

6.0 Costs

Costs associated with implementation of this interim final rule for the use of locomotive horns at highway-rail grade crossings will be incurred by (1) railroads subject to this rule, (2) communities that have existing whistle bans and those that desire to establish New Quiet Zones, (3) residents of communities that are not able to retain whistle bans, and (4) local, state and federal governments.

What costs affected parties will incur will depend on the decisions communities make regarding the sounding of locomotive horns at crossings in their communities. The next section presents costs associated with maximum horn sound requirements. The following section presents the criteria that FRA used to estimate how many communities that have whistle-ban crossings will retain these and how many may not. Cost estimates for not retaining bans are also presented. The sections that follow present the estimated costs of complying with the requirements for establishing and maintaining quiet zones.

Many commenters from the greater Chicago area indicate that safety levels at grade crossings in that area are not affected by whistle bans. A current study performed for FRA concludes that the effectiveness rate of locomotive horns at gated crossings in the Chicago area is different from national levels. Therefore, this analysis presents impacts of this rulemaking for the Chicago area separate from the rest of the nation where appropriate.

6.1 '229.129 Audible Warning Device' Maximum Sound Requirements

Much of the resources expended as a result of this regulation will be for testing existing locomotives, and retesting locomotives because of major maintenance, routine service, and non-compliant horns. To model these costs, the labor rates for three different methods to conduct horn tests were approximated. Horns may be tested by the railroad itself, by contractors, or by the railroad using rental equipment. Noting that dissimilar sized railroads may find it advantageous to use the three testing methods in different amounts, assumptions were made as to which classes of railroads will use what methods. New locomotives will face much lower costs, as horn adjustments are easier to make in the manufacturing process than in the field. Costs are assigned, however, for implementing the new regulation.

The maximum volume provision will also result in incremental equipment costs for railroads and other stakeholders that perform sound level testing of locomotive horns. Although railroads and others who perform tests currently have sound level meters (SLMs), they will likely need to acquire additional meters to meet the burden of testing all locomotives in five years. Some will also need to buy meters that can accept a remote microphone. The analysis estimates that 122 new meters will be required. Calibration costs are also designated for these meters, with only a portion of costs allocated after five years, reflecting the reduced testing burden. All testing entities will need to purchase tripods (or some other testing fixture) to mount the remote

microphone at the new testing height of fifteen feet. A cable to connect the remote microphone to the SLM is also necessary. Of course, if a horn exceeds the maximum volume standard, it will need to be adjusted and retested. Costs to adjust non-compliant horns were calculated using a non-compliance rate of 30%, and estimated separately for labor required to make the change and the cost of parts. One of the possible ways for a railroad to test locomotive horns is by renting a SLM. This method will especially appeal to smaller railroads with fewer locomotives, for whom renting may be a cost-effective option. Rental costs are determined by multiplying the average SLM rental cost of \$60 per day by the number of locomotives that will be tested in this way (estimated using the Who-Does-What assumptions). The table below itemizes the costs from this provision. Labor rates appear in Exhibit 1.

Summary of Costs

Cost Description	Total NPV Cost
Existing Locomotive Horn Tests	\$1,209,392
Non-Compliant Locomotives (Adjustment)	\$86,881
Non-Compliant Locomotives (Retests)	\$367,720
Retesting Horns Due to Major Service	\$501,899
Retesting Horns Due to Minor Maintenance	\$156,240
Administrative and Planning	\$36,871
New Meters	\$211,884
New Meters: Calibration	\$80,460
Additional Equipment: Tripod & Remote Microphone Cable	\$28,984
Non-Compliant Locomotives (Parts)	\$57,921
Rental SLM	\$164,226
Total NPV Costs	\$2,902,478

Total discounted costs are estimated at about \$3 million for the upper sound level limit on the locomotive horn. Appendix D presents costs and benefits associated with this requirement in greater detail.

6.2 Existing Whistle Bans That Will Not Be Retained

Some communities that would otherwise establish quiet zones may no longer do so as a result of this rulemaking. Such communities would only retain existing whistle bans to the extent that they could take advantage of the exceptions the rule offers to quiet zones with low risk indexes. When determining whether or not to retain whistle bans, communities will consider factors such as population density and proximity to the crossings, train traffic levels and times of day, costs associated with the safety improvements necessary to establish quiet zones, and availability of funding for such improvements. Communities with low train traffic levels, particularly at nighttime, and low population densities may decide to cancel certain whistle bans if they have to make improvements to the crossings.

FRA does not have information regarding how many communities may not be able to retain existing whistle bans. However, the Draft Environmental Impact Statement that accompanied the NPRM for this rulemaking did estimate the number of *severely impacted persons* by locomotive horn noise for each whistle-ban crossing identified at the time and for cancelled bans. The estimates for existing whistle bans were updated for the Final Environmental Impact Statement using data from the 2000 census. The number of persons severely impacted was

calculated as a function of proximity of residents to grade crossings, locomotive horn sound level over sound of train, numbers of daytime and nighttime trains passing through, speed of trains, and population densities.

This analysis assumes that nationwide communities will make every effort to fund improvements necessary to retain whistle bans at grade crossings where the sounding of the locomotive horns would severely impact more than 20 residents. This analysis assumes that communities where the levels of night-time train traffic are very high¹, may make extra efforts to retain whistle bans when more than 10 persons are severely impacted. Note that the average household is comprised of 2.3 persons. Therefore, severely impacting 20 residents is the equivalent of severely impacting 8.7 households. FRA estimates the sounding of locomotive horns would severely impact 0 persons at 277 existing whistle-ban crossings and between 1 and 20 persons at each of approximately 442 existing whistle-ban crossings.

As a result of not retaining existing whistle bans, the health and/or safety of residents, young children in daycare centers, patients in hospitals, and other persons in the immediate vicinities of crossings where horns are routinely sounded may be negatively impacted. The routine sounding of horns may also serve as a learning impediment to students who need to concentrate in order to learn. Surgeons and other medical care providers who need to concentrate in order to perform critical medical procedures may find it difficult to perform their duties well when locomotive horns are sounded nearby. The routine sounding of horns may further be an impediment to residents in the close proximity trying to get their daily rest and sleep. The chronic inability to rest or sleep without interruption may result in a reduction in attentiveness while a person is performing safety sensitive activities.

Unfortunately, FRA cannot estimate the costs of the safety and health effects caused by routine locomotive horn noise. Such negative effects, however, should be reflected to some extent in property values that can be more readily measured. Noise experts consider residential land use more noise sensitive than industrial land use. Property values of residences in the immediate vicinities of whistle-ban crossings that are not retained may decrease due to the disturbances caused by the noise of the horns.

The effects of the sounding locomotive horns on property values have been studied recently in response to this rulemaking. The results have neither established nor excluded the possibility of adverse effects on property values. David E. Clark, Associate Professor of Economics, Marquette University and Argonne National Laboratory, Decision and Information Sciences Division performed a study for FRA entitled *Ignoring Whistle Bans and Residential Property Values: An Hedonic Housing Price Analysis*. This is the only study to date that has directly analyzed the impact of horn sounding on property values. As indicated earlier, in 1991, Conrail, began ignoring whistle bans that had been enacted by local communities along its rail lines. Clark studied the effects of this action on property values in three counties (two in Ohio and one in Massachusetts) where Conrail began sounding locomotive horns. According to Clark "Findings regarding impacts of the action by Conrail are mixed. Property values fell by almost

¹ Many crossings in the Chicago area have average train traffic levels well over 50 per day.

7% (6.7%) in one area (Middletown, Ohio) following the implementation of the Conrail policy, but they gradually increased over time. Within three years, the detrimental impact of the Conrail action was eliminated. For the other two areas, no (statistically) significant impacts from the Conrail action were revealed."

Clark also indicates "other things equal, being within 1,000 feet of an operating rail line depresses the sale price of a property from 5% to 13% on average."

Although FRA does not have evidence of any long-term effects of resuming the sounding of train horns, a worse case scenario of a temporary drop in property values is presented. Information regarding median housing values can be obtained at the county level using the *Census 2000 American FactFinder*. Certain existing whistle-ban crossings where the sounding of the horn would severely impact 20 persons or fewer will probably not be retained as a result of the requirements of this rulemaking unless the quiet zone qualifies for a low risk exemption or the particular crossing has a low risk level. Based on this assumption, train horn sounding would resume at a total of 36 crossings nationwide. At 18 of these crossings, horn sounding would not severely impact any persons and property values should not be impacted. Assuming (1) a 9 percent differential from median county housing values for the properties nearest the crossings, (2) a 6.7 percent decline in property values for residences of those persons severely impacted by train horn sounding, and (3) an average household size of 2.3 persons, the estimated total decline in values of residences of those severely impacted nationwide would total up to \$201,034 (PV, 7%). The value of approximately 34 residences would be affected². FRA believes that this is a worse case theoretical scenario and not one that it expects will occur for various reasons. Those who value quiet most would probably elect to reside a considerable distance from railroad lines to avoid other noise and vibration impacts resulting from train movements. Those that do purchase homes close enough to railroad crossings to be severely impacted by the sounding of the horn are aware of the possibility that one day horn sounding may resume.

To the extent that certain communities believe that there is a significant adverse impact on property values, they may decide to implement the safety measures necessary to establish quiet zones in compliance with this rule so as to retain the community tax base. Appendix A to this document discusses the effects of sounding locomotive horns on property values and presents the limited findings of the studies in greater detail.

Even if property values do not fall, homeowners that are forced to move away may incur other real economic costs associated with relocation. The Chaddick Institute indicates that it is very likely that some level of relocation costs will be incurred as a result of implementing the locomotive horn sounding requirements presented in the NPRM. Some residents may incur costs associated with mitigating the impacts of the locomotive horn sound. Since (1) the effect of locomotive horn noise on property values is not known at this time, and (2) the types of mitigation that will occur are not known with certainty, this analysis also uses relocation costs as a surrogate for the monetary costs that some residents that are severely affected by the cancellation of existing whistle bans will incur once this rule is implemented.

Relocation costs include planning, actual moving costs, time off from work to pack and unpack, and could also include the cost of buying and selling a residence. Actual expenditures vary greatly depending on the number of people in a household being relocated, the distance between the old and new residences, the time it takes to find a new permanent residence, the items being relocated (furniture, automobile(s), and other personal belongings), and whether a residence is sold and another purchased.

This analysis assumes that residents relocating due to the perceived disturbance caused by the sounding of locomotive horns alone will not elect to leave the general neighborhood where they reside. Relocation costs included in this analysis are limited to the same general neighborhood and similar home. To the extent that affected residents use this opportunity to achieve other residential goals, they may relocate further away or to smaller/larger homes. Such moves would no longer be solely direct impacts of the rule. Therefore, any additional costs involved with such relocations are not included in this analysis.

Following are estimates of average relocation costs attributable to this rule.

All Relocations

Planning (evaluation of disturbance):	6 household labor hours
Seeking New Residence ((2 people visiting/ evaluating potential residences):	30 household labor hours
Moving costs:	\$1,000 - \$2,000
Time Off Work to Pack/Unpack:	24 household labor hours
Meals:	\$50 - \$150
Closing Costs & Realtor Fees:	\$6,000 - \$24,000

Some Relocations

Temporary Storage (1 - 4 weeks):	\$ 75 - \$180
Temporary Housing (1 - 4 weeks):	\$ 300 - \$2,500

According to the U.S. Census Bureau, Historical Income Tables for Households, in 2000, the mean household income in the U.S. was \$57,047. Such information is not presented by State. However, in 2000, the median household income in the U.S. was \$42,151 and in Illinois \$46,435. Assuming that the median household income ratio of Illinois to the U.S. was approximately the same for mean household incomes, the mean household income for Illinois in 2000, was approximately \$62,845. Further assuming a 2,080 work hour year, the average hourly labor rate per household was \$27.43 in the U.S. and \$30.21 in Illinois in 2000. Applying these rates to the household labor hour estimates presented above and adding the other relocation costs, the average total cost per relocation is \$19,774 in the U.S. and \$20,941 in Illinois. Some relocations will also include an additional \$375 to \$2,680 for temporary housing. This analysis assumes that approximately 30 percent of relocations will require temporary storage and housing.

	Moving Costs	Temporary Storage & Housing	Range	Average
U.S.	\$8,696 - \$27,796	\$375 - \$2,680	\$9,071 - \$30,476	\$19,774
Illinois	\$8,863 - \$29,963	\$375 - \$2,680	\$9,238 - \$32,643	\$20,941

This analysis uses these costs as a surrogate for relocation costs incurred by renters even though renters are generally more mobile than homeowners and, on average, would likely incur significantly lower relocation costs.

The Chaddick Institute study *Alternatives to the Whistle: The Role of Public Education and Enforcement in Promoting Highway-Rail Grade Safety in Metropolitan Chicago* indicates it would be appropriate to include relocation costs for 20 percent to 40 percent of properties near whistle ban grade crossings where the locomotive horn may begin to sound as a result of complying with the requirements proposed in the NPRM. The study further indicates that it is likely that any costs associated with actual annoyance caused by whistles will be born in lower income areas where communities may not be able to afford implementation of SSMs or ASMs. FRA believes that this is not always the case. Many lower income areas are in metropolitan cities where a large business base provides significant income to the community. In some cases the estimated cost of relocation will serve as a surrogate cost for the disturbance caused by the sounding of locomotive horns or the costs incurred by residents, businesses, hospitals, schools, places of worship, and others to mitigate the impacts of such noise.

Certain existing whistle-ban crossings where the sounding of the horn would severely impact 20 persons or fewer will probably not be retained as a result of the requirements of this rulemaking unless the quiet zone qualifies for a low risk exemption or the particular crossing has a low risk level. The process for identifying expected whistle ban cancellations is presented in section 6.5 of this analysis. This analysis assumes that each whistle ban cancellation will affect an average of five households and that, of the five households affected, three will relocate, see a reduction in property value, or take action to mitigate the effects of the locomotive horn.

Applying these assumptions, 3 households in the Chicago area and 117 households in the rest of the nation will incur relocation or mitigation costs associated with the cancellation of existing whistle bans in the first 20 years of the rule. **The NPV of such costs are approximately \$47,927 in the Chicago area and \$1,676,663 in the rest of the nation. Exhibit 3 presents annual costs.**

6.3 Advance Warning Signs at Quiet Zone Crossings

Every crossing at which the locomotive horn is not sounded will require an advance warning sign advising motorists the horn is not sounded. Whistle-ban crossings do not currently have

such signs. Therefore, this analysis assumes that a pair of signs will be installed at all crossings where whistles will not be sounded. A plate with the warning imprinted on it attached to an already existing advance warning sign post (W – 10) will meet the requirement. Most of the installation cost will probably be for labor. FRA estimates that the cost of the plate and labor to attach it to a pre-existing post will total \$100.

Crossings in Pre-Rule Quiet Zones must have advance warning signs in place three years after this final rule is published. This analysis assumes that costs associated with posting signs at existing whistle-ban crossings that are expected to be included in Pre-Rule Quiet Zones will be distributed evenly in the first three years of the rule. New Quiet Zone crossings should have these signs in place before the locomotive horns are silenced.

Following are the twenty-year costs (PV) for the requirement for advance warning signs.

Pre-Rule Quiet Zones

Chicago Area	\$ 33,504
Nationwide (excluding Chicago Area)	\$136,989
Total	\$170,493

New Quiet Zones

Existing Whistle Bans established after 10/9/96	\$ 5,773
New Quiet Zones (horns are currently sounded)	\$ 36,832
Total	\$ 42,605

Total Twenty-Year Costs (PV): **\$213,098**

6.4 Train Operations Which Do Not Require Sounding of Horns at Individual Crossings

Locomotive horns need not be sounded at individual highway-rail grade crossings at which the maximum authorized operating speed for that segment of track is 15 miles per hour or less and train crewmembers or properly equipped flaggers (as defined in by 49 CFR 234.5) provide warning to motorists. This exception is intended to avoid unnecessary noise impacts on railroad personnel working on the ground in very close proximity to the locomotive horn in industrial areas where substantial switching occurs at very low speeds with flaggers providing warning to motorists. Typically, a conductor or brakeman on the train provides such flagging protection. These situations typically involve local trains that are traversing short distances to serve an industry location by ‘spotting’ or ‘pulling’ freight cars. FRA does not encourage indiscriminate proliferation of this type of practice, and nothing in this final rule requires a railroad to have a crossing flagged.

This rule preempts state laws requiring the sounding of the locomotive horns. Locomotive engineers probably use discretion when sounding train horns under such circumstances to minimize the noise disturbance generated. This rule will allow engineers to stop sounding the

horn under these circumstances at no additional cost.

6.5 Establishing Quiet Zones

This rule permits the establishment of two types of quiet zones (1) Pre-Rule Quiet Zones and (2) New Quiet Zones.

A Pre-Rule Quiet Zone is a segment of a rail line with one or more consecutive public highway-rail crossings at which locomotive horns did not sound due to formal or informal agreements between the community and the railroad or railroads that were in place and enforced or observed as of both October 9, 1996 and the effective date of the final rule.

The final rule offers communities three alternatives for establishing Pre-Rule Quiet Zones. The first is by determining that the Crossing Corridor Severity Index (CCRI) of the quiet zone, which is the average of the individual crossing risk indexes, is at a level permissible under the rule. That is, either (1) the CCRI (taking into account the silencing of the locomotive horn) is below the Nationwide Significant Risk Threshold (NSRT), which is the average risk index of individual gated horn-sounding crossings nationwide or (2) the crossings in the quiet zone have not had any collisions considered preventable by sounding the locomotive horn in the past five years and the CCRI is below the product of two times the NSRT. The second alternative for establishing a quiet zone is by applying a supplementary safety measure (SSM) to every public crossing in the quiet zone. Temporary closures of a public grade crossing, four-quadrant gate systems, gates with medians or channelization devices, and one-way streets with gate(s) are currently approved SSMs. FRA has determined that each SSM is an effective substitute for the sounding of the horn in preventing grade crossing collisions. The third alternative allows communities to install alternative safety measures (ASM) and/or automatic gates and flashing lights at one or more of the crossings in the quiet zone. For purposes of this rule, ASMs include all of the SSMs as well as photo-enforcement, programmed enforcement, and public education and awareness. Under this corridor approach, risk reduction of the entire quiet zone following implementation of the ASMs and/or flashing lights and gates has to (1) fully compensate for not sounding locomotive horns or (2) reduce the quiet zone's CCRI below the NSRT. Applicants electing to implement this corridor approach must demonstrate risk compensation or reduction through data and analysis.

Locomotive horn use appears to have an effectiveness rate at gated crossings in the Chicago Area that is different from the rest of the nation. In 2002, a study performed for FRA in support of this rulemaking by Westat, Incorporated, a nationally respected statistical firm, *Analysis of the Safety Impact of Train Horn Bans at Highway-Rail Grade Crossings: An Update Using 1997 – 2001 Data* estimated a distinct horn effectiveness rate for gated crossings in the Chicago area that was lower than that for gated crossings in the rest of the nation. The findings of this study are discussed in greater detail in the section *7.0 Benefits* of this document. Since a permissible level of risk for pre-rule quiet zones is one that fully compensates for the effectiveness of the locomotive horn, crossings in the six county-Chicago area may compensate for less risk to meet this standard than crossings in the rest of the nation. This analysis presents costs associated with establishing pre-rule quiet zones for the Chicago area separate from those for the rest of the nation.

For purposes of this analysis, Pre-Rule Quiet Zones will be composed of the following four categories.

1. Pre-Rule Quiet Zones With a CCRI Below the NSRT
2. Pre-Rule Quiet Zones With No Relevant Collisions³ in the Past Five Years and a CCRI Above the NSRT and Below Twice the NSRT
3. Pre-Rule Quiet Zones With No Relevant Collisions in the Past Five Years and a CCRI Above Twice the NSRT
4. Pre-Rule Quiet Zones With Relevant Collisions in the Past Five Years and a CCRI Above the NSRT

As discussed earlier, affected communities will consider many factors in determining whether or not to make the investments necessary to retain whistle bans by establishing quiet zones. Safety measure implementation costs, train traffic volumes and times of operation, as well as the number of residents affected and their proximity to affected crossings will likely be the principal factors communities consider.

A New Quiet Zone is a segment of a rail line with one or more consecutive public highway-rail crossings at which routine sounding of locomotive horns is restricted and which does not qualify as a Pre-Rule Quiet Zone. The final rule offers communities the same three ways to establish New Quiet Zones as Pre-Rule Quiet Zones with the additional requirement that all public crossings included be equipped with flashing lights and automatic gates. New Quiet Zones can be classified as follows:

1. New Quiet Zones That Qualify Without Improvements- CCRI Below the NSRT
2. New Quiet Zones That Require Improvements - CCRI Above the NSRT

³ Highway-Rail Crossing collisions between trains and highway vehicles where (1) at least one the first four units of a train (including any locomotives) is involved and (2) the driver of the highway vehicle is in the vehicle at the time of the collision.

New Quiet Zones will be comprised of crossings with existing whistle bans that were established after October 9, 1996, of former whistle-ban crossings, and of crossings where locomotive horns have always been routinely sounded.

The following two tables present the costs and effectiveness rates associated with the various approved safety measures and warning device upgrades that communities may use to reduce their risk levels so that they may establish and maintain quiet zones.

Approved Safety Measure	Initial Cost to Community	Annual Cost	Effectiveness Rate
Temporary Closures (daily w/ swing or sliding gates)	\$2,000	\$2,000	1.00
Permanent Closures	\$5,000	\$0	1.00
Grade Separation	\$3 million - \$5 million	\$0	1.00
4-6 Inch Mountable Curbs w/ Frangible Delineators	\$13,000 (100 ft each side)	\$500	0.75
6-9 Inch Non-Mountable Concrete Curbs	\$15,000	\$0	0.77
No Gates to four-quad Gates	\$280,000 (4 - 6 gates installed)	\$5,000	at least 0.82
Two Quad to four-quad Gates	\$100,000 (no vehicle presence detection) \$128,000 (w/ VPD)	\$2,500	0.82 (no vehicle presence detection) 0.77 (w/ VPD)
Paired One-Way Streets	\$35,000 (relocate existing gates)	\$0	0.82
Photo-Enforcement	Single Crossing: \$65,500 2 Crossings: \$40,500 ea. 3 Crossings: \$32,167 ea. 4 Crossings: \$28,000 ea.	Single Crossing: \$24,000 2 Crossings: \$12,400 ea. 3 Crossings: \$8,533 ea. 4 Crossings: \$6,600 ea.	Must establish a baseline (60% assumed for purposes of estimating benefits in this analysis)
Programmed Enforcement	\$20,000 - \$25,000 to establish baseline	\$4,600 average Communities recoup costs through fines collected	Must establish a baseline sufficient to reduce risk to a permissible level
Public Education and Awareness	\$20,000 - \$25,000 to establish baseline	\$5,000 for materials \$5,000 for labor	Same as Programmed Enforcement Above

Warning Device Upgrade	Initial Cost to Community	Annual Cost	Effectiveness Rate
Passive Warning Devices to Automatic Gates & CWT	\$140,000	\$2,500	0.79
Passive Warning Devices to Flashing Lights & CWT	\$94,000	\$2,000	0.59
Flashing Lights to Automatic Gates & CWT ⁴	\$40,000 (average assuming half of the crossings already have CWT or are CWT ready)	\$500	0.66

Photo-enforcement, programmed enforcement, and public education and awareness require establishment of baseline violation rates (number of violations/train movements). The baseline monitoring period must be a minimum of 4 weeks if conducted without public notice or media coverage and 16 weeks if conducted with public notice or media coverage. Once a baseline has been established, photo-enforcement may begin and violation rates must be monitored for the next 6 months. Semi-annual analysis, verifying the last quarter's violation rates remain at or below the levels established prior to initiation of the program, must be performed for the first five years (until the crossings have 5 years of collision history with photo-enforcement). Thereafter, analysis will be required every fourth quarter. For purposes of this analysis, FRA is assuming that it will cost communities approximately \$7,000 to establish a baseline, \$3,000 annually to monitor violation rates every other quarter, and \$1,500 annually to monitor violation rates very fourth quarter. This analysis assumes that the level of effort will be maintained throughout the twenty-year period of this analysis and therefore, effectiveness rates will remain at or below the required levels. This analysis assumes that communities will voluntarily continue to respond to increases in highway vehicle traffic or train traffic by adjusting or adding safety measures.

Photo-enforcement is generally a more feasible alternative for communities that treat more than one crossing because equipment can be shared and thus costs reduced. Once photo-enforcement is implemented, annual operating costs can be paid for with the revenue generated from motorist violations. The Illinois General Assembly has not yet approved the use of photo-enforcement in Illinois. However, given the very favorable results of demonstration projects and tests in Illinois and California, and the strong trend now associated with photo-enforcement to prevent red-light running, it is very likely that the Illinois General Assembly would approve the use of photo-enforcement. This analysis assumes that such approval will be granted in the very near future. FRA is participating in an evaluation study of three wayside horn installations in Mundelein,

⁴ Assuming that half of existing crossings equipped with flashing lights already have CWT. The average incremental cost for CWT is \$20,000.

Illinois. The rule contains provisions to allow the use of wayside horns that are placed at crossings and directed at oncoming motorists. Wayside horns are activated by the same track circuits used to detect the train's approach by other automated warning devices. Use of wayside horns in lieu of train-mounted horns reduces net community noise impacts. Although wayside horns do not provide motorists with information about the proximity, speed, and direction of approaching trains, demonstrations have thus far indicated that they may be as effective as train horns. This interim final rule permits their use as a one-for-one substitution at individual crossings either within or outside of quiet zones. This rule requires communities that install wayside horns to notify FRA at what crossings they have been placed. Minimal costs are associated with this requirement.

This rule contains provisions for the development of new alternatives for the testing and introduction of new grade crossing safety technology that would provide a sufficient level of safety to enable locomotive horns to be silenced. Communities will likely take advantage of such opportunities to the extent that these can be implemented at a lower cost than the already approved safety measures. This analysis allocates costs for all affected communities to implement a sufficient number of already approved SSMs, ASMs, and/or add automatic gates and flashing lights to meet the requirements of the rule for establishing and maintaining quiet zones. Therefore, to the extent that communities take advantage of the opportunity to develop new alternatives, this analysis may overstate costs. FRA anticipates that many communities will indeed take advantage of this flexibility and develop alternatives based on variations of the approved SSMs and ASMs. For instance, some crossings may be treated with distinct additional safety measures on each highway approach (e.g. two gates blocking all lanes on one approach and mountable curbs with frangible delineators on the other).

Interested parties may demonstrate proposed new SSMs or procedures to determine if they are an effective substitute for the locomotive horn in the prevention of collisions and casualties at public highway-rail grade crossings. Following successful demonstration, such parties may apply for approval by submitting detailed descriptions of the design and results of the demonstration as well as implementation cost information. Again, this analysis assumes that such demonstrations will occur only to the extent that demonstration and implementation are less expensive than using one of the already approved safety measures. Therefore, estimated compliance costs presented in this analysis may be overstated to the extent that communities take advantage of this flexibility.

What safety measures communities will select

Not all approved safety measures (SSMs and ASMs) can be implemented at all crossings. Physical characteristics of certain crossings as well as other constraints will not permit the implementation of certain safety measures. For instance, according to the Northwest Municipal Conference, paired one-way streets with gates may contribute to the failure of business districts as one-way streets have done in the past. One-way streets may limit access to businesses and therefore reduce sales. Cost alone will make grade separation an infeasible measure for many communities. Although crossing closures appear to be low cost alternatives, communities must

ensure that highway traffic from those crossings could be safely diverted to nearby streets. Appendix B Safety Measures discusses in greater detail the safety measures (including implementation costs, feasibility, and effectiveness) presented in the table above.

For purposes of this analysis, FRA is assuming that, in general, a community's first choice for implementation of a safety measure will be the lowest cost feasible option. For many gated crossings this should be mountable-curbs with frangible delineators. Distance to the nearest intersection, is an important determinant of feasibility for this option because the medians must extend 100 feet on each approach, unless there is an intersection within that distance (in that case the median or channelization device must extend at least 60 feet). The DOT Grade Crossing Inventory contains information regarding the distance of the nearest intersection for grade crossings. This information is presented in ranges of (1) less than 75 feet, (2) 75 to 200 feet, and (3) 200 – 500 feet. For purposes of estimating which crossings communities would choose to install mountable curbs and frangible delineators or non-mountable concrete curbs, FRA is assuming that communities will do so at all gated crossings where the nearest intersection is 200 - 500 feet away. Installation costs are higher for concrete curbs and maintenance costs are higher for mountable curbs with frangible delineators. Overall, twenty-year implementation costs are higher for mountable curbs. In an effort to produce conservative cost estimates, this analysis assumes that all curb installations will be of the mountable type with frangible delineators. Although photo-enforcement is probably the next least expensive safety measure, some communities may not have the resources to view tapes and process any resulting violations. As a result, some communities may install four-quadrant-gate systems. Some four-quadrant gate systems may include vehicle presence detection systems to prevent highway vehicles from becoming trapped by four-quadrant gate systems at such crossings. In metropolitan areas where traffic signals may be in close proximity of grade crossings, there may be long queues at crossings. This analysis assumes that half of all four-quadrant gate installations will include vehicle presence detection systems. Of the gated crossings that have intersections within 200 feet that must be treated, this analysis assumes that half will be equipped with four-quadrant gates and half will be able to accommodate median arrangements. Finally, this analysis assumes that communities that have to treat more than one gated crossing where the nearest intersection is within 200 feet will implement photo-enforcement with 2 to 4 crossings sharing equipment.

This analysis does not allocate costs for communities to implement any SSMs or ASMs other than mountable curbs with frangible delineators, photo-enforcement, and four-quadrant gate systems. However, this should not affect the overall estimated cost of treating crossings because the costs of implementing other SSMs and ASMs are generally in line with, if not lower than, the costs of implementing mountable curbs with frangible delineators, four-quadrant gates, and photo-enforcement. Furthermore, some SSMs may not be implemented solely in response to this rulemaking. For instance, grade separations and permanent closures are probably much more dependent on roadway traffic planning needs than on quiet zone needs. It would not be reasonable or proper to assign the full costs of such measures to this rule. Communities will generally improve the crossings with the highest individual risk index with the lowest cost feasible safety measure. This will ensure the greatest reduction per safety measure addition.

For purposes of this analysis FRA is making the simplifying assumption that the calculation of the QZRI following the addition of gates to crossings already equipped with flashing lights will generally yield the same result whether the effectiveness of .66 is applied to the flashing lights crossing risk index directly or whether the accident prediction formula is recalculated using the formula for crossings with gates in lieu of the formula for crossings with flashing lights. FRA realizes that the two calculations may actually yield significantly different estimates depending on the circumstances. However, to the extent that the direction of the change can vary from crossing to crossing, the aggregate difference is expected to be minimal.

Communities seeking to retain seasonal whistle bans may elect to implement temporary closures. To the extent that communities do implement closures as a result of this rulemaking, the costs of doing so will be lower or comparable to the costs of other measures that are more commonly implemented. Therefore, any costs incurred by communities electing this alternative are already included and overstated in this economic analysis as costs of implementing other safety measures.

Prior to implementing a quiet zone, communities must notify affected railroads, traffic control and law enforcement authorities, state agencies and FRA.

Quiet Zone Development and Application Process

The level of actual quiet zone development and application costs communities will incur will depend on the types of quiet zones that are established or retained, the number of crossings in each, and their CCRIs. This section presents costs associated with the types of quiet zones that FRA believes will be established based on the information that was available at the time this analysis was developed.

Quiet zones created by virtue of having a CCRI that is below the NSRT, or by implementing sufficient SSMs to reduce their CCRIs to a permissible level may be designated without FRA approval. Communities must submit to FRA for approval applications for the creation of other quiet zones. That is, communities using the corridor approach (e.g. implementing ASMs) must submit quiet zone applications to FRA.

For communities having to implement safety measures to reduce their risk levels to permissible levels, it will generally be more cost effective to use the ASM corridor approach than to use the SSM approach (every crossing must be treated). Therefore, most communities will have to submit quiet zone applications to FRA. Some applications will be for QZs comprised of 2 crossings; others for QZs comprised of 50 or more crossings (e.g. large metropolitan areas). FRA does not know with certainty how many communities will submit quiet zone applications. The number of WBJs that have CCRIs above the NSRT and are comprised of more than one crossing is probably a good proxy for the number of quiet zone applications that will be submitted to FRA. Some of the WBJs identified may use SSMs, reducing the number of WBJs that need to apply for approval. FRA expects to spend an average of approximately 15 hours

reviewing each quiet zone application. Federal government labor costs will likely be incurred at an average burdened hourly rate of \$60 (GS 14 salary plus burden for overhead and fringe benefits).

Employees performing the type of analysis necessary to comply with the requirements of the rule at the local level will probably be senior engineers with some assistance from attorneys and administrative assistants. Commenters from the Chicago area indicate that burdened hourly labor rates for municipal employees in that area range between \$60 and \$75. Labor rates in the Chicago area are among the highest in the nation and are not representative of labor rates across the nation. This analysis assumes that local government employees' burdened hourly labor rates average \$68 in the Chicago area and \$60 nationwide, excluding the Chicago area.

FRA estimates that it will take communities an average of 80 labor hours to develop a quiet zone plan. Actual development costs per quiet zone will depend on the number of crossings included in the quiet zone and their risk level, as well as other factors and may significantly differ from quiet zone to quiet zone. Before they can begin the implementation processes, communities will have to analyze the characteristics of each affected grade crossing, consult with the railroad(s) operating over the crossing, get quotes from equipment vendors, evaluate alternative safety measures, and secure funding. Some communities may have to seek approval from city councils and state offices. Finally, the DOT Grade Crossing Inventory form must be updated for every crossing in a quiet zone.

Average quiet zone development and approval cost per quiet zone in the Chicago area is thus \$6,340. Similarly, average initial development and approval costs per quiet zone nationwide (excluding Chicago) total \$5,700.

Total twenty-year quiet zone development and FRA approval costs are estimated to be \$493,923(PV) for the Chicago area and \$772,284(PV) for the rest of the nation. Annual cost estimates are presented in Exhibit 6.

Initial Notification, Certification, and Initial Inventory Update

Communities must provide written notice of a quiet zone designation to all railroads operating over the public highway-rail grade crossings within the quiet zone, the highway or traffic control authority and law enforcement authority having control over vehicular traffic at the crossings in the quiet zone, the state agency responsible for highway and road safety, and the FRA Associate Administrator for Safety. Communities must also certify that they have reviewed relevant studies and understand risks and benefits of the quiet zones they establish. Most communities establishing quiet zones are already very familiar with the risks and benefits of doing so. Nevertheless, they may not be aware of all relevant studies and the implications of their results to their particular circumstances. FRA believes that adequate review of relevant studies and examination of the implications for their particular circumstances and written notification to appropriate parties will take an average of about 40 labor hours per quiet zone. Communities with fewer grade crossings in their quiet zones may need less time to notify and certify; those

with more crossings may need much more time.

FRA further expects that it will take an FRA staff person about 30 minutes to review and process each notification and certification that is received.

Average compliance cost per community in the Chicago area is thus \$2,750. Average initial notification and certification compliance costs per community nationwide (excluding Chicago) is thus \$2,430.

In addition, communities that are considering establishing Pre-Rule Quiet Zones must update the DOT Grade Crossing Inventory for each crossing that is being considered for inclusion within 18 months of issuance of the rule and again when establishing the quiet zone. Initial updating of the DOT Grade Crossing Inventory should not take more than one labor hour. Since state departments of transportation maintain a ranking of crossings by degree of hazard in order to plan allocation of funds for crossing safety purposes, States should already have the data that would need to be included in the DOT Grade Crossing Inventory.

Total costs associated with the initial inventory update, notification, and certification requirements are estimated to be \$292,106 (PV, 7%) for the Chicago area and \$1,775,092 (PV, 7%) for the rest of the nation. Annual cost estimates are presented in Exhibit 6.

Illinois: According to comments from the Chicago Area Transportation Study (CATS), the “Illinois Commerce Commission has excused railroads from routinely sounding their horns at grade crossings that are equipped with automatic warning devices and experienced less than three collisions in the past five years.” Therefore, in absence of this rulemaking, Illinois communities wanting to establish quiet zones over crossings not equipped with automatic warning devices would still have to incur costs associated with installing such devices.

CATS comments go on to state that, “according to the FRA inventory, 4,828 grade crossings met these criteria. Throughout the state, 1.9 million people reside within 1/4 mile of a Commerce Commission excused grade crossing; 3.8 million people reside within 2 miles, and 6.6 million live within one mile of a Commerce Commission excused grade crossing. A potential problem exists in that FRA does not currently include the Commerce Commission set of 4,828 grade crossings as currently operating under a ban. This is important in that these crossings are similar to crossings with whistle bans in place, since horns are not currently required to be sounded. Whether or not these crossings are included is critical when evaluating the cost - benefit of the proposed rule. The addition of 3,000 plus grade crossings to the cost side of the cost-benefit analysis is likely to indicate that the costs would exceed the benefits.”

Locomotive horns are currently sounded at most of the 4,828 grade crossings that qualify to be excused. FRA has received three requests from Chicago area communities for assistance in establishing quiet zones. This analysis includes costs associated with establishing New Quiet Zones in these communities.

Cost Estimating Methodology: FRA calculated the NSRT and CCRIs for the WBJs identified using the DOT Grade Crossing Inventory data for 1997 through 2001. The following sections present probable cost scenarios that would have resulted if this final rule had been effective in 2001 by relative standing compared to the NSRT and occurrence of relevant collisions. FRA believes that these cost scenarios are representative of actual scenarios that will occur when the rule is implemented. Exhibit 4 presents estimated annual expenditures on safety measure implementations by type of implementation.

6.5.1 Pre-Rule Quiet Zones With CCRIs Below the National Significant Risk Threshold

Chicago Area

There are approximately 25 Whistle Ban Jurisdictions (WBJ) with a total of 57 no-horn grade crossings in the Chicago area that have CCRIs below the NSRT. The crossings are distributed as follows:

<u>Type of Warning Device</u>	<u>Number of Crossings</u>
Automatic Gates & Flashing Lights	22
Flashing Lights	10
Passive Warning Devices	25
Total Crossings	57

Two relevant collisions (i.e. potentially preventable by sounding of the locomotive horn) occurred at these crossings in the 5-year period between 1997 and 2001. No casualties resulted from these collisions. The effect of one collision in the 5 previous years on predicted collisions, as calculated using the FRA Accident Prediction Formulas, is approximately a .045. Given (1) the very low probabilities for collisions at the crossings in the communities that comprise this group and (2) the small magnitude of the effect that the occurrence of a collision would have on predicted collisions, it is unlikely that these communities will see a rise in their CCRIs relative to the NSRT unless there is an increase in highway traffic volumes or other factors that more heavily influence collision probability. This analysis assumes that communities in the Chicago area that currently have CCRIs below the NSRT will retain such relative standing for the next 20 years.

Quiet Zone Establishment Costs: Since the communities in this category may designate quiet zones without seeking FRA approval or adding safety measures, this analysis does not include quiet zone development and approval costs for these 25 WBJs.

Initial updating of the DOT Grade Crossing Inventory for the 57 grade crossings is expected to total \$3,622. Notification of affected parties and certification are estimated to total \$55,915 for the communities in this group. Total twenty-year costs (PV) for communities in this group are estimated to be \$59,537.

Twenty-Six of the 57 crossings in this category would have 20 or fewer severely impacted persons if the locomotive horn were to sound. Since the communities in this category can designate quiet zones without upgrading any crossings, this analysis assumes that communities will take advantage of this and do so. Therefore, no residents should be affected by locomotive horn noise in these communities once this rule is implemented.

Nationwide, Excluding Chicago

There are approximately 277 WBJs with a total of 969 no-horn grade crossings nationwide, excluding the Chicago area that have CCRI below the NSRT. The crossings are distributed as follows:

<u>Type of Warning Device</u>	<u>Number of Crossings</u>
Automatic Gates & Flashing Lights	290
Flashing Lights	224
WW, Bells, Highway Signals	8
Passive Warning Devices	447
Total Crossings	969

In the 5-year period between 1997 and 2001, 45 relevant collisions resulting in 5 injuries and no fatalities occurred in the WBJs in this category. Since the CCRI of these WBJs remained below the NSRT, despite the occurrence of collisions; it is likely that, despite the occurrence of collisions in the future, the CCRI for these WBJs will remain below the NSRT. Changes in other factors that affect risk level may increase the CCRI of some WBJs in this category to levels above the NSRT. However, changes in those same factors, but in the opposite direction, may reduce risk levels of WBJs with CCRI above NSRT to levels below the NSRT moving these WBJs into this category. Such shifts could occur before communities upgrade crossings or implement safety measures. Furthermore, as exposure levels at gated crossings in general rise, so will the NSRT. This analysis assumes that, to the extent shifts in risk levels relative to the NSRT occur, they will cause moves in both directions and their effects will cancel out overall.

Quiet Zone Establishment Costs: Since these communities may designate quiet zones without seeking FRA approval or adding safety measures, this analysis does not include quiet zone development and approval costs for these 277 WBJs.

Initial updating of the DOT Grade Crossing Inventory for the 969 grade crossings is expected to total \$54,336. Notification of affected parties and certification are estimated to total \$1,068,419 for the communities in this group. Total twenty-year costs (PV) for communities in this group are estimated to be \$1,122,755.

Note that 202 of the 969 crossings in this category would have no impacted persons by the train horn and 291 of the crossings would have 20 or fewer severely impacted persons if the locomotive horn were to sound. Since these crossings will more than likely be included in quiet zones that will be designated without any improvements required, no residents should be impacted by locomotive horn noise once this rule is implemented.

6.5.2 Pre-Rule Quiet Zones With No Relevant Collisions in the Past 5 Years and CCRIs Above the NSRT and Below Twice the NSRT

Chicago

There are 23 WBJs comprised of 61 grade crossings in this category. None of the crossings would have to be upgraded initially. However, it would take the occurrence of only one collision potentially preventable by sounding of the locomotive horn for a community in this group to have to make improvements to one or more crossings to retain the quiet zone (assuming the quiet zone risk index remains between the product of one and two times the NSRT).

As discussed earlier, the DOT Accident Prediction Formulas estimate the probability that a collision will occur at an individual grade crossing in a given year. For each WBJ, the sum of the individual crossings' collision probabilities represents the probability that a collision will occur at some crossing in the WBJ during the year. For purposes of this analysis, FRA is using this probability to estimate the frequency of collisions at WBJs in this category. These frequencies are in turn used to estimate how many WBJs in this category would have to make improvements to one or more crossings to retain their quiet zones in each year of the rule. The tables below summarize this information for the first twenty years of the rule and present costs.

Relevant Collisions that Would Trigger Safety Measure Implementations

Year of Rule	# Crossings in WBJs		Potential Safety Measure Implementations Warranted to Reduce Risk to Permissible Levels				
	ASM	SSM	Add Lights	Add Gates To Lights	Medians	Medians / 4-Q Gates	Photo-Enforcement
Year 3							
Year 4	28				5		
Year 5	6					1	
Year 6							
Year 7							
Year 8	5				1		
Year 9							
Year 10							
Year 11							
Year 12							
Year 13							
Year 14							
Year 15	4					2	
Year 16							
Year 17							
Total	43	0	0	0	6	3	0

**Cost to Upgrade Existing Whistle-Ban Crossings In the Chicago Area
That Are Part of Quiet Zones With No Relevant Collisions in the Past 5 Years
And CCRIs Between One and Two Times the NSRT (20 Year PV)**

Type of Improvement	Crossings	Installation	Maintenance	Total Cost
Medians	6	\$49,997	\$16,396	\$66,393
Medians OR Four-Quadrant Gates (corridor approach)	3	\$79,872	\$10,341	\$90,211
Total	9	\$129,869	\$26,737	\$156,604

This analysis assumes that, in response to this rule, communities where relevant collisions are expected to occur will take steps to reduce their QZRIs to permissible levels (an amount sufficient to compensate for the effectiveness of the locomotive horn or to meet the NSRT) in the least costly manner. The best effectiveness rate estimate that Westat could provide for the locomotive horn at gated crossings in the Chicago area is 17 percent. A more detailed discussion of the Westat studies appears in the Benefits section of this document.

To reduce QZRI to a permissible level in the least costly manner, when possible, communities will generally improve the crossings with the highest individual risk index with the lowest cost feasible safety measure, as discussed earlier.

To reduce the WBJ CCRIs to permissible levels in 7 WBJs, 6 crossings would likely be treated with 100-foot medians with frangible delineators and 3 crossings would be treated with either median arrangements or four-quadrant gates⁵. Due to the cost differential between medians (\$13,000 to \$15,000) and four-quadrant gates (\$100,000), most communities will try to accommodate medians; however some may find it not feasible.

If a collision that is potentially preventable by sounding a locomotive horn occurs at a no-horn crossing in a community in this category, the quiet zone must be terminated within six months, unless the public authority files with FRA a notice of intent to mitigate within that period. The period before termination can be extended to three years, if the community is pursuing mitigation by preparing in good faith to implement a quiet zone. This analysis assumes that costs incurred to retain quiet zones will be evenly spread among the three years following the occurrence of the relevant collision.

Quiet Zone Establishment Costs:

Even though communities with WBJs in this category would not have to implement additional

⁵ Given the way in which grade crossing data appears in the DOT Grade Crossing Inventory, FRA cannot determine whether crossings that have intersections within 75 feet will have sufficient space to accommodate 60-foot medians.

safety measures initially, or ever in some cases, they will probably analyze their quiet zone to determine what could be done if they should have to take action following the occurrence of a potentially preventable collision. Quiet Zone development and approval costs for the 23 WBJs in this category are estimated to total \$123,481.

Initial updating of the DOT Grade Crossing Inventory for the 61 grade crossings is estimated to cost \$3,877 (PV). Notification of affected parties and certification are estimated to total \$51,890 for the WBJs in this group. Total administrative costs for this category are estimated to be \$179,248 (PV).

Nationwide, Excluding Chicago

FRA expects that 80 WBJs with a total of 213 whistle-ban crossings in WBJs that have had no relevant collisions in the past five years will establish pre-rule quiet zones. None of the crossings in the WBJs in this category would have to be upgraded initially. Again, it would take the occurrence of only one collision potentially preventable by sounding a locomotive horn for a community to have to make improvements to one or more whistle-ban crossings in order to retain their quiet zone.

As discussed above, for purposes of this analysis, FRA is using the collision probabilities generated by the Accident Prediction Formulas to estimate the frequency of collisions at WBJs in this category. These frequencies are in turn used to estimate how many WBJs will have to make improvements to one or more whistle ban grade crossings to retain their quiet zone in each year of the rule, through year 20. Any triggering events after year 17 would not require implementation of a safety measure until after the 20th year of the rule. The table below presents the predicted triggering collision years and the improvements that could be made to reduce risk to permissible levels.

Relevant Collisions that Would Trigger Safety Measure Implementations

Year of Rule	# Crossings in WBJs		Potential Safety Measure Implementations Warranted to Reduce Risk to Permissible Levels				
	ASM	SSM	Add Lights	Add Gates To Lights	Medians	Medians / 4-Q Gates	Photo-Enforcement
Year 3	25			6	2		
Year 4	19				2		
Year 5	21		2		3		
Year 6	10		1		5	1	
Year 7	18		1	2	1	1	
Year 8	9					1	2 sharing
Year 9	6				1	1	
Year 10	4					1	
Year 11	9			1	2		
Year 12	6	1			1	3	
Year 13	6				2		
Year 14	14		2	1		1	2 sharing
Year 15	2		1				
Year 16	3					1	
Year 17	6		2			1	
Total	158	1	9	10	19	11	4

This analysis assumes that, of the WBJs where relevant collisions occur, those where the sounding of the horn at all whistle-ban crossings would severely impact no more than 20 persons or 8 households per corridor will not retain the whistle bans unless the number of affected crossings is large. No such WBJs were identified in this group.

Since communities have three years following the occurrence of a relevant collision to make any improvements, this analysis assumes that costs incurred will be evenly spread among the three years following the occurrence of the relevant collision. Following are estimated implementation costs associated with implementation of the most cost effective safety measures.

Cost to Upgrade Existing Whistle-Ban Crossings Nationwide, Excluding Chicago That Are Part of Quiet Zones With No Relevant Collisions in the Past 5 Years and CCRI's Between One and Two Times the NSRT (PV – 20 Years)

Type of Improvement	Crossings	Installation	Maintenance	Total Cost
Add Lights to Passive Markings	9	\$ 368,902	\$ 45,678	\$ 414,579
Add Gates to Flashing Lights	10	\$ 245,153	\$ 25,319	\$ 270,472
Medians	19	\$ 136,808	\$ 40,098	\$ 176,906
Medians OR Four-Quadrant Gates (SSMs)	1	\$ 24,663	\$ 2,786	\$ 27,449
Medians OR Four-Quadrant Gates (corridor approach)	10	\$ 269,660	\$ 35,623	\$ 305,283
Photo-Enforcement (2 sharing)	4	\$ 80,596	\$143,908	\$ 224,504
Total	53	\$1,125,782	\$293,412	\$1,419,193

Quiet Zone Development Costs: Quiet Zone development and approval costs for the 80 WBJs in this category are estimated to total \$386,142.

Initial updating of the DOT Grade Crossing Inventory for the 213 grade crossings is expected to total \$11,944 (PV). Notification of affected parties and certification are estimated to total \$305,480 for WBJs in this group. Twenty-year administrative costs for establishing and maintaining these quiet zones are expected to total \$703,566 (PV).

6.5.3 Pre-Rule Quiet Zones With No Relevant Collisions in the Past 5 Years and CCRI's Above The Product of Two Times the NSRT

Chicago

Thirty-five WBJs comprised of 82 existing no-horn crossings fall into this category. None of the crossings in this group have maximum timetable speeds under 15 mph. This group is generally comprised of commuter rail operations in the Chicago area.

For the whistle bans in this group to be retained, a total of 35 crossings would have to be

improved using corridor risk reduction methods. Most communities would have to improve only one crossing to reduce the CCRI to a permissible level under the rule. Following are estimated improvement costs to retain quiet zones in the Chicago area with CCRIs that are above twice the NSRT.

Cost to Upgrade Existing Whistle-Ban Crossings in the Chicago Area That Are Part of Pre-Rule Quiet Zones With No Relevant Collisions in the Past 5 Years And CCRIs Above Twice the NSRT (20-Year PV)

Type of Improvement	Crossings	Installation	Maintenance	Total Cost
Gates with Medians (SSMs)	3	\$ 28,062	\$9,881	\$ 37,943
Gates w/ Medians (corridor approach)	9	\$ 84,185	\$29,643	\$113,828
Medians OR Four-Quadrant Gates (SSMs)	6	\$ 274,141	\$59,286	\$333,427
Medians OR Four-Quadrant Gates (corridor approach)	15	\$ 685,354	\$148,215	\$833,568
Flashing Lights to Gates	2	\$ 57,562	\$6,587	\$64,149
Total	35	\$1,129,304	\$253,612	\$1,382,915

This analysis assumes that only one crossing with potentially no persons severely affected by the sounding of train horns would be terminated as a result of this rule.

Quiet Zone Establishment Costs: Quiet Zone development and approval costs for the 35 WBJs in this category are estimated to total \$187,906.

Initial updating of the DOT Grade Crossing Inventory for the 82 grade crossings is estimated to cost \$5,211. Notification of affected parties and certification are estimated to total \$78,396 for WBJs in this group. Administrative costs are expected to total \$211,513(PV).

If their State DOT wholly or partially funds any of the improvements, communities have up to 8 years to make the necessary improvements to reduce their CCRIs to permissible levels. It is very likely that the Illinois DOT will be funding grade crossing improvements in the Chicago area to some degree. Therefore, this analysis assumes that safety measure implementations will be distributed evenly among years 2 through 8 of the final rule.

Ten communities with a total of ten crossings in this category are expected to use SSMs. The remaining communities are expected to use corridor risk reduction methods or install gates.

Nationwide Excluding Chicago

This category includes 14 WBJs comprised of 46 existing whistle-ban crossings.

Communities would probably elect not to include in quiet zones 5 crossings that currently have whistle bans because there would be no persons severely affected by the sounding of train horns. As a result, one WBJ would not become a pre-rule quiet zone.

For the remaining 41 crossings in this category to retain their whistle ban status in the least costly manner, gates would be installed at 3 crossings equipped with flashing lights, medians installed at 7 gated crossings, medians or 4-quadrant gates at 7 crossings, and photo-enforcement (2 crossings sharing equipment) at 2 gated crossings. Costs are detailed in the table below.

Cost to Upgrade Existing Whistle-Ban Crossings Nationwide, Excluding Chicago, That Are Part of Quiet Zones With No Relevant Collisions in the Past 5 Years and Have CCRI's Above Twice the NSRT

Type of Improvement	Crossings	Installation	Maintenance	Total Cost
Gates with Medians (corridor approach)	7	\$ 65,477	\$ 23,056	\$ 88,533
Medians OR Four-Quadrant Gates (SSMs)	3	\$137,071	\$ 29,643	\$ 166,714
Medians OR Four-Quadrant Gates (corridor approach)	4	\$182,761	\$ 39,524	\$ 222,285
Photo-Enforcement (2 sharing)	2	\$ 68,355	\$196,515	\$ 264,870
Lights to Gates (SSMs)	3	\$ 67,156	\$ 7,685	\$ 74,841
Total	19	\$520,820	\$296,423	\$817,243

This analysis assumes that implementation of safety measures will be evenly distributed among years 2 through 8 of the rule as many state DOTs will at least partially fund some of the improvements made.

Sixteen communities with a total of sixteen crossings in this category are expected to use SSMS to establish quiet zones. The remaining communities are expected to use corridor risk reduction methods or install gates at crossings with flashing lights.

Quiet Zone Establishment Costs: Quiet Zone development and approval costs for the 14 WBJs in this category are estimated to total \$67,575.

Initial updating of the DOT Grade Crossing Inventory for the 46 grade crossings is expected to cost \$2,579. Notification of affected parties and certification are estimated to total \$53,862 for WBJs in this group. Total administrative costs \$124,016 (PV).

6.5.4 Pre-Rule Quiet Zones With One or More Relevant Collisions in the Past 5 Years and CCRIs Above the NSRT

Chicago Area

Thirty-four WBJs with a total of 183 existing whistle-ban crossings are in this category. The crossings are distributed as follows:

<u>Type of Warning Device</u>	<u>Number of Crossings</u>
Automatic Gates & Flashing Lights	173
Flashing Lights	9
Passive Warning Devices	1
Total Crossings	183

In the 5-year period between 1997 and 2001, 71 relevant collisions resulting in 16 fatalities and 36 injuries occurred in the WBJs in this category. The following table presents estimated compliance costs based on the assumption that communities will implement the most cost-effective safety measures to reduce their CCRIs to permissible levels.

Cost to Upgrade Existing Whistle-Ban Crossings in the Chicago Area

Type of Improvement	Crossings	Installation	Maintenance	Total Cost
Photo-enforcement - 3 sharing	3	\$84,546	\$211,548	\$ 296,093
Install Medians (SSMs)	2	\$18,708	\$ 6,587	\$ 25,295
Install Medians (corridor approach)	14	\$130,995	\$ 46,111	\$ 177,066
Install Medians OR Four-Quadrant Gates (SSMs)	4	\$182,761	\$ 39,524	\$ 222,285
Install Medians OR Four-Quadrant Gates (corridor Approach)	15	\$685,354	\$148,215	\$ 833,568
Add Gates to Flashing Lights	3	\$86,344	\$ 9,881	\$ 96,226
Total	41	\$1,188,708	\$461,866	\$1,650,533

Eight no-horn crossings in this category would have 20 or fewer persons severely affected by the sounding of locomotive horns. All of these crossings could either be included in pre-rule quiet zones at no additional cost or would likely be upgraded because of the combination of high levels of night-time train traffic and having more than 10 persons severely impacted. Train horns are not likely to be sounded at any of these crossings once the rule is implemented.

Quiet Zone Development Costs: Quiet Zone development and approval costs for the 34 WBJs in this category are estimated to total \$182,537.

Initial updating of the DOT Grade Crossing Inventory for the 183 grade crossings \$11,630 (PV). Notification of affected parties and certification are estimated to total \$81,566 for the WBJs in this group. Total administrative costs \$275,733 (PV).

As mentioned earlier, the Illinois DOT will likely fund grade crossing improvements in the Chicago area to some degree. Therefore, this analysis assumes that safety measure implementations will be distributed evenly among years two through year eight of the final rule.

Six single-crossing WBJs with a total of six crossings in this category are expected to use SSMs to reduce their CCRI to permissible levels and establish quiet zones. The remaining communities are expected to use corridor risk reduction methods or have automatic gates installed.

The Chicago Area Transportation Study estimates that 25 percent of whistle ban grade crossings in Illinois will implement photo-enforcement to establish quiet zones and an additional 20

percent will implement programmatic law enforcement and public education and awareness programs. Most communities that use photo-enforcement find that fines arising from violations issued to motorists cover associated annual operating costs. To the extent that photo-enforcement and programmed enforcement are more prevalent in the Chicago area than this analysis assumes, this analysis overstates costs associated with implementing safety measures.

Nationwide, Excluding Chicago

Seventy-five WBJs with a total of 376 existing whistle-ban crossings are in this category. The crossings are distributed as follows:

<u>Type of Warning Device</u>	<u>Number of Crossings</u>
Automatic Gates & Flashing Lights	180
Flashing Lights	105
Passive Warning Devices	91
Total Crossings	376

In the 5-year period between 1997 and 2001, 183 collisions resulting in 9 fatalities and 69 injuries occurred in the WBJs in this category. The following table presents safety measure implementation costs assuming that communities elect to implement the most cost-effective measures.

Cost to Upgrade Crossings Nationwide, Excluding the Chicago Area

Type of Improvement	Crossings	Installation	Maintenance	Total Cost
Photo-Enforcement - 2 sharing	6	\$205,066	\$589,545	\$ 794,611
Photo-enforcement - 3 sharing	3	\$ 84,546	\$211,548	\$ 296,093
Photo-enforcement - 4 sharing	4	\$100,734	\$231,130	\$ 331,865
Install Medians (corridor approach)	29	\$271,263	\$ 95,516	\$ 366,779
Medians OR Four-Quadrant Gates (SSMs)	22	1,005,185	\$217,382	\$1,222,567
Medians OR Four-Quadrant Gates (corridor approach)	3	\$137,071	\$ 29,643	\$ 166,714
Add Gates to Flashing Lights	32	\$690,750	\$105,397	\$ 796,147
Add Flashing Lights	9	\$608,723	\$118,572	\$ 727,295
Add Flashing Lights and Gates	5	\$1,208,813	\$194,121	\$1,402,934
Total	113	\$4,312,151	\$1,792,854	\$6,105,005

One-hundred-two crossings in this category would have 20 or fewer persons severely affected by the sounding of horns. Of these, 72 should be able to retain their whistle bans as a result of the improvements the communities are expected to make to retain other whistle bans or because the cumulative noise impact of the corridor(s) they belong in would exceed 20 persons. This analysis assumes that the remaining 30 whistle bans will be terminated and six WBJs will not become quiet zones once this rule is implemented.

Quiet Zone Development Costs:

Quiet Zone development and approval costs for the 69 WBJs in this category are estimated to total \$333,048.

Initial updating of the DOT Grade Crossing Inventory for the 347 grade crossings should total \$19,458 (PV). Notification of affected parties and certification are estimated to total \$271,020 for the WBJs in this group. Total administrative costs \$623,526 (PV).

It is very likely that certain state DOTs will be funding grade crossing improvements to some degree. Therefore, this analysis assumes that safety measure implementations will be distributed evenly among years two through eight of the final rule.

Three crossings in this category are expected to have SSMS implemented to establish quiet zones. The remaining 68 crossings are expected to have corridor risk reduction methods implemented or have flashing lights or automatic gates installed.

6.5.5 Communities with Whistle Bans Established After October 9, 1996

Some communities passed whistle ban ordinances after October 9, 1996. For purposes of this analysis, the crossings in these communities are considered New Quiet Zones. FRA is aware of 66 crossings where whistle bans were established after October 9, 1996, most of these in Madison, Wisconsin. These crossings are distributed as follows:

Warning Device	CCRI > NSRT	CCRI < NSRT	Total
Gates & Lights	14	3	17
Flashing Lights	38	11	49
Other	0	0	0
Total	52	14	66

In absence of this rule, the communities with these whistle bans would not have to incur any additional costs to retain these bans. It is likely, however, that in anticipation of this rule, these communities have elected to wait and implement safety measures in accordance with this rule. This analysis assumes that communities where these crossings are located will comply with the requirements of the rule for establishing New Quiet Zones.

To meet the requirements of the rule, automatic gates will have to be installed at 49 of these crossings⁶. No SSMS or ASMS would be required at any of the gated crossings. Communities and railroads will only incur costs to install and maintain automatic gates at all crossings that do not already have them. Exhibit 8 presents annual costs associated with installation and maintenance of the gates necessary to retain these recently established whistle bans.

Total twenty-year costs associated with installing gates at crossings already equipped with flashing lights are estimated to total \$1,930,277 (PV). These costs are broken down as follows:

	Upgrades	Installation Cost	Annual Maintenance	Total
Above NSRT	38	\$1,329,653	\$167,296	\$1,496,949
Below NSRT	11	\$ 384,900	\$ 48,428	\$ 433,327
Total	49	\$1,714,553	\$215,724	\$1,930,277

Quiet Zone Development Costs: Quiet Zone development and approval costs for eight New

⁶ Gates will be installed at 38 crossings in New Quiet Zones with CCRI greater than the NSRT and at 11 crossings in New Quiet Zones with CCRI less than the NSRT.

Quiet Zones are estimated to total \$39,890 (PV 7%). This includes costs associated with development of the quiet zones and FRA approval of the quiet zones. Initial notification of affected parties and certification are expected to total \$17,006 (PV). Initial updating of the DOT Grade Crossing Inventory for 66 crossings is expected to total \$3,701. Estimated administrative costs total \$60,596 (PV). Exhibit 6 presents annual cost estimates.

6.5.6 Communities Where Train Horns Are Currently Routinely Sounded

FRA has received numerous requests for guidance from communities desiring to establish New Quiet Zones. In general, communities have elected to wait for issuance of the final rule before proceeding with the actual creation of quiet zones. FRA is specifically aware of intentions to establish quiet zones in the following areas: Olmstead, Olmstead Falls, and Berea, Ohio; Fargo, North Dakota; Moorhead, Minnesota; Salt Lake City, Utah; Placentia, California; and Richardson, Texas. The following communities have expressed an interest to FRA in establishing quiet zones: Farmington, Minnesota; Peoria, Morrison, and Dekalb, Illinois; Stevens Point and Fox Point, Wisconsin; and Lansing, Michigan. FRA is aware of the safety measures that Fargo, North Dakota and Moorhead, Minnesota plan to implement. This analysis assumes that in response to this rulemaking, the other communities will implement a sufficient number of safety measures to reduce their average risk levels to permissible levels.

Communities will install mountable barriers with frangible delineators where possible. Where such measures are not feasible, communities will implement photo-enforcement when sharing of equipment is a viable alternative or install four quadrant gates, whichever is less expensive for meeting the requirements for establishing quiet zones. Communities will have to install automatic gates systems with flashing lights and constant warning time at all crossings that do not currently have them.

Although these communities would not have to implement any safety measures in absence of this rule, they probably would have done so to ensure the safety of the crossings. Many communities have contacted FRA regarding ways in which to establish whistle bans without reducing safety levels at crossings. Some of the safety measures that communities are contemplating go beyond what would be required by this rule. Communities that are not informed about the experiences of other communities with safety measures may have questions regarding the effectiveness rates and may spend resources trying to estimate them. In absence of this rule, communities with low risk crossings that do not have lights and gates may not upgrade the crossings as much as this rule is requiring. Specifically, given that the horn is estimated to be 30.9 percent effective at preventing collisions at crossings with flashing lights, that the effectiveness rate of installing gates at these crossings is estimated to be 66 percent (significantly higher than 30.9 percent), and that the upgrade to gates with constant warning time costs about \$40,000, it is likely many communities would opt to implement education and awareness programs or photo-enforcement in lieu of the upgrades to compensate for the effectiveness of the horn.

Some communities have expressed a desire to silence locomotive horns, but the railroads that operate through those communities have rejected the notion due to concerns about safety and

liability. Many communities along the Southern California Regional Railroad (Metrolink) rail corridors have expressed an interest in silencing locomotive horns. Metrolink operates over 399 at-grade crossings and 253 of these have median barriers of various lengths already in place. Design constraints at 92 crossings prohibit median installations. Metrolink indicates that it would like to implement photo-enforcement at these crossings. Metrolink implemented these safety measures at these crossings where locomotive horns sound today voluntarily and not in response to this rulemaking. Therefore, this analysis does not include costs associated with their implementation. Although the medians in place at many crossings may not be 100-foot long in each direction of approach to the crossings, it is likely that their effectiveness has reduced risk levels at the crossings where they are present. To the extent that most crossings along a quiet zone are treated, the average risk index of the quiet zone (after being adjusted to reflect the increase in risk due to silencing the locomotive horn) will likely be below the national risk index threshold. If not, it is likely that the more limited effectiveness of medians will still be sufficient to compensate for the silencing of locomotive horns. This analysis assumes that quiet zone formation along Metrolink rail corridors will not require the implementation of safety measures beyond those implemented voluntarily. This analysis only includes administrative and signage costs for the establishment of 5 quiet zones each comprised of an average of 5 crossings along Metrolink corridors. As with other assumptions made in order to conduct the analysis of the national level, no determinations as to specific quiet zones are implied. In the past, for instance, FRA has worked with Metrolink and the City of Covina, California, regarding improvements that appeared to be warranted at several crossings in that jurisdiction to support establishments of a quiet zone.

In 1991, Consolidated Rail Corporation (Conrail), one of the largest railroads in North America at the time⁷, began ignoring whistle bans that had been enacted by local communities along its rail lines. Other whistle bans ordinances along rail lines of the Norfolk Southern, CSX, Burlington Northern and Santa Fe, Kansas City Southern Railroad, Wisconsin Central, Union Pacific and the former Southern Pacific were also canceled prior to October 9, 1996. FRA believes that communities will establish New Quiet Zones along these corridors.

FRA estimates that communities will consider establishing New Quiet Zones incorporating a total of 811 crossings nationwide (excluding Florida) in the first three years of the rule. Information available to FRA indicates that no persons would be severely impacted at 105 of these crossings and that less than 20 persons are severely impacted by train horn noise at 245 of these crossings. This analysis assumes that communities will establish New Quiet Zones only to the extent that more than 20 persons are severely affected. In addition, communities may not include in New Quiet Zones crossings that would have to be upgraded and have low daytime train traffic volumes and no nighttime train traffic. FRA identified 75 such crossings⁸.

⁷ Most of Conrail's railroad assets have since been sold to Norfolk Southern Corporation and CSX Transportation.

⁸ Seventy-two of the 75 have an average of 0 trains per day, the other 3 have an average of less than 10 trains per day.

Therefore, this analysis assumes that New Quiet Zones established in the first three years of this rule will be comprised of a total of 376 crossings (exclusive of the 66 crossings that would comprise New Quiet Zones discussed above). These are distributed as follows:

Warning Device	CCRI > NSRT	CCRI < NSRT	Total
Gates & Lights	139	40	179
Flashing Lights	77	33	110
Other	42	45	87
Total	258	118	376

The safety measures that would be required to establish these New Quiet Zones, excluding Moorhead and Fargo, are as follows:

	CCRI > NSRT	CCRI < NSRT	Total
Install Gates & Lights	43	45	88
Install Gates	76	33	109
Install Medians	22	0	22
Medians Or 4-Q Gates	14	0	14
Photo-Enforcement	2	0	2
Total	157	78	235

Exhibit 8 presents annual costs associated with installation and maintenance of safety measures. Twenty-year costs (PV) for these safety measures are as follows:

	CCRI > NSRT	CCRI < NSRT	Total
Install Gates & Lights	\$ 6,212,670	\$ 6,501,631	\$12,714,301
Install Gates	\$ 2,993,899	\$ 1,299,982	\$ 4,293,881
Install Medians	\$ 347,040	\$ 0	\$ 347,040
Medians Or 4-Q Gates	\$ 962,578	\$ 0	\$ 962,578
Photo-Enforcement	\$ 336,773	\$ 0	\$ 336,773
Total	\$10,852,960	\$ 7,801,613	\$18,654,573

Moorhead, Minnesota and Fargo, North Dakota already have plans underway to implement various safety measures to meet or exceed the requirements of this rule. The cost of the project for both communities will be nearly \$6.9 million, according to preliminary estimates⁹. The

⁹ Moorhead's QZ application includes 12 crossings. They propose to close two crossings and install four-quadrant gates at the remaining ten crossings. The Fargo, ND QZ application (joint with Moorhead) consists of eight crossings one of which is private. They propose to close one crossing, install medians at three crossings, install four-quadrant gates at another three crossings, and install gates at the private industrial crossing. Video cameras will be installed to document the safety of crossings. Quadrant gates and medians will be built and videotaped for another

improvements planned for these quiet zones exceed the requirements of this rule. This rule may therefore result in a cost savings for these two communities.

Quiet Zone Development Costs: Quiet Zone development and approval costs for 99 New Quiet Zones are estimated to total \$493,634 (PV 7%). This includes costs associated with development of the quiet zones and FRA approval of the quiet zones. Initial notification of affected parties and certification are expected to total \$210,444 (PV). Initial updating of the DOT Grade Crossing Inventory for 401 crossings is expected to total \$22,486. Total administrative costs are estimated at \$726,564 (PV). Exhibit 6 presents annual cost estimates.

Potential Savings for New Quiet Zones: According to the Office of the Mayor of Salt Lake City, Utah, certain housing projects in Salt Lake City have had difficulty getting financing and tax credit approval because they are in close proximity to a rail line. In some cases, to receive assistance from the U.S. Department Housing and Urban Development, developers must mitigate for train horn noise by installing triple pane windows, central air conditioning, and/or additional insulation. This rule will allow the creation of New Quiet Zones that will reduce the need for noise mitigation and therefore permit the development of residential housing at a lower cost. For many urban areas, the cost of installing flashing lights and automatic gates as well as additional safety measures at crossings may be lower than implementing noise mitigation alternatives.

6.6 Affirmation and Periodic Update of the DOT Grade Crossing Inventory

Every five years, communities which implement quiet zones using SSMs and those that the FRA Administrator has determined do not present a significant risk if horns are not sounded must affirm in writing to FRA and other parties that were initially notified that they continue to conform with the requirements for quiet zones as well as submit to FRA a complete DOT-AAR National Highway-Rail Inventory Form for each crossing in the quiet zone. One of the fields that must be filled out on this form is the Average Annual Daily Traffic (AADT). Local authorities generally estimate this number based on periodic samples taken using counters. Communities update AADT periodically for purposes such as traffic planning or other planning activities. Therefore, FRA does not expect that communities will have to estimate AADT more frequently as a result of this rule.

prescribed period before the final order is given to “turn the whistles off.” Video-taping for this demonstration project is not required under the final rule.

Communities that elect to establish quiet zones by implementing ASMs (e.g. programmatic education) must establish “before and after” total crossing violation rates for such quiet zones. Every three years, these communities must affirm in writing to FRA and other parties that were initially notified that they continue to conform with the requirements for quiet zones as well submit to FRA a complete DOT-AAR National Highway-Rail Inventory Form for each crossing in the quiet zone.

FRA assumes and NPRM commenters agree that it takes an average of one labor hour to complete an inventory form and process a letter of re-affirmation.

Costs associated with the requirements for updating the inventory and re-affirmation for Pre-Rule Quiet Zones are expected to total \$119,028 (PV) for communities in the Chicago area and \$224,589 (PV) for communities in the rest of the nation. For New Quiet Zones, the costs are expected to total \$87,182 (PV). Exhibit 6 presents annual costs associated with these requirements.

6.7 Annual FRA Update of NSRT and QZRIs

Annually, FRA will (1) recalculate the NSRT as well as the QZRI for each quiet zone, (2) issue a notice in the Federal Register with these indexes, (3) update a website with these indexes, and (4) e-mail the affected communities. FRA anticipates that this effort will take approximately 40 labor hours annually. Federal government labor costs to accomplish this will likely be incurred at an average burdened hourly rate of \$60 (GS 14 salary plus burden for overhead and fringe benefits).

Total twenty-year costs associated with this requirement are expected to total \$25,426 (PV). Exhibit 6 presents annual costs associated with these requirements.

6.8 Power Out Indicators or Remote Health Monitoring Systems

This rule requires that each public highway-rail grade crossing in a New Quiet Zone be equipped with both flashing lights and automatic gates that control traffic over the crossing. Such warning devices must be equipped with power out indicators capable of indicating to trains approaching a grade crossing equipped with an active warning system whether commercial electric power is activating the warning system at that crossing. The requirement can be met with remote health monitoring of grade crossing warning systems if such systems are equipped to indicate power status.

According to industry sources, the average cost of a remote monitoring system that relies on cell telephone technology is \$2,500 (material and labor) to install and \$800 to maintain annually (excluding calling costs). This type of system can perform daily checks for up to 10 years. Other systems currently in use rely on automatic train control system radios or satellites.

Power out indicators consist of a simple light bulb, wired to the electrical power circuits that detect whether electrical power is available to properly actuate the warning device. When power is available, the light is continuously lit. The light is located outside the instrument case that houses the control circuitry for the automatic crossing warning devices, and is in plain view of approaching trains. If electrical power is not available to actuate the warning device, the light goes dark. Industry sources indicate that the average installation cost of a power out indicator is about \$600 (material and labor). This analysis assumes that annual maintenance costs are approximately \$200.

According to the DOT Grade Crossing Inventory, 62,813 crossings nationwide currently have active warning devices. FRA does not have complete information regarding which crossings have remote health monitoring systems or power-out light systems. However, FRA does have information regarding the prevalence of power out indicators on certain Class 1 railroads. This information indicates that approximately 42,206 Class 1 railroad crossings are equipped with active warning devices and 31,334 have either power out indicators or remote health monitoring systems. FRA believes that the proportion of whistle-ban crossings equipped with remote health monitoring or power out systems may be greater than the national average.

The state of Illinois is currently undertaking an effort to equip all crossings that have active warning devices in the state with remote health monitoring systems. Illinois is working with the Class 1 railroads first. As of March 2002, approximately 1,500 systems had been installed on Class 1 railroad crossings.

In general, new active warning device system installations now include either remote health monitoring systems or power out indicators.

This power out requirement only applies to crossings that form part of *New Quiet Zones*. Initially, FRA expects that *New Quiet Zones* will be mainly comprised of former Conrail, Burlington Northern and Santa Fe, Kansas City Southern Railroad, Wisconsin Central, Union Pacific, CSX, and Norfolk Southern whistle-ban crossings and the newly established whistle-ban crossings in Madison, Wisconsin. Norfolk Southern and CSX purchased most of Conrail assets. These railroads have already equipped approximately 50 percent of their crossings that have automatic warning devices with remote health monitoring systems. In absence of this rule, these railroads would probably continue to install such systems at the remaining crossings with automatic warning devices. However, in response to this rule, these two railroads may have to do so at an expedited rate along some of the former Conrail whistle-ban crossings. This analysis assumes that the incremental installation costs associated with this expedited rate are minimal and are therefore not included in this analysis.

6.9 Private Crossings in Quiet Zones

The final rule requires the evaluation of private crossings within a proposed quiet zone by a diagnostic team to determine whether institution of the quiet zone will significantly increase risk at the private crossing(s).

If a diagnostic team determines that a private crossing could experience a significant increase in risk as a result of quiet zone implementation then (1) the public authority may “adopt” the crossing and include it in its corridor-based risk-reduction program; (2) the crossing may be closed; or (3) safety improvements that address increased risk at that crossing, as evaluated by the diagnostic team would be implemented. FRA expects local and State public authorities to make these determinations in the first instance; FRA’s role is to determine whether these authorities have considered the criteria set forth in the appendix and have stated an accurate and reasonable basis for their determinations.

FRA estimates that 17 private crossings could potentially fall within potential New Quiet Zones. In the majority of states, railroads are not currently required to sound locomotive horns at private crossings. Diagnostic team reviews could conclude that certain private crossings need to have safety measures implemented to be included in quiet zones. Private crossing owners would have little incentive to make these improvements. There are three possible outcomes for the communities in which diagnostic teams determine that private crossings must somehow be improved (1) the quiet zone is not formed, (2) the community funds the improvements to be able to establish the quiet zone with the private crossing included, or (3) quiet zones are structured around the private crossing without including it. In the first case, horns would not have to be sounded unless required by State law. In the next two cases, locomotive horns would not be sounded on approach to the private crossing.

FRA identified some private crossings along the Metra system in the greater Chicago area. No collisions have been reported for these crossings in the past twenty years. It is unlikely that diagnostic team reviews will recommend significant improvements to these crossings where train horns do not currently sound. FRA believes that the number of private crossings that are covered by whistle bans today are few in number and the formation of pre-rule quiet zones will not require significant improvement of these crossings.

This analysis assumes that communities proposing to establish quiet zones where there are private crossings will in many cases incur costs associated with diagnostic team reviews. Diagnostic teams are usually composed of representatives from the state, the city, the railroad and a traffic engineer. They may also include, as necessary, representatives from affected school bus services, emergency response agencies, and the FRA. Average labor costs for this effort should not total more than 32 labor hours or approximately \$1,920.

Communities that include the private crossings in their quiet zones may also incur costs associated with installing crossbucks, stop signs, and advance warning signs on highway approaches to the crossings. FRA estimates that it will cost approximately \$600 per crossing to install all three signs on two approaches. Additional costs for implementing safety measures will be incurred to the extent that diagnostic teams deem necessary. FRA does not collect sufficient information regarding private crossings to estimate how many private crossings would fall in proposed quiet zones, how many may need one or more signs installed, or how many may need safety measures installed.

To the extent that quiet zones are structured around private crossings or that quiet zones are not established as a result of costs associated with making improvements recommended by diagnostic teams, only diagnostic team review costs will be incurred. FRA does not expect private crossing owners to be unduly burdened with the requirement for the diagnostic team review. Communities are expected to fund recommended improvements to the extent that they value silencing the locomotive horns in the entire quiet zone.

6.10 Total Twenty-Year Costs

Total Twenty-Year Costs (PV¹⁰, 7%)

	Nationwide	Chicago	Rest of Nation
<u>Locomotive Horns Sounded</u>			
Maximum Horn Sound Level	\$ 2,902,478	Not Applicable	Not Applicable
Relocations Due to Locomotive Horn Noise	\$ 1,724,590	\$ 47,927	\$1,676,663
<u>Pre-Rule Quiet Zones</u>			
Advance Warning Signs	\$ 170,493	\$ 33,504	\$ 136,989
<u>QZs w/ CCRI < NSRT</u>			
QZ Development, Approval, Certification, Notification, & Initial Inventory Updates	\$ 1,182,292	\$ 59,537	\$1,122,755
<u>QZs w/ NSRT < CCRI < 2xNSRT; No Collisions</u>			
QZ Development, Approval, Certification, Notification, & Initial Inventory Updates	\$ 882,814	\$ 179,248	\$ 703,566
SSMs/ASMs Installation & Maintenance	\$ 1,575,797	\$ 156,604	\$1,419,193
<u>QZs w/ CCRI > 2xNSRT; No Collisions</u>			
QZ Development, Approval, Certification, Notification, & Initial Inventory Updates	\$ 335,529	\$ 211,513	\$ 124,016
Install & Maintain Safety Improvements	\$ 2,200,158	\$1,382,915	\$ 817,243
<u>QZs w/ CCRI > NSRT; With Collisions</u>			
QZ Development, Approval, Certification, Notification, & Initial Inventory Updates	\$ 899,259	\$ 275,733	\$ 623,526
Install & Maintain Safety Improvements	\$ 7,755,538	\$1,650,533	\$ 6,105,005
Periodic Affirmation/Inventory Update	\$ 274,066	\$ 58,426	\$ 215,640
TOTAL PRE-RULE QUIET ZONES	\$15,275,946	\$4,008,013	\$11,267,933
	Total	Non-Existing Quiet Zones	Whistle Bans Est. Post 10/9/96
<u>New Quiet Zones</u>			
Advance Warning Signs	\$ 42,605	\$ 36,832	\$ 5,773

¹⁰ The Present Value (PV) of cost and benefit flows is calculated in this analysis. PV provides a way of converting future benefits and costs into equivalent dollars today so that benefit and cost streams that involve different time paths may be compared. The formula used to calculate these flows is: $1/(1+I)^t$ where "I" is the discount rate, and "t" is the year. Per guidance from the Office of Management and Budget, a discount rate of .07 is used in this analysis.

QZ Development, Approval, Certification, Notification, & Initial Inventory Updates	\$ 787,160	\$ 726,564	\$ 60,596
QZ CCRI < NSRT			
Install & Maintain Safety Improvements	\$ 8,234,940	\$7,801,613	\$ 433,327
QZ CCRI > NSRT			
Install & Maintain Safety Improvements	\$12,349,909	\$10,852,960	\$1,496,949
Periodic Affirmation/Inventory Update	\$ 87,182	-----	-----
TOTAL NEW QUIET ZONE COSTS	\$21,501,796	\$19,417,969	\$1,996,645

Federal Railroad Administration

Annual Update of NSRT/QZRIs and Notification	\$25,426
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Total Twenty-Year Costs associated with implementation of this rule are estimated to be \$41,430,236 (PV, 20 Years, 7%).

Please note that costs associated with photo-enforcement will likely be recouped almost entirely through the collection of fines arising from violations.

In general there has been a downward trend in collisions at grade crossings nationwide due to the implementation of various private and public safety initiatives. Costs presented in this analysis may be overstated to the extent that such initiatives would lead to the eventual implementation of some of the same or equivalent safety measures that this rule requires for the establishment of quiet zones. In such cases, this rule may be merely accelerating implementation and the rate of expenditures.