounds for the requested relief, and be served upon all parties identified in § 222.43(a). Unless the Administrator specifically provides otherwise, and gives notice to the petitioner or publishes a notice in the FEDERAL REGISTER, the filing of a petition under this paragraph does not stay the effectiveness of the action sought to be reviewed. The Administrator may reaffirm, modify, or revoke the decision of the Associate Administrator without further proceedings and shall notify the petitioner and other interested parties in writing or by publishing a notice in the FEDERAL REGISTER.

(b) A public authority may challenge a decision by the Associate Administrator to deny an application by that authority for approval of a quiet zone, or to require additional safety measures, or that a quiet zone be terminated, by filing a petition for reconsideration with the Associate Administrator. The petition must specify the grounds for the requested relief, be filed within 60 days of the decision to be reconsidered, and be served upon all parties identified in § 222.43(a). Upon receipt of a timely and proper petition, the Associate Administrator will provide the petitioner an opportunity to submit additional materials and for an informal hearing. Upon review of the additional materials and completion of any hearing requested, the Associate Administrator shall issue a decision on the petition that will be administratively final.

**§ 222.59 When may a wayside horn be used?**

(a) Notwithstanding any provisions in this part to the contrary:

(1) A wayside horn conforming to the requirements of Appendix E of this part may be used in lieu of a locomotive horn at any highway-rail grade crossing equipped with an active warning system consisting of, at a minimum, flashing lights and gates; and

(2) A wayside horn conforming to the requirements of Appendix E of this part may be installed within a quiet zone. For purposes of calculating the

length of a quiet zone, the presence of a wayside horn at a highway-grade crossing within a quiet zone shall be considered in the same manner as a grade crossing treated with an SSM. A grade crossing equipped with a wayside horn shall not be considered in calculating the Quiet Zone Risk Index or Crossing Corridor Risk Index.

(b) A public authority installing a wayside horn at a grade crossing within a quiet zone shall identify by both the U.S. DOT National Highway-Rail Grade Crossing Inventory Number and street or highway name the grade crossing equipped with such wayside horn in its notice to railroads and other parties required by § 222.43.

(c) A public authority installing a wayside horn at a grade crossing outside a quiet zone shall provide written notice to the Associate Administrator and to each railroad operating over the grade crossing that a wayside horn is being installed and the date on which the wayside horn will be operational. The grade crossing shall be identified by both the U.S. DOT National Highway-Rail Grade Crossing Inventory Number and street or highway name. The public authority shall provide notification of the operational date at least 21 days in advance.

(d) A railroad operating over a grade crossing equipped with an operational wayside horn installed within a quiet zone pursuant to this section shall cease routine locomotive horn use at the grade crossing. A railroad operating over a grade crossing equipped with an operational wayside horn installed outside of a quiet zone may cease routine locomotive horn use by agreement with the public authority.

APPENDIX A TO PART 222—APPROVED SUPPLEMENTARY SAFETY MEASURES

1. *Temporary Closure of a Public Highway-Rail Grade Crossing:* Close the crossing to highway traffic during designated quiet periods.

*Effectiveness:* 1.0.

Because an effective closure system prevents vehicle entrance onto the crossing, the probability of a collision with a train at the crossing is zero during the period the crossing is closed. Effectiveness would therefore equal 1. However, analysis should take into consideration that traffic would need to be redistributed among adjacent crossings or

grade separations for the purpose of estimating risk following the silencing of train horns, unless the particular "closure" was accomplished by a grade separation.

*Required:*

a. The closure system must completely block highway traffic from entering the crossing.

b. The crossing must be closed during the same hours every day.

c. The crossing may only be closed during one period each 24-hours.

d. Barricades and signs used for closure of the roadway shall conform to the standards contained in the MUTCD.

e. Daily activation and deactivation of the system is the responsibility of the public authority responsible for maintenance of the street or highway crossing the railroad. The entity may provide for third party activation and deactivation; however, the public authority shall remain fully responsible for compliance with the requirements of this part.

f. The system must be tamper and vandal resistant to the same extent as other traffic control devices.

*Recommended:*

Signs for alternate highway traffic routes should be erected in accordance with MUTCD and State and local standards and should inform pedestrians and motorists that the streets are closed, the period for which they are closed, and that alternate routes must be used.

2. *Four-Quadrant Gate System:* Install gates at a crossing sufficient to fully block highway traffic from entering the crossing when the gates are lowered, including at least one gate for each direction of traffic on each approach.

*Effectiveness:*

Four-quadrant gates only, no presence detection: .82.

Four-quadrant gates only, with presence detection: .77.

Four-quadrant gates with traffic channelization of at least 60 feet (with or without presence detection): .92.

*Required:*

Four-quadrant gate systems shall conform to the standards for four-quadrant gates contained in the MUTCD, and shall in addition comply with the following:

a. When a train is approaching, all highway approach and exit lanes on both sides of the highway-rail crossing must be spanned by gates, thus denying to the highway user the option of circumventing the conventional approach lane gates by switching into the opposing (oncoming) traffic lane in order to enter the crossing and cross the tracks.

b. Crossing warning systems must be activated by use of constant warning time devices unless existing conditions at the crossing would prevent the proper operation of the constant warning time devices.

c. Crossing warning systems must be equipped with power-out indicators.

NOTE: Requirements b and c apply only to New Quiet Zones. Constant warning time devices and power-out indicators are not required to be added to existing warning systems in Pre-Rule Quiet Zones. However, if warning systems in Pre-Rule Quiet Zones are upgraded, or new warning systems are installed, constant warning time devices, if reasonably practical, and power-out indicators are required.

d. The gap between the ends of the entrance and exit gates (on the same side of the railroad tracks) when both are in the fully lowered, or down, position must be less than two feet if no median is present. If the highway approach is equipped with a median or a channelization device between the approach and exit lanes, the lowered gates must reach to within one foot of the median or channelization device, measured horizontally across the road from the end of the lowered gate to the median or channelization device or to a point over the edge of the median or channelization device. The gate and the median top or channelization device do not have to be at the same elevation.

e. "Break-away" channelization devices must be frequently monitored to replace broken elements.

*Recommendations for new installations only:*

f. Gate timing should be established by a qualified traffic engineer based on site specific determinations. Such determination should consider the need for and timing of a delay in the descent of the exit gates (following descent of the conventional entrance gates). Factors to be considered may include available storage space between the gates that is outside the fouling limits of the track(s) and the possibility that traffic flows may be interrupted as a result of nearby intersections.

g. A determination should be made as to whether it is necessary to provide vehicle presence detectors (VPDs) to open or keep open the exit gates until all vehicles are clear of the crossing. VPD should be installed on one or both sides of the crossing and/or in the surface between the rails closest to the field. Among the factors that should be considered are the presence of intersecting roadways near the crossing, the priority that the traffic crossing the railroad is given at such intersections, the types of traffic control devices at those intersections, and the presence and timing of traffic signal preemption.

h. Highway approaches on one or both sides of the highway-rail crossing may be provided with medians or channelization devices between the opposing lanes. Medians should be defined by a non-traversable curb or traversable curb, or by reflectorized channelization devices, or by both.

i. Remote monitoring (in addition to power-out indicators, which are required) of the status of these crossing systems is preferable. This is especially important in those areas in which qualified railroad signal department personnel are not readily available.

3. *Gates with Medians or Channelization Devices*: Install medians or channelization devices on both highway approaches to a public highway-rail grade crossing denying to the highway user the option of circumventing the approach lane gates by switching into the opposing (oncoming) traffic lane in order to drive around lowered gates to cross the tracks.

*Effectiveness:*

Channelization devices—.75

Non-traversable curbs with or without channelization devices—.80.

*Required:*

a. Opposing traffic lanes on both highway approaches to the crossing must be separated by either: (1) Medians bounded by non-traversable curbs or (2) channelization devices.

b. Medians or channelization devices must extend at least 100 feet from the gate arm, or if there is an intersection within 100 feet of the gate, the median or channelization device must extend at least 60 feet from the gate arm.

c. Intersections of two or more streets, or a street and an alley, that are within 60 feet of the gate arm must be closed or relocated. Driveways for private, residential properties (up to four units) within 60 feet of the gate arm are not considered to be intersections under this part and need not be closed. However, consideration should be given to taking steps to ensure that motorists exiting the driveways are not able to move against the flow of traffic to circumvent the purpose of the median and drive around lowered gates. This may be accomplished by the posting of “no left turn” signs or other means of notification. For the purpose of this part, driveways accessing commercial properties are considered to be intersections and are not allowed. It should be noted that if a public authority can not comply with the 60 feet or 100 feet requirement, it may apply to FRA for a quiet zone under §222.39(b), “Public authority application to FRA.” Such arrangement may qualify for a risk reduction credit in calculation of the Quiet Zone Risk Index. Similarly, if a public authority finds that it is feasible to only provide channelization on one approach to the crossing, it may also apply to FRA for approval under §222.39(b). Such an arrangement may also qualify for a risk reduction credit in calculation of the Quiet Zone Risk Index.

d. Crossing warning systems must be activated by use of constant warning time devices unless existing conditions at the crossing would prevent the proper operation of the constant warning time devices.

e. Crossing warning systems must be equipped with power-out indicators. Note: Requirements b and c apply only to New Quiet Zones. Constant warning time devices and power-out indicators are not required to be added to existing warning systems in Pre-Rule Quiet Zones. However, if warning systems in Pre-Rule Quiet Zones are upgraded, or new warning systems are installed, constant warning time devices, if reasonably practical, and power-out indicators are required.

f. The gap between the lowered gate and the curb or channelization device must be one foot or less, measured horizontally across the road from the end of the lowered gate to the curb or channelization device or to a point over the curb edge or channelization device. The gate and the curb top or channelization device do not have to be at the same elevation.

g. “Break-away” channelization devices must be frequently monitored to replace broken elements

4. *One Way Street with Gate(s)*: Gate(s) must be installed such that all approaching highway lanes to the public highway-rail grade crossing are completely blocked.

*Effectiveness:* .82.

*Required:*

a. Gate arms on the approach side of the crossing should extend across the road to within one foot of the far edge of the pavement. If a gate is used on each side of the road, the gap between the ends of the gates when both are in the lowered, or down, position must be no more than two feet.

b. If only one gate is used, the edge of the road opposite the gate mechanism must be configured with a non-traversable curb extending at least 100 feet.

c. Crossing warning systems must be activated by use of constant warning time devices unless existing conditions at the crossing would prevent the proper operation of the constant warning time devices.

d. Crossing warning systems must be equipped with power-out indicators. Note: Requirements c and d apply only to New Quiet Zones. Constant warning time devices and power-out indicators are not required to be added to existing warning systems in Pre-Rule Quiet Zones. However, if warning systems in Pre-Rule Quiet Zones are upgraded, or new warning systems are installed, constant warning time devices, if reasonably practical, and power-out indicators are required.

#### APPENDIX B TO PART 222—ALTERNATIVE SAFETY MEASURES

##### INTRODUCTION

A public authority seeking approval of a quiet zone under public authority application to FRA (§222.39(b)) may include in its

proposal ASMs listed in this appendix. Credit will be given for closing of public highway-rail grade crossings provided the baseline severity risk index at other crossings is appropriately adjusted by increasing traffic counts at neighboring crossings as input data to the severity risk formula (except to the extent that nearby grade separations are expected to carry that traffic). FRA Regional Managers for Grade Crossing Safety can assist in performing the required analysis.

Appendix B addresses two types of ASMs: Modified SSMS and non-engineering ASMs. Modified SSMS are SSMS that do not fully comply with the provisions listed in appendix A. Depending on the resulting configuration, non-compliant SSMS may still provide a substantial reduction in risk and can contribute to the creation of quiet zones. Non-engineering ASMs are programmed enforcement, public education and awareness, and photo enforcement that may be used to reduce risk in the creation of a quiet zone. The public authority must receive written FRA approval of the quiet zone application prior to the silencing of train horns. The public authority is strongly encouraged to submit the application to FRA for review and comment *before* the appendix B treatments are initiated to ensure that the proposed modified SSMS and/or non-engineering ASMs will meet with FRA's approval. If non-engineering ASMs are proposed, the public authority may wish to confirm with FRA that the sampling methods are appropriate.

#### I. MODIFIED SSMS

a. If there are unique circumstances pertaining to a specific crossing or number of crossings which prevent SSMS from being fully compliant with all of the SSM requirements listed in Appendix A, those SSM requirements may be adjusted or revised. In that case, the SSM, as modified by the public authority, will be treated as an ASM under this Appendix B, and not as an SSM under Appendix A. FRA will review the safety effects of the modified SSMS and the proposed quiet zone, and will approve the proposal if it finds that the Quiet Zone Risk Index is reduced to the level that would be expected with the sounding of the train horns or to a level at, or below the Nationwide Significant Risk Threshold, whichever is greater.

b. A public authority may provide estimates of effectiveness based upon adjustments from the effectiveness levels provided in Appendix A or from actual field data derived from the crossing sites. The specific crossing and applied mitigation measure will be assessed to determine the effectiveness of the modified SSM. FRA will continue to develop and make available effectiveness estimates and data from experience under the final rule.

c. If one or more of the requirements associated with an SSM as listed in Appendix A

is revised or deleted, data or analysis supporting the revision or deletion must be provided to FRA for review. The following engineering types of ASMs may be included in a proposal for approval by FRA for creation of a quiet zone: (1) Temporary Closure of a Public Highway-Rail Grade Crossing, (2) Four-Quadrant Gate System, (3) Gates With Medians or Channelization Devices, and (4) One-Way Street With Gate(s).

#### II. NON-ENGINEERING ASMS

A. The following non-engineering ASMs may be used in the creation of a Quiet Zone: (The method for determining the effectiveness of the non-engineering ASMs, the implementation of the quiet zone, subsequent monitoring requirements, and provision for dealing with an unacceptable effectiveness rate is provided in paragraph B.

1. *Programmed Enforcement*: Community and law enforcement officials commit to a systematic and measurable crossing monitoring and traffic law enforcement program at the public highway-rail grade crossing, alone or in combination with the Public Education and Awareness ASM.

##### *Required:*

a. Subject to audit, a statistically valid baseline violation rate must be established through automated or systematic manual monitoring or sampling at the subject crossing(s); and

b. A law enforcement effort must be defined, established and continued along with continual or regular monitoring that provides a statistically valid violation rate that indicates the effectiveness of the law enforcement effort.

2. *Public Education and Awareness*: Conduct, alone or in combination with programmed law enforcement, a program of public education and awareness directed at motor vehicle drivers, pedestrians and residents near the railroad to emphasize the risks associated with public highway-rail grade crossings and applicable requirements of state and local traffic laws at those crossings.

##### *Requirements:*

a. Subject to audit, a statistically valid baseline violation rate must be established through automated or systematic manual monitoring or sampling at the subject crossing(s); and

b. A sustainable public education and awareness program must be defined, established and continued along with continual or regular monitoring that provides a statistically valid violation rate that indicates the effectiveness of the law enforcement effort. This program shall be provided and supported primarily through local resources.

3. *Photo Enforcement*: This ASM entails automated means of gathering valid photographic or video evidence of traffic law violations at a public highway-rail grade crossing

together with follow-through by law enforcement and the judiciary.

*Required:*

a. State law authorizing use of photographic or video evidence both to bring charges and sustain the burden of proof that a violation of traffic laws concerning public highway-rail grade crossings has occurred, accompanied by commitment of administrative, law enforcement and judicial officers to enforce the law;

b. Sanction includes sufficient minimum fine (*e.g.*, \$100 for a first offense, “points” toward license suspension or revocation) to deter violations;

c. Means to reliably detect violations (*e.g.*, loop detectors, video imaging technology);

d. Photographic or video equipment deployed to capture images sufficient to document the violation (including the face of the driver, if required to charge or convict under state law).

NOTE: This does not require that each crossing be continually monitored. The objective of this option is deterrence, which may be accomplished by moving photo/video equipment among several crossing locations, as long as the motorist perceives the strong possibility that a violation will lead to sanctions. Each location must appear identical to the motorist, whether or not surveillance equipment is actually placed there at the particular time. Surveillance equipment should be in place and operating at each crossing at least 25 percent of each calendar quarter.

e. Appropriate integration, testing and maintenance of the system to provide evidence supporting enforcement;

f. Public awareness efforts designed to reinforce photo enforcement and alert motorists to the absence of train horns;

g. Subject to audit, a statistically valid baseline violation rate must be established through automated or systematic manual monitoring or sampling at the subject crossing(s); and

h. A law enforcement effort must be defined, established and continued along with continual or regular monitoring.

B. The effectiveness of an ASM will be determined as follows:

1. Establish the quarterly (3 months) baseline violation rates for each crossing in the proposed quiet zone.

a. A violation in this context refers to a motorist not complying with the automatic warning devices at the crossing (not stopping for the flashing lights and driving over the crossing after the gate arms have started to descend, or driving around the lowered gate arms). A violation does not have to result in a traffic citation for the violation to be considered.

b. Violation data may be obtained by any method that can be shown to provide a statistically valid sample. This may include the

use of video cameras, other technologies (*e.g.*, inductive loops), or manual observations that capture driver behavior when the automatic warning devices are operating.

c. If data is not collected continuously during the quarter, sufficient detail must be provided in the application in order to validate that the methodology used results in a statistically valid sample. FRA recommends that at least a minimum of 600 samples (one sample equals one gate activation) be collected during the baseline and subsequent quarterly sample periods.

d. The sampling methodology must take measures to avoid biases in their sampling technique. Potential sampling biases could include: sampling on certain days of the week but not others; sampling during certain times of the day but not others; sampling immediately after implementation of an ASM while the public is still going through an adjustment period; or applying one sample method for the baseline rate and another for the new rate.

e. The baseline violation rate should be expressed as the number of violations per gate activations in order to normalize for unequal gate activations during subsequent data collection periods.

f. All subsequent quarterly violation rate calculations must use the same methodology as in this paragraph unless FRA authorizes another methodology.

2. The ASM should then be initiated for each crossing. Train horns are still being sounded during this time period.

3. In the calendar quarter following initiation of the ASM, determine a new quarterly violation rate using the same methodology as in paragraph (1) above.

4. Determine the violation rate reduction for each crossing by the following formula:

$$\text{Violation rate reduction} = \frac{(\text{new rate} - \text{baseline rate})}{\text{baseline rate}}$$

5. Determine the effectiveness rate of the ASM for each crossing by multiplying the violation rate reduction by .78.

6. Using the effectiveness rates for each crossing treated by an ASM, determine the Quiet Zone Risk Index. If and when the Quiet Zone Risk Index for the proposed quiet zone has been reduced to either the risk level which would exist if locomotive horns sounded at all crossings in quiet zone or to a risk level below the Nationwide Significant Risk Threshold, the public authority may apply to FRA for approval of the quiet zone. Upon receiving written approval of the quiet zone application from FRA, the public authority may then proceed with notifications and implementation of the quiet zone.

7. Violation rates must be monitored for the next two calendar quarters and every second quarter thereafter. If after five years from the implementation of the quiet zone, the violation rate for any quarter has never

exceeded the violation rate that was used to determine the effectiveness rate that was approved by FRA, violation rates may be monitored for one quarter per year.

8. In the event that the violation rate is ever greater than the violation rate used to determine the effectiveness rate that was approved by FRA, the public authority may continue the quiet zone for another quarter. If, in the second quarter the violation rate is still greater than the rate used to determine the effectiveness rate that was approved by FRA, a new effectiveness rate must be calculated and the Quiet Zone Risk Index recalculated using the new effectiveness rate. If the new Quiet Zone Risk Index indicates that the ASM no longer fully compensates for the lack of a train horn, or that the risk level is equal to, or exceeds the Nationwide Significant Risk Threshold, the procedures for dealing with unacceptable effectiveness after establishment of a quiet zone should be followed.

#### APPENDIX C TO PART 222—GUIDE TO ESTABLISHING QUIET ZONES

##### INTRODUCTION

This Guide to Establishing Quiet Zones (Guide) is divided into four sections in order to address the variety of methods and conditions that affect the establishment of quiet zones under this rule.

Section I of the Guide provides an overview of the different ways in which a quiet zone may be established under this rule. This includes a brief discussion on the safety thresholds that must be attained in order for train horns to be silenced and the relative merits of each. It also includes the two general methods that may be used to reduce risk in the proposed quiet zone, and the different impacts that the methods have on the quiet zone implementation process.

Section II of the Guide provides information on establishing New Quiet Zones. A New Quiet Zone is one at which train horns are currently being sounded at crossings. The Public Authority Designation and Public Authority Application to FRA methods will be discussed in depth.

Section III of the Guide provides information on establishing Pre-Rule Quiet Zones. A Pre-Rule Quiet Zone is one where train horns were not routinely sounded as of October 9, 1996 and December 18, 2003. The differences between New and Pre-Rule Quiet Zones will be explained. Public Authority Designation and Public Authority Application to FRA methods also apply to Pre-Rule Quiet Zones.

Section IV of the Guide deals with the required notifications that must be provided by public authorities when establishing both New and continuing Pre-Rule Quiet Zones.

Section V of the Guide provides examples of quiet zone implementation.

##### SECTION I—OVERVIEW

In order for a quiet zone to be qualified under this rule, it must be shown that the lack of the train horn does not present a significant risk with respect to loss of life or serious personal injury, or that the significant risk has been compensated for by other means. The rule provides four basic ways in which a quiet zone may be established. Creation of both New Quiet Zones and Pre-Rule Quiet Zones are based on the same general guidelines; however, there are a number of differences that will be noted in the discussion on Pre-Rule Quiet Zones.

##### A. Qualifying Conditions

One of the following four conditions or scenarios must be met in order to show that the lack of the train horn does not present a significant risk, or that the significant risk has been compensated for by other means:

1. One or more SSMS as identified in Appendix A are installed at *each* public crossing in the quiet zone; or
2. The Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold without implementation of additional safety measures at any crossings in the quiet zone; or
3. Additional safety measures are implemented at selected crossings resulting in the Quiet Zone Risk Index being reduced to a level equal to, or less than, the Nationwide Significant Risk Threshold; or
4. Additional safety measures are taken at selected crossings resulting in the Quiet Zone Risk Index being reduced to at least the level of risk that would exist if train horns were sounded at every public crossing in the quiet zone.

It is important to consider the implications of each approach before deciding which one to use. If a quiet zone is qualified based on reference to the Nationwide Significant Risk Threshold (*i.e.* the Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold—see the second and third scenarios above), then an annual review will be done by FRA to determine if the Quiet Zone Risk Index remains equal to, or less than, the Nationwide Significant Risk Threshold. Since the Nationwide Significant Risk Threshold and the Quiet Zone Risk Index may change from year to year, there is no guarantee that the quiet zone will remain qualified. The circumstances that cause the disqualification may not be subject to the control of the public authority. For example, an overall national improvement in safety at gated crossings may cause the Nationwide Significant Risk Threshold to fall. This may cause the Quiet Zone Risk Index to become greater than the Nationwide Significant Risk Threshold. If the quiet zone is no longer qualified, then the public authority will have

to take additional measures, and may incur additional costs that might not have been budgeted, to once again lower the Quiet Zone Risk Index to at least the Nationwide Significant Risk Threshold in order to retain the quiet zone. Therefore, while the initial cost to implement a quiet zone under the second or third scenario may be lower than the other options, these scenarios also carry a degree of uncertainty about the quiet zone's continued existence.

The use of the first or fourth scenarios reduces the risk level to at least the level that would exist if train horns were sounding in the quiet zone. These methods may have higher initial costs because more safety measures may be necessary in order to achieve the needed risk reduction. Despite the possibility of greater initial costs, there are several benefits to these methods. The installation of SSMS at every crossing will provide the greatest safety benefit of any of the methods that may be used to initiate a quiet zone. With both of these methods (first and fourth scenarios), the public authority will never need to be concerned about the Nationwide Significant Risk Threshold, annual reviews of the Quiet Zone Risk Index, or failing to be qualified because the Quiet Zone Risk Index is higher than the Nationwide Significant Risk Threshold. Public authorities are strongly encouraged to carefully consider both the pros and cons of all of the methods and to choose the method that will best meet the needs of its citizens by providing a safer and quieter community.

For the purposes of this Guide, the term "Risk Index with Horns" is used to represent the level of risk that would exist if train horns were sounded at every public crossing in the proposed quiet zone. If a public authority decides that it would like to fully compensate for the lack of a train horn and not install SSMS at each public crossing in the quiet zone, it must reduce the Quiet Zone Risk Index to a level that is equal to, or less than, the Risk Index with Horns. The Risk Index with Horns is similar to the Nationwide Significant Risk Threshold in that both are targets that must be reached in order to establish a quiet zone under the rule. Quiet zones that are established by reducing the Quiet Zone Risk Index to at least the level of the Nationwide Significant Risk Threshold will be reviewed annually by FRA to determine if it still qualifies under the rule to retain the quiet zone. Quiet zones that are established by reducing the Quiet Zone Risk Index to at least the level of the Risk Index with Horns will not be subject to annual reviews.

The use of FRA's web-based Quiet Zone Calculator is recommended to aid in the decision making process (<http://www.fra.dot.gov/Content3.asp?P=1337>). The Quiet Zone Calculator will allow the public authority to consider a variety of options in determining

which SSMS make the most sense. It will also perform the necessary calculations used to determine the existing risk level and whether enough risk has been mitigated in order to create a quiet zone under this rule.

#### *B. Risk Reduction Methods*

FRA has established two general methods to reduce risk in order to have a quiet zone qualify under this rule. The method chosen impacts the manner in which the quiet zone is implemented.

1. *Public Authority Designation (SSMS)*—The Public Authority Designation method (§222.39(a)) involves the use of SSMS (see appendix A) at some or all crossings within the quiet zone. The use of only SSMS to reduce risk will allow a public authority to designate a quiet zone without approval from FRA. If the public authority installs SSMS at every crossing within the quiet zone, it need not demonstrate that they will reduce the risk sufficiently in order to qualify under the rule since FRA has already assessed the ability of the SSMS to reduce risk. However, if only SSMS are installed within the quiet zone, but not at every crossing, the public authority must calculate that sufficient risk reduction will be accomplished by the SSMS. Once the improvements are made, the public authority must make the required notifications, and the quiet zone may be implemented. FRA does not need to approve the plan as it has already assessed the ability of the SSMS to reduce risk.

2. *Public Authority Application to FRA (ASMS)*—The Public Authority Application to FRA method (§222.39(b)) involves the use of ASMS (see appendix B). ASMS include both modified SSMS that do not fully comply with the provisions found in Appendix A (e.g. shorter than required traffic channelization devices), and non-engineering ASMS such as programmed law enforcement. If the use of ASMS (or a combination of ASMS, SSMS, and modified SSMS) is elected to reduce risk, then the public authority must apply to FRA for approval of the quiet zone. The application must contain sufficient data and analysis to confirm that the proposed ASMS do indeed provide the necessary risk reduction. FRA will review the application and will issue a formal approval if it determines that risk is reduced to a level that is necessary in order to comply with the rule. Once FRA approval has been received and the safety measures fully implemented, the public authority would then proceed to make the necessary notifications, and the quiet zone may be implemented. The use of non-engineering ASMS will require continued monitoring and analysis throughout the existence of the quiet zone to ensure that risk continues to be reduced.

3. *Calculating Risk Reduction*—The following should be noted when calculating risk

reductions in association with the establishment of a quiet zone. This information pertains to both New Quiet Zones and Pre-Rule Quiet Zones and to the Public Authority Designation and Public Authority Application to FRA methods.

*Crossing closures:* If any public crossing within the quiet zone is proposed to be closed, include that crossing when calculating the Risk Index with Horns. Do *not* include the crossing to be closed when calculating the Quiet Zone Risk Index since the crossing will no longer exist. This will reflect the fact that the risk associated with the crossing has been eliminated entirely. However, be sure to increase the traffic counts at other crossings within the quiet zone and recalculate the risk indices for those crossings that will handle the traffic diverted from the closed crossing.

*Example:* A proposed New Quiet Zone contains four crossings: A, B, C and D streets. A, B and D streets are equipped with flashing lights and gates. C Street is a passive crossbuck crossing with a traffic count of 400 vehicles per day. It is decided that C Street will be closed as part of the project. Compute the risk indices for all four streets. The calculation for C Street will utilize flashing lights and gates as the warning device. Calculate the Crossing Corridor Risk Index by averaging the risk indices for all four of the crossings. This value will also be the Risk Index with Horns since train horns are currently being sounded. To calculate the Quiet Zone Risk Index, first re-calculate the risk indices for B and D streets by increasing the traffic count for each crossing by 200. (Assume for this example that the public authority decided that the traffic from C Street would be equally divided between B and D streets.) Increase the risk indices for A, B and D streets by 66.8 percent and average the results. This is the initial Quiet Zone Risk Index and accounts for the risk reduction caused by closing C Street.

*Grade Separation:* Grade separated crossings that were in existence before the creation of a quiet zone are not included in any of the calculations. However, any public crossings within the quiet zone that are proposed to be treated by grade separation should be treated in the same manner as crossing closures as explained above. Highway traffic that may be diverted from other crossings within the quiet zone to the new grade separated crossing should be considered when computing the Quiet Zone Risk Index.

*Example:* A proposed New Quiet Zone contains four crossings: A, B, C and D streets. All streets are equipped with flashing lights and gates. C Street is a busy crossing with a traffic count of 25,000 vehicles per day. It is decided that C Street will be grade separated

as part of the project. Compute the risk indices for all four streets. Calculate the Crossing Corridor Risk Index, which will also be the Risk Index with Horns, by averaging the risk indices for all four of the crossings. To calculate the Quiet Zone Risk Index, first recalculate the risk indices for B and D streets by decreasing the traffic count for each crossing by 1,200. (The public authority decided that 2,400 motorists will decide to use the grade separation at C Street in order to avoid possible delays caused by passing trains.) Increase the risk indices for A, B and D streets by 66.8 percent and average the results. This is the initial Quiet Zone Risk Index and accounts for the risk reduction caused by the grade separation at C Street.

*Wayside Horns:* Crossings with wayside horn installations will be treated as a one for one substitute for the train horn and are not to be included when calculating the Crossing Corridor Risk Index, the Risk Index with Horns or the Quiet Zone Risk Index.

*Example:* A proposed New Quiet Zone contains four crossings: A, B, C and D streets. All streets are equipped with flashing lights and gates. It is decided that C Street will have a wayside horn installed. Compute the risk indices for A, B and D streets. Since C Street is being treated with a wayside horn, it is not included in the calculation of risk. Calculate the Crossing Corridor Risk Index by averaging the risk indices for A, B and D streets. This value is also the Risk Index with Horns. Increase the risk indices for A, B and D streets by 66.8 percent and average the results. This is the initial Quiet Zone Risk Index for the proposed quiet zone.

#### SECTION II—NEW QUIET ZONES

FRA has established several approaches that may be taken in order to establish a New Quiet Zone under this rule. Please see the preceding discussions on “Qualifying Conditions” and “Risk Reduction Methods” to assist in the decision-making process on which approach to take. This following discussion provides the steps necessary to establish New Quiet Zones and includes both the Public Authority Designation and Public Authority Application to FRA methods. It must be remembered that in a New Quiet Zone all public crossings must be equipped with flashing lights and gates.

##### *A. Requirements for Both Public Authority Designation and Public Authority Application*

The following steps are necessary when establishing a New Quiet Zone. This information pertains to both the Public Authority Designation and Public Authority Application to FRA methods.

1. Determine all public and private at-grade crossings that will be included within the quiet zone. Also determine any existing grade-separated crossings that fall within

the quiet zone. Each crossing must be identified by the US DOT Crossing Inventory number and street or highway name. If a crossing does not have a US DOT crossing number, then contact FRA's Office of Safety (202-493-6299) for assistance.

2. Ensure that the quiet zone will be at least one-half mile in length. (§222.35(a)(1))

3. A complete and accurate Grade Crossing Inventory Form must be on file with FRA for all crossings (public and private) within the quiet zone. These must be dated within six months prior to the designation of the quiet zone. An inspection of each crossing in the proposed quiet should be performed and the Grade Crossing Inventory Forms updated to reflect the current conditions at each crossing.

4. Every public crossing within the quiet zone must be equipped with active warning devices comprising both flashing lights and gates. The warning devices must be equipped with power out indicators. Constant warning time circuitry is also required unless existing conditions would prevent the proper operation of the constant warning time circuitry. The plans for the quiet zone may be made assuming that flashing lights and gates are at all public crossings; however the quiet zone may not be implemented until all public crossings are actually equipped with the flashing lights and gates. (§222.35(b)(1))

5. Private crossings must have cross-bucks and "STOP" signs on both approaches to the crossing. Private crossings with public access, industrial or commercial use must have a diagnostic team review and be treated according to the team's recommendations. (§§222.25(b) and (c))

6. Each highway approach to every public and private crossing must have an advanced warning sign (in accordance with the MUTCD) that advises motorists that train horns are not sounded at the crossing. (§222.35(c)(1) and 222.25(c)(2))

#### *B. New Quiet Zones—Public Authority Designation*

Once again it should be remembered that all public crossings must be equipped with automatic warning devices consisting of flashing lights and gates in accordance with §222.35(b). In addition, one of the following conditions must be met in order for a public authority to designate a new quiet zone without FRA approval:

- One or more SSMs as identified in Appendix A are installed at *each* public crossing in the quiet zone (§222.39(a)(1)); or
- The Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold without SSMs installed at any crossings in the quiet zone (§222.39(a)(2)(i)); or
- SSMS's are installed at selected crossings resulting in the Quiet Zone Risk Index being reduced to a level equal to, or less

than, the Nationwide Significant Risk Threshold (§222.39(a)(2)(ii)); or

- SSMS's are installed at selected crossings resulting in the Quiet Zone Risk Index being reduced to a level of risk that would exist if the horn were sounded at every crossing in the quiet zone (*i.e.* the Risk Index with Horns) (§222.39(a)(3)).

Steps necessary to establish a New Quiet Zone using the Public Authority Application to FRA method:

1. If one or more SSMs as identified in appendix A are installed at each public crossing in the quiet zone, the requirements for a public authority designation quiet zone have been met. It is not necessary for the same SSM to be used at each crossing. Once the necessary improvements have been installed, notifications may take place and the quiet zone implemented in accordance with the rule. If SSMs are not installed at each crossing, proceed on to Step 2 and use the risk reduction method.

2. To begin, calculate the risk index for each public crossing within the quiet zone (See appendix D. FRA's web-based Quiet Zone Calculator may be used to do this calculation). If flashing lights and gates have to be installed at any public crossings, calculate the risk indices for such crossings as if lights and gates were installed. (NOTE: Flashing lights and gates must be installed prior to initiation of the quiet zone.) If the Inventory record does not reflect the actual conditions at the crossing, be sure to use the conditions that currently exist when calculating the risk index. Note: Private crossings are not included when computing the risk for the proposed quiet zone.

3. The Crossing Corridor Risk Index is then calculated by averaging the risk index for each public crossing within the proposed quiet zone. Since train horns are routinely being sounded for crossings in the proposed quiet zone, this value is also the Risk Index with Horns.

4. In order to calculate the initial Quiet Zone Risk Index, first adjust the risk index at each public crossing to account for the increased risk due to the absence of the train horn. The absence of the horn is reflected by an increased risk index of 66.8 percent at gated crossings. The initial Quiet Zone Risk Index is then calculated by averaging the increased risk index for each public crossing within the proposed quiet zone. At this point the Quiet Zone Risk Index will equal the Risk Index with Horns multiplied by 1.668.

5. Compare the Quiet Zone Risk Index to the Nationwide Significant Risk Threshold. If the Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold, then the public authority may decide to designate a quiet zone and proceed with the notification process. With this approach, FRA will annually recalculate the Nationwide Significant Risk Threshold and

the Quiet Zone Risk Index. If the Quiet Zone Risk Index for the quiet zone is above the Nationwide Significant Risk Threshold, FRA will notify the Public Authority so that appropriate measures can be taken. (See §222.51(a).)

6. If the Quiet Zone Risk Index is greater than the Nationwide Significant Risk Threshold, then select an appropriate SSM for a crossing. Reduce the inflated risk index calculated in Step 4 for that crossing by the effectiveness rate of the chosen SSM. (See appendix A for the effectiveness rates for the various SSMs.) Recalculate the Quiet Zone Risk Index by averaging the revised inflated risk index with the inflated risk indices for the other public crossings. If this new Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold, the quiet zone would qualify for public authority designation. If the Quiet Zone Risk Index is still higher than the Nationwide Significant Risk Threshold, treat another public crossing with an appropriate SSM and repeat the process until the Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold. Once this is obtained the quiet zone has qualified for the public authority designation method, and notification may take place once all the necessary improvements have been installed. With this approach, FRA will annually recalculate the Nationwide Significant Risk Threshold and the Quiet Zone Risk Index. If the Quiet Zone Risk Index for the quiet zone is above the Nationwide Significant Risk Threshold, FRA will notify the public authority so that appropriate measures can be taken. (See §222.51(a).)

7. If the public authority wishes to reduce the risk of the quiet zone to the level of risk that would exist if the horn were sounded at every crossing within the quiet zone, the public authority should calculate the initial Quiet Zone Risk Index as in Step 4. The objective is to now reduce the Quiet Zone Risk Index to the level of the Risk Index with Horns by adding SSMs at the crossings. The difference between the Quiet Zone Risk Index and the Risk Index with Horns is the amount of risk that will have to be reduced in order to fully compensate for lack of the train horn. The use of the Quiet Zone Calculator will aid in determining which SSMs may be used to reduce the risk sufficiently. Follow the procedure stated in Step 6, except that the Quiet Zone Risk Index must be equal to, or less than, the Risk Index with Horns instead of the Nationwide Significant Risk Threshold. Once this risk level is attained, the quiet zone has qualified for the public authority designation method, and notification may take place once all the necessary improvements have been installed. One important distinction with this option is that the public authority will never need to be concerned with the Nationwide Signifi-

cant Risk Threshold or the Quiet Zone Risk Index. The rule's intent is to make the quiet zone as safe as if the train horns were sounding. If this is accomplished, the public authority may designate the crossings as a quiet zone and need not be concerned with possible fluctuations in the Nationwide Significant Risk Threshold or annual risk reviews.

#### *C. New Quiet Zones—Public Authority Application to FRA*

A public authority must apply to FRA for approval of a quiet zone under two conditions. First, if any of the SSMs selected for the quiet zone do not fully conform to the design standards set forth in appendix A. These are referred to as modified SSMs in appendix B. Second, when programmed law enforcement, public education and awareness programs, or photo enforcement is used to reduce risk in the quiet zone, these are referred to as non-engineering ASMs in appendix B. It should be remembered that non-engineering ASMs will require periodic monitoring as long as the quiet zone is in existence. Please see appendix B for detailed explanations of ASMs and the periodic monitoring of non-engineering ASMs.

The public authority is strongly encouraged to submit the application to FRA for review and comment *before* the appendix B treatments are initiated. This will enable FRA to provide comments on the proposed modified SSMs or non-engineering ASMs to help guide the application process. If non-engineering ASMs are proposed, the public authority also may wish to confirm with FRA that the methodology it plans to use to determine the effectiveness rates of the proposed ASMs is appropriate. A quiet zone that utilizes a combination of SSMs from appendix A and ASMs from appendix B must make a Public Authority Application to FRA. A complete and thoroughly documented application will help to expedite the approval process.

The following discussion is meant to provide guidance on the steps necessary to establish a new quiet zone using the Public Authority Application to FRA method. Once again it should be remembered that all public crossings must be equipped with automatic warning devices consisting of flashing lights and gates in accordance with §222.35(b).

1. Gather the information previously mentioned in the section on "Requirements for both Public Authority Designation and Public Authority Application."

2. Calculate the risk index for each public crossing as directed in Step 2—Public Authority Designation.

3. Calculate the Crossing Corridor Risk Index, which is also the Risk Index with Horns, as directed in Step 3—Public Authority Designation.

4. Calculate the initial Quiet Zone Risk Index as directed in Step 4—Public Authority Designation.

5. Begin to reduce the Quiet Zone Risk Index through the use of ASMs and SSMS. Follow the procedure provided in Step 6—Public Authority Designation until the Quiet Zone Risk Index has been reduced to equal to, or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns. (Remember that the public authority may choose which level of risk reduction is the most appropriate for its community.) Effectiveness rates for ASMs should be provided as follows:

a. Modified SSMS—Estimates of effectiveness for modified SSMS may be proposed based upon adjustments from the effectiveness rates provided in appendix A or from actual field data derived from the crossing sites. The application should provide an estimated effectiveness rate and the rationale for the estimate.

b. Non-engineering ASMs—Effectiveness rates are to be calculated in accordance with the provisions of appendix B, paragraph 2(b).

6. Once it has been determined through analysis that the Quiet Zone Risk Index has been reduced to equal to, or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns, the public authority may make application to FRA for a quiet zone under §222.39(b). FRA will review the application to determine the appropriateness of the proposed effectiveness rates, and whether or not the proposed application demonstrates that the quiet zone meets the requirements of the rule. When submitting the application to FRA for approval, the application must contain the following (§222.39(b)(1)):

- Sufficient detail concerning the present safety measures at the public crossings within the proposed quiet zone. This includes current and accurate crossing inventory forms.
- Detailed information on the SSMS's or ASM's that are proposed to be implemented and at which public crossings within the proposed quiet zone.
- Membership and recommendations of the diagnostic team (if any) that reviewed the proposed quiet zone.
- A commitment to implement the proposed safety measures.
- Demonstrate through data and analysis that the proposed measures will reduce the Quiet Zone Risk Index to equal, to or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns.
- A copy of the application must be provided to the parties listed under Required Notifications.

7. Upon receiving written approval from FRA of the quiet zone application, the public authority may then proceed with notifications and implementation of the quiet zone. If the quiet zone is qualified by reducing the

Quiet Zone Risk Index to at the least the level of the Nationwide Significant Risk Threshold, FRA will annually recalculate the Nationwide Significant Risk Threshold and the Quiet Zone Risk Index. If the Quiet Zone Risk Index for the quiet zone is above the Nationwide Significant Risk Threshold, FRA will notify the public authority so that appropriate measures can be taken. (See §222.51(a)).

NOTE: The provisions stated above for crossing closures, grade separations and wayside horns apply for Public Authority Application to FRA as well.

#### SECTION III—PRE-RULE QUIET ZONES

Pre-Rule Quiet Zones are treated slightly differently from New Quiet Zones in the rule. This is a reflection of the statutory requirement to “take into account the interest of communities that have in effect restrictions on the sounding of a locomotive horn at highway-rail grade crossings \* \* \*” It also recognizes the historical experience of train horns not being sounded at Pre-Rule Quiet Zones.

#### Overview

Pre-Rule Quiet Zones that do not meet the requirements for automatic approval (see discussion that follows) must meet the same requirements as New Quiet Zones as provided in §222.39. In other words, risk must be reduced through the use of SSMS or ASMs so that the Quiet Zone Risk Index for the quiet zone has been reduced to either the risk level which would exist if locomotive horns sounded at all crossings in the quiet zone (*i.e.* the Risk Index with Horns) or to a risk level equal to, or less than, the Nationwide Significant Risk Threshold. Pre-Rule Quiet Zones must meet these requirements by December 18, 2008 (§222.41(b)(2)). There are four differences in the requirements between Pre-Rule Quiet Zones and New Quiet Zones that must be noted.

First, since train horns have not been routinely sounded in the Pre-Rule Quiet Zone, it is not necessary to increase the risk indices of the public crossings to reflect the additional risk caused by the lack of a train horn. Since the train horn has already been silenced, the added risk caused by the lack of a horn is reflected in the actual collision history at the crossings. Collision history is an important part in the calculation of the severity risk indices. In other words, the Quiet Zone Risk Index is calculated by averaging the existing risk index for each public crossing without the need to increase the risk index by 66.8 percent. For Pre-Rule Quiet Zones, the Crossing Corridor Risk Index and the initial Quiet Zone Risk Index have the same value.

Second, since train horns have been silenced at the crossings, it will be necessary

to mathematically determine what the risk level would have been at the crossings if train horns had been routinely sounded. These revised risk levels then will be used to calculate the Risk Index with Horns. This calculation is necessary to determine how much risk must be eliminated in order to compensate for the lack of the train horn. This will allow the public authority to have the choice to reduce the risk to at least the level of the Nationwide Significant Risk Threshold or to fully compensate for the lack of the train horn.

To calculate the Risk Index with Horns, the first step is to divide the existing severity risk index for each crossing by the appropriate value as shown in Table 1. This proc-

ess eliminates the risk that was caused by the absence of train horns. The table takes into account that the train horn has been found to produce different levels of effectiveness in preventing collisions depending on the type of warning device at the crossing. (NOTE: FRA's web based Quiet Zone Calculator will perform this computation automatically for pre-rule quiet zones.) The Risk Index with Horns is the average of the revised risk indices. The difference between the calculated Risk Index with Horns and the Quiet Zone Risk Index is the amount of risk that would have to be reduced in order to fully compensate for the lack of train horns.

TABLE 1.—RISK INDEX DIVISOR VALUES

	Passive	Flashing lights	Lights and gates
U.S. except Chicago .....	1.749	1.309	1.668
Chicago Region .....	N/A	N/A	1.173

NOTE: The Chicago Region includes the Illinois counties of: Cook, DuPage, Lake, Kane, McHenry and Will. Pre-Rule Quiet Zones in the Chicago Region are able to use a lower adjustment factor at crossings equipped with gates due to data that indicate that the collision rate for Pre-Rule Quiet Zone crossings that were equipped with flashing lights and gates in the Chicago Region had an increased collision rate of 17.3 percent when compared to similar gated crossings in the Nation where horns were sounded. Gated crossings in Pre-Rule Quiet Zones outside of the Chicago Region had an increased collision rate of 66.8 percent when compared to similar crossings in the Nation where horns were sounded. Passive and flashing lights crossings in the Chicago Region use the "U.S. except Chicago" values in Table 1.

The third difference is that credit is given for the risk reduction that is brought about through the upgrading of the warning devices at public crossings (§222.35(b)(2)). For New Quiet Zones, all crossings must be equipped with automatic warning devices consisting of flashing lights and gates. Crossings without gates must have gates installed. The severity risk index for that crossing is then calculated to establish the risk index that is used in the Risk Index with Horns. The Risk Index with Horns is then increased by 66.8 percent to adjust for the lack of the train horn. The adjusted figure is the initial Quiet Zone Risk Index. There is no credit received for the risk reduction that is attributable to warning device upgrades.

For Pre-Rule Quiet Zones, the Risk Index with Horns is calculated from the initial risk indices which use the warning devices that

are currently installed. If a public authority elects to upgrade an existing warning device as part of its quiet zone plan, the accident prediction value for that crossing will be recalculated based on the upgraded warning device. (Once again, FRA's web-based Quiet Zone Calculator can do the actual computation.) The new accident prediction value is then used in the severity risk index formula to determine the risk index for the crossing. This adjusted risk index is then used to compute the new Quiet Zone Risk Index. This computation allows the risk reduction attributed to the warning device upgrades to be used in establishing a quiet zone.

The fourth difference is that pre-rule quiet zones have different minimum requirements under §222.35. A pre-rule quiet zone may be less than one-half mile in length if that was its length as of October 9, 1996. A pre-rule quiet zone does not have to have automatic warning devices consisting of flashing lights and gates at every public crossing (§222.32(b)(2)). The existing crossing safety warning systems in place as of December 18, 2003, may be retained but cannot be downgraded. It also is not necessary for the automatic warning devices to be equipped with constant warning time devices or power out indicators; however, when the warning devices are upgraded, constant warning time and power out indicators will be required if reasonably practical (§222.35(b)(2)). Advance warning signs that notify the motorist that train horns are not sounded and STOP signs and crossbucks at private crossings do not have to be installed until December 18, 2006, which allows three years to install the required signage.

*A. Requirements for Both Public Authority Designation and Public Authority Application—Pre-Rule Quiet Zones*

These following is necessary when establishing a Pre-Rule Quiet Zone. This information pertains to Automatic Approval, the Public Authority Designation and Public Authority Application to FRA methods.

1. Determine all public and private at-grade crossings that will be included within the quiet zone. Also determine any existing grade separated crossings that fall within the quiet zone. Each crossing must be identified by the U.S. DOT Crossing Inventory number and street name. If a crossing does not have a U.S. DOT crossing number then contact FRA for assistance.

2. Document the length of the quiet zone. It is not necessary that the quiet zone be at least one-half mile in length. Pre-Rule Quiet Zones may be shorter than one-half mile. However, the addition of a new crossing to a quiet zone nullifies its pre-rule status, and the resulting New Quiet Zone must be at least one-half mile. The deletion of a crossing from a Pre-Rule Quiet Zone (except through closure or grade separation) must result in a quiet zone that is a least one half mile in length.

3. A complete and accurate Grade Crossing Inventory Form must be on file with FRA for all crossings (public and private) within the quiet zone. These must be dated within six months prior to the designation of the quiet zone. An inspection of each crossing in the proposed quiet should be performed and the Grade Crossing Inventory Forms updated to reflect the current conditions at each crossing.

4. Pre-Rule Quiet Zones must retain, and may upgrade, the existing grade crossing safety warning systems. Unlike New Quiet Zones, it is not necessary that every public crossing within a Pre-Rule Quiet Zone be equipped with active warning devices comprising both flashing lights and gates. Existing warning devices need not be equipped with power out indicators and constant warning time circuitry. If warning devices are upgraded to flashing lights, or flashing lights and gates, the upgraded equipment must include, as is required for New Quiet Zones, power out indicators and constant warning time devices (if reasonably practical).

5. By December 18, 2006, private crossings must have cross-bucks and “STOP” signs on both approaches to the crossing. Private crossings with public access, industrial or commercial use must have a diagnostic team review and be treated according to the team’s recommendations unless the quiet zone qualifies for automatic approval. A diagnostic team review of private crossings is not necessary for Pre-Rule Quiet Zones that qualify for Automatic Approval.

6. By December 18, 2006, each highway approach to every public and private crossing must have an advanced warning sign (in accordance with the MUTCD) that advises motorists that train horns are not sounded at the crossing.

*B. Pre-Rule Quiet Zones—Automatic Approval*

In order for a Pre-Rule Quiet Zone to be automatically approved as a quiet zone under this rule (§222.41(a)), one of the following conditions must be met:

- One or more SSMs as identified in appendix A are installed at *each* public crossing in the quiet zone; or
- The Quiet Zone Risk Index is equal, to or less, than the Nationwide Significant Risk Threshold; or
- The Quiet Zone Risk Index is above the Nationwide Significant Risk Threshold but less than twice the Nationwide Significant Risk Threshold and there have been no relevant collisions at any public grade crossing within the quiet zone for the preceding five years.

Additionally, it must be in compliance with the minimum requirements for quiet zones (§222.35) and the notification requirements in §222.43.

The following discussion is meant to provide guidance on the steps necessary to determine if a Pre-Rule Quiet Zone qualifies for automatic approval.

1. All of the items listed in *Requirements for both Public Authority Designation and Public Authority Application—Pre-Rule Quiet Zones* previously mentioned are to be accomplished. Remember that a Pre-Rule Quiet Zone may be less than one-half mile in length if that was its length as of October 9, 1996. Also, a Pre-Rule Quiet Zone does not have to have automatic warning devices consisting of flashing lights and gates at every public crossing.

2. If one or more SSMs as identified in Appendix A are installed at each public crossing in the quiet zone, the quiet zone qualifies and notification should take place. If the Pre-Rule Quiet Zone does not qualify by this step, proceed on to the next step.

3. Calculate the risk index for each public crossing within the quiet zone (*See* appendix D). Be sure that the risk index is calculated using the formula appropriate for the type of warning device that is actually installed at the crossing. Unlike New Quiet Zones, it is not necessary to calculate the risk index using flashing lights and gates as the warning device. (FRA’s web-based Quiet Zone Calculator may be used to simplify the calculation process). If the Inventory record does not reflect the actual conditions at the crossing, be sure to use the conditions that currently exist when calculating the risk index.

4. The Quiet Zone Risk Index is then calculated by averaging the risk index for each

public crossing within the proposed quiet zone. (NOTE: The initial Quiet Zone Risk Index and the Crossing Corridor Risk Index are the same for Pre-Rule Quiet Zones.)

5. Compare the Quiet Zone Risk Index to the Nationwide Significant Risk Threshold. If the Quiet Zone Risk Index is equal to, or less than, the Nationwide Significant Risk Threshold, then the quiet zone qualifies for automatic approval, and the public authority may proceed with the notification process. With this approach, FRA will annually recalculate the Nationwide Significant Risk Threshold and the Quiet Zone Risk. If the Quiet Zone Risk Index for the quiet zone is above the Nationwide Significant Risk Threshold, FRA will notify the public authority so that appropriate measures can be taken (See § 222.51(b)(2)). If the pre-rule quiet zone does not qualify by this step, proceed on to the next step.

6. If the Quiet Zone Risk Index is above the Nationwide Significant Risk Threshold but less than twice the Nationwide Significant Risk Threshold and there have been no relevant collisions at any public grade crossing within the quiet zone for the preceding five years, then the quiet zone qualifies for automatic approval, and the public authority may proceed with the notification process. NOTE: A relevant collision means a collision at a highway-rail grade crossing between a train and a motor vehicle, excluding the following: a collision resulting from an activation failure of an active grade crossing warning system; a collision in which there is no driver in the motor vehicle; or a collision where the highway vehicle struck the side of the train beyond the fourth locomotive unit or rail car. With this approach, FRA will annually recalculate the Nationwide Significant Risk Threshold and the Quiet Zone Risk. If the Quiet Zone Risk Index for the quiet zone is above two times the Nationwide Significant Risk Threshold, or a relevant collision has occurred during the preceding year, FRA will notify the public authority so that appropriate measures can be taken (See § 222.51(b)(3)).

If the Pre-Rule Quiet Zone does not qualify for automatic approval, continuation of the quiet zone beyond the interim three year period will require implementation of SSMs or ASMs so that the Quiet Zone Risk Index for the quiet zone has been reduced to a risk level equal to, or below, either the risk level which would exist if locomotive horns sounded at all crossings in the quiet zone (*i.e.* the Risk Index with Horns) or the Nationwide Significant Risk Threshold. This is the same methodology used to create New Quiet Zones with the exception of the four differences previously noted. A review of the previous discussion on the two methods used to establish quiet zones may prove helpful in determining which would be the most beneficial to use for a particular Pre-Rule Quiet Zone.

### C. Pre-Rule Quiet Zones—Public Authority Designation

The following discussion is meant to provide guidance on the steps necessary to establish a Pre-Rule Quiet Zone using the Public Authority Designation method.

1. All of the items listed in “Requirements for both Public Authority Designation and Public Authority Application—Pre-Rule Quiet Zones” previously mentioned are to be accomplished. Remember that a Pre-Rule Quiet Zone may be less than one-half mile in length if that was its length as of October 9, 1996. Also, a Pre-Rule Quiet Zone does not have to have automatic warning devices consisting of flashing lights and gates at every public crossing.

2. Calculate the risk index for each public crossing within the quiet zone as in Step 3—Pre-Rule Quiet Zones—Automatic Approval.

3. The Crossing Corridor Risk Index is then calculated by averaging the risk index for each public crossing within the proposed quiet zone. Since train horns are not being sounded for crossings, this value is actually the initial Quiet Zone Risk Index.

4. Calculate Risk Index with Horns by the following:

a. For each public crossing, divide the risk index that was calculated in Step 2 by the appropriate value in Table 1. This produces the risk index that would have existed had the train horn been sounded.

b. Average these reduced risk indices together. The resulting average is the Risk Index with Horns.

5. Begin to reduce the Quiet Zone Risk Index through the use of SSMs or by upgrading existing warning devices. Follow the procedure provided in Step 6—Public Authority Designation until the Quiet Zone Risk Index has been reduced to a level equal to, or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns. A public authority may elect to upgrade an existing warning device as part of its Pre-Rule Quiet Zone plan. When upgrading a warning device, the accident prediction value for that crossing must be re-calculated for the new warning device. Determine the new risk index for the upgraded crossing by using the new accident prediction value in the severity risk index formula. This new risk index is then used to compute the new Quiet Zone Risk Index. (Remember that FRA’s web-based Quiet zone Calculator will be able to do the actual computations.) Once the Quiet Zone Risk Index has been reduced to equal to, or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns, the quiet zone has qualified for the Public Authority Designation method, and notification may take place once all the necessary improvements have been installed. If quiet zone is established by reducing the Quiet Zone Risk Index to equal to, or less

than, the Nationwide Significant Risk Threshold, FRA will annually recalculate the Nationwide Significant Risk Threshold and the Quiet Zone Risk Index. If the Quiet Zone Risk Index for the quiet zone is above the Nationwide Significant Risk Threshold, FRA will notify the public authority so that appropriate measures can be taken (See §222.51(a)).

NOTE: The provisions stated above for crossing closures, grade separations, and wayside horns apply for Public Authority Designation.

#### *D. Pre-Rule Quiet Zones—Public Authority Application to FRA*

The following discussion is meant to provide guidance in the steps necessary to establish a Pre-Rule Quiet zone using the Public Authority Application to FRA method.

1. All of the items listed in “Requirements for both Public Authority Designation and Public Authority Application—Pre-Rule Quiet Zones” previously mentioned are to be accomplished. Remember that a Pre-Rule Quiet Zone may be less than one-half mile in length if that was its length as of October 9, 1996. Also, a Pre-Rule Quiet Zone does not have to have automatic warning devices consisting of flashing lights and gates at every public crossing.

2. Calculate the risk index for each public crossing within the quiet zone (See Appendix D. FRA’s web-based Quiet Zone Calculator may be used to simplify the calculation process). If the Inventory record does not reflect the actual conditions at the crossing, be sure to use the conditions that currently exist when calculating the risk index.

3. The Crossing Corridor Risk Index is then calculated by averaging the risk index for each public crossing within the proposed quiet zone. Since train horns are not being sounded for crossings, this value is actually the initial Quiet Zone Risk Index.

4. Calculate Risk Index with Horns by the following:

a. For each public crossing, divide its risk index that was calculated in Step 2 by the appropriate value in Table 1. This produces the risk index that would have existed had the train horn been sounded.

b. Average these reduced risk indices together. The resulting average is the Risk Index with Horns.

5. Begin to reduce the Quiet Zone Risk Index through the use of ASMs and/or SSMS. Follow the procedure the provided in Step 6—Public Authority Designation until the Quiet Zone Risk Index has been reduced to a level equal to, or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns. A public authority may elect to upgrade an existing warning device as part of its Pre-Rule Quiet Zone plan. When upgrading a warning device, the accident prediction value for that crossing must

be re-calculated for the new warning device. Determine the new risk index for the upgraded crossing by using the new accident prediction value in the severity risk index formula. (Remember that FRA’s web-based quiet zone risk calculator will be able to do the actual computations.) This new risk index is then used to compute the new Quiet Zone Risk Index. Effectiveness rates for ASMs should be provided as follows:

a. Modified SSMS—Estimates of effectiveness for modified SSMS may be proposed based upon adjustments from the benchmark levels provided in Appendix A or from actual field data derived from the crossing sites. The application should provide an estimated effectiveness rate and the rationale for the estimate.

b. Non-engineering ASMs—Effectiveness rates are to be calculated in accordance with the provisions of appendix B, paragraph 2(b).

6. Once it has been determined through analysis that the Quiet Zone Risk Index has been reduced to a level equal to, or less than, either the Nationwide Significant Risk Threshold or the Risk Index with Horns, the public authority may make application to FRA for a quiet zone under §222.39(b). FRA will review the application to determine the appropriateness of the proposed effectiveness rates, and whether or not the proposed application demonstrates that the quiet zone meets the requirements of the rule. When submitting the application to FRA for approval, it should be remembered that the application must contain the following (§222.39(b)(1)):

a. Sufficient detail concerning the present safety measures at the public crossings within the proposed quiet zone. This includes current and accurate crossing inventory forms.

b. Detailed information on the SSMS’s, ASM’s, or upgraded warning devices that are proposed to be implemented and at which public crossings within the proposed quiet zone.

c. Membership and recommendations of the diagnostic team (if any) that reviewed the proposed quiet zone.

d. A commitment to implement the proposed safety measures.

e. Demonstrate through data and analysis that the proposed measures will reduce the Quiet Zone Risk Index to, or below, either the Nationwide Significant Risk Threshold or the Risk Index with Horns.

f. A copy of the application must be provided to the parties listed under Required Notifications.

7. Upon receiving written approval from FRA of the quiet zone application, the public authority may then proceed with notifications and implementation of the quiet zone. If the quiet zone is established by reducing the Quiet Zone Risk Index to a level equal to, or less than, the Nationwide Significant

Risk Threshold, FRA will annually recalculate the Nationwide Significant Risk Threshold and the Quiet Zone Risk. If the Quiet Zone Risk Index for the quiet zone is above the Nationwide Significant Risk Threshold, FRA will notify the public authority so that appropriate measures can be taken (See §222.51(a)).

NOTE: The provisions stated above for crossing closures, grade separations, and wayside horns apply for Public Authority Application to FRA as well.

#### SECTION IV—REQUIRED NOTIFICATIONS

A. The public authority responsible for the creation of a New Quiet Zone or the continuation of a Pre-Rule Quiet Zone, is required to provide notification to parties that will be affected by the quiet zone. The notification process is to ensure that interested parties are made aware in a timely manner of the establishment or continuation of quiet zones. Specific information is to be provided so that the crossings in the quiet zone can be identified. The method used to qualify or continue the quiet zone is to be given. The notification process also includes additional information that must be provided to FRA. Once the rule becomes effective, railroads will be obligated to sound train horns when approaching all public crossings unless notified in accordance with the rule that a New Quiet Zone has been established or that a Pre-Rule Quiet Zone is being continued.

The time frames for the notification process is as follows:

- New Quiet Zones—Notification of the establishment of a New Quiet Zone under §222.39 must be mailed at least 21 days before the routine sounding of train horns for public crossings is to cease (§222.43(a)(2)(i)). The routine use of train horns at public crossings will not cease unless the proper notification has been given.
- Pre-Rule Quiet Zones—Notification of the continuation of a Pre-Rule Quiet Zone under §222.41 must be served no later than December 18, 2004 (§222.43(a)(2)(ii)). Failure to provide the required notice will result in the commencement of the sounding of train horns at public crossings on this date.

#### B. Parties To Be Notified

The public authority that is implementing a New Quiet Zone or is continuing a Pre-Rule Quiet Zone must provide notification of the quiet zone by certified mail, return receipt requested, to the following (see §222.43(a)(1)):

- All railroads operating over the crossings within the quiet zone.
- The highway or traffic control authority, or law enforcement authority having control over vehicular traffic at crossings within the quiet zone.

- The State agency responsible for highway and road safety.
- All landowners owning a private crossing within the quiet zone.
- The Associate Administrator.

#### C. Required Information

The quiet zone implementation notification should contain the following information (§222.43(a)(3)):

1. A list all grade crossings within the quiet zone by both the U.S. DOT crossing number and the street or highway name. This includes public, private and grade separated crossings.
2. The specific date upon which routine use of the train horn will cease at crossings within the quiet zone. The date for New Quiet Zones shall be no earlier than 21 days after mailing of written notification.
3. The notice should state which section contained in the rule is used as the basis for establishment or continuation of the quiet zone.
4. Reference to §222.39(a)(1), (2), or (3) shall include a copy of the FRA web page containing the quiet zone data upon which the public authority relies.
5. Reference to §222.39(b) shall include a copy of FRA's notification of approval.
6. Reference to §222.41 shall include a statement as to how the quiet zone is in compliance with that section. If appropriate, it shall include a copy of the FRA web page containing the quiet zone data upon which the public authority relies.
7. A certificate of service showing to whom and by what means the notice was provided.

D. In addition to the above required information, the notification to the Associate Administrator also must include the following (§222.43(b)):

1. An accurate and complete Grade Crossing Inventory Form for each public and private highway-rail grade crossing within the quiet zone, dated within six months prior to designation or approval by FRA of the quiet zone. Copies of the inventory forms may be obtain on FRA Web site ([www.fra.dot.gov](http://www.fra.dot.gov)).
2. An accurate, complete and current Grade Crossing Inventory Form reflecting SSMs or ASMs in place upon establishment of the quiet zone. SSMs or ASMs that cannot be fully described on the Inventory form must be fully described in writing.
3. The name and title of the person responsible for monitoring compliance with the requirements of this part, and the manner in which that person can be contacted.
4. A list of all parties that received notification of the establishment or continuation of the quiet zone together with copies of the certificates of service showing to whom and by what means the notice was provided.
5. A statement signed by the CEO of each public authority establishing or continuing a

quiet zone that certifies that responsible officials of the public authority have reviewed documentation provided by FRA sufficient to make an informed decision regarding the advisability of establishing the quiet zone.

SECTION V—EXAMPLES OF QUIET ZONE IMPLEMENTATIONS

Example 1—New Quiet Zone

A public authority wishes to create a New Quiet Zone over four public crossings. All of the crossings are equipped with flashing lights and gates, and the length of the quiet zone is 0.75 mile. There are no private crossings within the proposed zone.

The tables that follow show the street name in the first column, and the existing risk index for each crossing with the horn sounding (“Crossing Risk Index w/Horns”) in the second. The third column, “Crossing Risk Index w/o Horns”, is the risk index for each crossing after it has been inflated by 66.8% to account for the lack of train horns. The fourth column, “SSM Eff”, is the effectiveness of the SSM at the crossing. A zero indicates that no SSM has been applied. The last

column, “Crossing Risk Index w/o Horns Plus SSM”, is the inflated risk index for the crossing after being reduced by the implementation of the SSM. At the bottom of the table are two values. The first is the Risk Index with Horns (“RIWH”) which represents the average initial amount of risk in the proposed quiet zone with the train horn sounding. The second is the Quiet Zone Risk Index (“QZRI”) and is the average risk in the proposed quiet zone taking into consideration the increased risk caused by the lack of train horns and reductions in risk attributable to the installation of SSMs. For this example it is assumed that the Nationwide Significant Risk Threshold is 15,424. In order for the proposed quiet zone to qualify under the rule, the Quiet Zone Risk Index must be reduced to at least either the Nationwide Significant Risk Threshold (15,424) or to the Risk Index with Horns.

Table 1 shows the existing conditions in the proposed quiet zone. SSMs have not yet been installed. The Risk Index with Horns for the proposed quiet zone is 11,250. The Quiet Zone Risk Index without any SSMs is 18,765.

TABLE 1

Street	Crossing risk index w/horns	Crossing risk index w/o horns	SSM EFF	Crossing risk index w/o horns, plus SSM
A .....	12000	20016	0	20016
B .....	10000	16680	0	16680
C .....	8000	13344	0	13344
D .....	15000	25020	0	25020
	RIWH			QZRI
	11250			18765

The public authority decides to install traffic channelization devices at D Street. Reducing the risk at the crossing that has the highest severity risk index will provide the greatest reduction in risk. The effectiveness of traffic channelization devices is 0.75. Table 2 shows the changes in the proposed

quiet zone corridor that would occur when traffic channelization devices are installed at D Street. The Quiet Zone Risk Index has been reduced to 14,073.75. This reduction in risk would qualify the quiet zone as the risk has been reduced lower than the Nationwide Significant Risk Threshold which is 15,424.

TABLE 2

Street	Crossing risk index w/ horns	Crossing risk index w/o horns	SSM EFF	Crossing risk index w/o horns plus SSM
A .....	12000	20016	0	20016
B .....	10000	16680	0	16680
C .....	8000	13344	0	13344
D .....	15000	25020	0.75	6255
	RIWH			QZRI
	11250			14073.75

The public authority realizes that authorizing the quiet zone by lowering the risk to below the Nationwide Significant Risk

Threshold will result in an annual recalculation of the Quiet Zone Risk Index and comparison to the Nationwide Significant

Risk Threshold. As the Quiet Zone Risk Index is close to the Nationwide Significant Risk Threshold (14,074 to 15,424), there is a reasonable chance that the Quiet Zone Risk Index may some day exceed the Nationwide Significant Risk Threshold. This would result in the quiet zone no longer being qualified and additional steps would have to be taken to keep the quiet zone. Therefore, the public authority decides to reduce the risk

further by the use of traffic channelization devices at A Street. Table 3 shows the results of this change. The Quiet Zone Risk Index is now 10,320.75 which is less than the Risk Index with Horns of 11,250. The quiet zone now qualifies by fully compensating for the loss of train horns and will not have to undergo annual reviews of the Quiet Zone Risk Index.

TABLE 3

Street	Crossing risk index w/horns	Crossing risk index w/o horns	SSM EFF	Crossing risk index w/o horns plus SSM
A .....	12000	20016	0.75	5004
B .....	10000	16680	0	16680
C .....	8000	13344	0	13344
D .....	15000	25020	0.75	6255
	RIWH			QZRI
	11250			10320.75

*Example 2—Pre-Rule Quiet Zone*

A public authority wishes to qualify a Pre-Rule Quiet Zone which did not meet the requirements for Automatic Approval because the Quiet Zone Risk Index is greater than twice the Nationwide Significant Risk Threshold. There are four public crossings in the Pre-Rule Quiet Zone. Three of the crossings are equipped with flashing lights and gates, and the fourth (Z Street) is passively signed with a STOP sign. The length of the quiet zone is 0.6 mile, and there are no private crossings within the proposed zone.

The tables that follow are very similar to the tables in Example 1. The street name is shown in the first column, and the existing risk index for each crossing (“Crossing Risk Index w/o Horns”) in the second. This is a change from the first example because the risk is calculated without train horns sounding because of the existing ban on whistles. The third column, “Crossing Risk Index w/ Horns”, is the risk index for each crossing after it has been adjusted to reflect what the risk would have been had train horns been sounding. This is mathematically done by dividing the existing risk index for the three gated crossing by 1.668. The risk at the passive crossing at Z Street is divided by 1.749. (See the above discussion in “Pre-Rule Quiet Zones—Establishment Overview” for more information.) The fourth column, “SSM EFF”, is the effectiveness of the SSM at the

crossing. A zero indicates that no SSM has been applied. The last column, “Crossing Risk Index w/o Horns Plus SSM”, is the risk index without horns for the crossing after being reduced for the implementation of the SSM. At the bottom of the table are two values. The first is the Risk Index with Horns (RIWH) which represents the average initial amount of risk in the proposed quiet zone with the train horn sounding. The second is the Quiet Zone Risk Index (“QZRI”) and is the average risk in the proposed quiet zone taking into consideration the increased risk caused by the lack of train horns and reductions in risk attributable to the installation of SSMs. Once again it is assumed that the Nationwide Significant Risk Threshold is 15,424. The Quiet Zone Risk Index must be reduced to either the Nationwide Significant Risk Threshold (15,424) or to the Risk Index with Horns in order to qualify under the rule.

Table 4 shows the existing conditions in the proposed quiet zone. SSMs have not yet been installed. The Risk Index with Horns for the proposed quiet zone is 18,705.83. The Quiet Zone Risk Index without any SSMs is 31,375. Since the Nationwide Significant Risk Threshold is less than the calculated Risk Index with Horns, the public authority’s goal will be to reduce the risk to at least value of the Risk Index with Horns. This will qualify the Pre-Rule Quiet Zone under the rule.

TABLE 4

Street	Crossing risk index w/o horns	Crossing risk index w/horns	SSM EFF	Crossing risk index w/o horns plus SSM
W .....	35000	20983.21	0	35000
X .....	42000	25179.86	0	42000

TABLE 4—Continued

Street	Crossing risk index w/o horns	Crossing risk index w/horns	SSM EFF	Crossing risk index w/o horns plus SSM
Y .....	33500	20083.93	0	33500
Z .....	15000	8576.33	0	15000
	RIWH 18705.83			QZRI 31375

The Z Street crossing is scheduled to have flashing lights and gates installed as part of the state's highway-rail grade crossing safety improvement plan (section 130). While this upgrade is not directly a part of the plan to authorize a quiet zone, the public authority may take credit for the risk reduction achieved by the improvement from a passive STOP sign crossing to a crossing equipped with flashing lights and gates. Unlike New

Quiet Zones, upgrades to warning devices in Pre-Rule Quiet Zones do contribute to the risk reduction necessary to qualify under the rule. Table 5 shows the quiet zone corridor after including the warning device upgrade at Z Street. Note that the Risk Index with Horns and the Crossing Risk Index With Horns for Z Street do not change. The Quiet Zone Risk Index has been reduced to 29,500.

TABLE 5

Street	Crossing risk index w/o horns	Crossing risk index w/horns	SSM EFF	Crossing risk index w/o horns plus SSM
W .....	35000	20983.21	0	35000
X .....	42000	25179.86	0	42000
Y .....	33500	20083.93	0	33500
Z .....	7500	8576.33	0	7500
	RIWH 18705.83			QZRI 29500

The public authority elects to install four-quadrant gates without vehicle presence detection at X Street. As shown in Table 6, this

reduces the Quiet Zone Risk Index to 20,890. This risk reduction is not sufficient to qualify as quiet zone under the rule.

TABLE 6

Street	Crossing risk index w/o horns	Crossing risk index w/horns	SSM EFF	Crossing risk index w/o horns plus SSM
W .....	35000	20983.21	0	35000
X .....	42000	25179.86	0.82	7560
Y .....	33500	20083.93	0	33500
Z .....	7500	8576.33	0	7500
	RIWH 18705.83			QZRI 20890

The public authority next decides to use traffic channelization devices at W Street. Table 7 shows that the Quiet Zone Risk Index is now reduced to 14,327.5. This risk re-

duction fully compensates for the loss of the train horn as it is less than the Risk Index with Horns. The quiet zone is qualified under the rule.

TABLE 7

Street	Crossing risk index w/o horns	Crossing risk index w/horns	SSM EFF	Crossing risk index w/o horns plus SSM
W .....	35000	20983.21	0.75	8750
X .....	42000	25179.86	0.82	7560

TABLE 7—Continued

Street	Crossing risk index w/o horns	Crossing risk index w/horns	SSM EFF	Crossing risk index w/o horns plus SSM
Y .....	33500	20083.93	0	33500
Z .....	7500	8576.33	0	7500
	RIWH 18705.83			QZRI 14327.5

[69 FR 70664, Dec. 18, 2004; 69 FR 1930, Jan. 13, 2004]

APPENDIX D TO PART 222—DETERMINING RISK LEVELS

INTRODUCTION

The Nationwide Significant Risk Threshold, the Crossing Corridor Risk Index, and the Quiet Zone Risk Index are all measures of collision risk at public highway-rail grade crossings that are weighted by the severity of the associated casualties. Each crossing can be assigned a risk index.

The Nationwide Significant Risk Threshold represents the average severity weighted collision risk for all public highway-rail grade crossings equipped with lights and gates nationwide where train horns are routinely sounded. FRA developed this index to serve as a threshold of permissible risk for quiet zones established under this rule.

The Crossing Corridor Risk Index represents the average severity weighted collision risk for all public highway-rail grade crossings along a defined rail corridor.

The Quiet Zone Risk Index represents the average severity weighted collision risk for all public highway-rail grade crossings that are part of a quiet zone.

THE PREDICTION FORMULAS

The Prediction Formulas were developed by DOT as a guide for allocating scarce traffic safety budgets at the State level. They allow users to rank candidate crossings for safety improvements by collision probability. There are three formulas, one for each warning device category: (1) automatic gates with flashing lights, (2) flashing lights with no gates, and (3) passive warning devices.

The prediction formulas can be used to derive the following for each crossing:

1. PC which is the predicted collisions.
2. P(FC|C) which is the probability of a fatal collision given that a collision occurs.
3. P(CC|C) which is the probability of a casualty collision given that a collision occurs.

The following factors are the determinants of the number of predicted collisions per year:

- Average annual daily traffic;
- Total number of trains per day;

- Number of highway lanes;
- Number of main tracks;
- Maximum timetable train speed;
- Whether the highway is paved or not;
- Number of through trains per day during daylight hours.

The resulting basic prediction is improved in two ways. It is enriched by the particular crossing's collision history for the previous five years and it is calibrated by resetting normalizing constants. The normalizing constants are reset so that the sum of the predicted accidents in each warning device group (passive, flashing lights, gates) for the top twenty percent most hazardous crossings exactly equals the number of accidents which occurred in a recent period for the top twenty percent of that group. This adjustment factor allows the formulas to stay current with collision trends. The calibration also corrects for errors such as data entry errors. The final output is the predicted number of collisions (PC).

The severity formulas answer the question, "What is the chance that a fatality (or casualty) will happen, given that a collision has occurred?" The fatality formula calculates the probability of a fatal collision given that a collision occurs (*i.e.* the probability of a collision in which a fatality occurs) P(FC|C). Similarly, the casualty formula calculates the probability of a casualty collision given that a collision occurs P(CC|C). As casualties consist of both fatalities and injuries, the probability of a non-fatal injury collision is found by subtracting the probability of a fatal collision from the probability of a casualty collision. To convert the probability of a fatal or casualty collision to the number of expected fatal or casualty collisions, that probability is multiplied by the number of predicted collisions (PC).

For the prediction and severity index formulas, please see the following DOT publications: *Summary of the DOT Rail-Highway Crossings Resource Allocation Procedure—Revised*, June 1987, and the *Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition*, August 1987. Both documents are in the docket for this rulemaking and also available through the National Technical Information Service located in Springfield, Virginia 22161.

RISK INDEX

The risk index is basically the predicted cost to society of the casualties that are expected to result from the predicted collisions at a crossing. It incorporates three outputs of the DOT prediction formulas. The two components of a risk index are:

1. Predicted Cost of Fatalities = PC × P(FC|C) × (Average Number of Fatalities Observed In Fatal Collisions) × \$3 million
2. Predicted Cost of Injuries = PC × (P(CC|C) – P(FC|C)) × (Average Number of Injuries in Collisions Involving Injuries) × \$1,167,000

PC, P(CC|C), and P(FC|C) are direct outputs of the DOT prediction formulas.

The average number of fatalities observed in fatal collisions and the average number of injuries in collisions involving injuries were calculated by FRA as follows.

The highway-rail incident files from 1997 through 2001 were matched against a data file containing the list of whistle ban crossings in existence from January 1, 1997 through December 31, 2001 to identify two types of collisions involving trains and motor vehicles (1) those that occurred at crossings where a whistle ban was in place during the period, and (2) those that occurred at crossings equipped with automatic gates where a whistle ban was not in place. Certain records were excluded. These were incidents where the driver was not in the

motor vehicle, or the motor vehicle struck the train beyond the 4th locomotive or rail car that entered the crossing. FRA believes that sounding the train horn would not be very effective at preventing such incidents.<sup>1</sup>

Collisions in the group containing the gated crossings nationwide where horns are routinely sounded were then identified as either fatal, injury only, or no casualty. Collisions were identified as fatal if one or more deaths occurred, regardless of whether or not injuries were also sustained. Collisions were identified as injury only when injuries, but no fatalities resulted.

The collisions (incidents) selected were summarized by year from 1997 through 2001 (see table below). The fatality rate for each year was calculated by dividing the number of fatalities (“Deaths”) by the number of fatal incidents (“Number”). The injury rates were calculated by dividing the number of injuries in injury only incidents (“Injured”) by the number of injury only incidents (“Number”).

The following table lists the results. Note that the number of injuries in the sixth column includes only those injuries resulting from injury only incidents, it excludes any non-fatal injuries sustained in fatal incidents. Non-fatal injuries sustained in fatal incidents are not included in this table. The first line in the table presents information in summary form for the five-year period.

MOTOR VEHICLE INCIDENTS AT NON WB GATED CROSSINGS

	Total incidents	Fatal incidents			Injury incidents		
		Number	Deaths	Rate	Number	Injured	Rate
Total .....	2,028	255	311	<b>1.2196</b>	552	739	<b>1.3388</b>
2001 .....	457	70	78	1.1143	119	156	1.3109
2000 .....	430	48	56	1.1667	109	157	1.4404
1999 .....	395	43	59	1.3721	109	144	1.3211
1998 .....	353	46	57	1.2391	105	131	1.2476
1997 .....	393	48	61	1.2708	110	151	1.3727

The fatality rate and the injury rate for the five-year period appear in bold in the first line.

Per guidance from DOT, \$3 million is the value placed on preventing a fatality. The Abbreviated Injury Scale (AIS) developed by the Association for the Advancement of Automotive Medicine categorizes injuries into six levels of severity. Each AIS level is assigned a value of injury avoidance as 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.)

<sup>1</sup>The data used to make these exclusions is contained in blocks 18—Position of Car Unit in Train; 19—Circumstance; Rail Equipment Struck/Struck By Highway User; 28—Number

of Locomotive Units; and 29—Number of Cars of the current FRA Form 6180-57 Highway-Rail Grade Crossing Accident/Incident Report.

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?
- If school buses or transit buses use crossings within the proposed quiet zone corridor, can they be rerouted to a use single crossing within or outside of the quiet zone?

PRIVATE CROSSINGS WITHIN A PROPOSED QUIET ZONE

In addition to the items discussed above, a diagnostic team should examine the following for any private crossings within a proposed quiet zone:

- How often is the private crossing used?
- What kind of signing or pavement markings are in place at the private crossing?
- What types of vehicles use the private crossing?  
School buses  
Large trucks  
Hazmat carriers  
Farm equipment
- What is the volume, speed and type of train traffic over the crossing?
- Do passenger trains use the crossing?
- Do approaching trains sound the horn at private crossings?  
State or local law forbids or requires it?  
Railroad safety rule requires it?
- Are there any nearby crossings where train horns sound that might also provide some warning at the private crossing where no horns sound?
- What are the approach (corner) sight distances?
- What is the clearing sight distance for all approaches?
- What are the private roadway approach grades?
- What are the private roadway pavement surfaces?

APPENDIX G TO PART 222—SCHEDULE OF CIVIL PENALTIES<sup>1</sup>

Section	Violation	Willful violation
<b>Subpart B—Use of Locomotive Horns</b>		
§ 222.21 Use of locomotive horn:		
(a) Failure to sound horn at grade crossing .....	\$5,000	\$7,500
Failure to sound horn in proper pattern .....	1,000	3,000
(b) Failure to sound horn at least 15 and no more than 20 seconds before crossing .....	5,000	7,500
Sounding horn more than ¼ mile in advance of crossing .....	1,000	4,000

Section	Violation	Willful violation
§ 222.33 Failure to sound horn when conditions of § 222.33 are not met .....	5,000	7,500
§ 222.45 Sounding locomotive horn at a grade crossing within a quiet zone .....	1,500	5,000
§ 222.49 (b) Failure to provide Grade Crossing Inventory Form information .....	2,500	5,000
§ 222.59 (c) Routine sounding locomotive horn at a grade crossing equipped with wayside horn .....	5,000	7,500

<sup>1</sup> A penalty may be assessed against an individual only for a willful violation. The Administrator reserves the right to assess a penalty of up to \$27,000 for any violation where circumstances warrant. See 49 CFR part 209, appendix A.

[68 FR 70664, Dec. 18, 2003, as amended at 69 FR 30594, May 28, 2004]

**PART 223—SAFETY GLAZING STANDARDS—LOCOMOTIVES, PASSENGER CARS AND CABOOSES**

**Subpart A—General**

- Sec.
- 223.1 Scope.
- 223.3 Application.
- 223.5 Definitions.
- 223.7 Responsibility.

**Subpart B—Specific Requirements**

- 223.8 Additional requirements for passenger equipment.
- 223.9 Requirements for new or rebuilt equipment.
- 223.11 Requirements for existing locomotives.
- 223.13 Requirements for existing cabooses.
- 223.15 Requirements for existing passenger cars.
- 223.17 Identification of equipped locomotives, passenger cars and cabooses.
- APPENDIX A TO PART 223—CERTIFICATION OF GLAZING MATERIALS
- APPENDIX B TO PART 223—SCHEDULE OF CIVIL PENALTIES

AUTHORITY: 49 U.S.C. 20102-03, 20133, 20701-20702, 21301-02, 21304; 28 U.S.C. 2461, note; and 49 CFR 1.49.

**Subpart A—General**

**§ 223.1 Scope.**

This part provides minimum requirements for glazing materials in order to protect railroad employees and railroad passengers from injury as a result of objects striking the windows of locomotives, caboose and passenger cars.

[44 FR 77352, Dec. 31, 1979]

**§ 223.3 Application.**

(a) This part applies to railroads that operate rolling equipment on standard

gauge track that is a part of the general railroad system of transportation.

(b) This part does not apply to—

(1) Locomotives, cabooses, and passenger cars that operate only on track inside an installation that is not part of the general railroad system of transportation;

(2) Rapid transit operations in an urban area that are not connected with the general railroad system of transportation.

(3) Locomotives, passenger cars and cabooses that are historical or antiquated equipment and are used only for excursion, educational, recreational purposes or private transportation purposes.

(4) Locomotives that are used exclusively in designated service as defined in § 223.5(m).

[44 FR 77352, Dec. 31, 1979, as amended at 53 FR 28600, July 28, 1988]

**§ 223.5 Definitions.**

As used in this part—

*Administrator* means the Administrator of the Federal Railroad Administration or the Administrator's delegate.

*Caboose* means a car in a freight train intended to provide transportation for crewmembers.

*Certified glazing* means a glazing material that has been certified by the manufacturer as having met the testing requirements set forth in Appendix A of this part and that has been installed in such a manner that it will perform its intended function.

*Designated service* means exclusive operation of a locomotive under the following conditions:

(1) The locomotive is not used as an independent unit or the controlling unit is a consist of locomotives except when moving for the purpose of servicing or repair within a single yard area;