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SECTION 1: INTRODUCTION

This introductory section includes the study purpose and a summary of the Quiet Zone process, and describes the contents of this study.

The purpose of the Oakland Railroad Quiet Zone Study is to explore the potential for implementation of a Quiet Zone on the Union Pacific Railroad (UP) corridor through the Jack London Square area of the City of Oakland. A railroad Quiet Zone is an area where locomotive engineers are not required to sound train warning horns as they approach an at-grade crossing.

There are six crossings for this Quiet Zone study: Oak Street, Webster Street, Franklin Street, Broadway, Washington Street, and Clay Street. From the east end at Oak Street, the Niles Subdivision tracks traverse west across Oak Street before entering the Jack London Square Amtrak Station. The tracks continue west on Embarcadero West/First Street from Webster Street all the way through Clay Street and into the Port Railroad Shipping Yard and Amtrak Maintenance Yard.

The proposed Quiet Zone, encompassing the six crossings, is two-thirds of a mile long and is shown in Figure 1 below.

Figure 1: Study Area
The Niles Subdivision tracks are owned and maintained by UP. There are two main tracks in the proposed Quiet Zone area. These run across and in the middle of City streets through franchise agreements between UP and the City. The tracks are used by UP and BNSF Railway freight trains as well as Amtrak passenger trains. A third track paralleling the double track runs the length of the proposed Quiet Zone between Webster and Clay Streets. This track, however, is out of service. Just to the east of Webster Street, the third track is active, serving as a bypass track for freight trains around the Jack London Square Amtrak Station. The triple track continues east through the Oak Street crossing.

In all, 61 trains per weekday traverse the Martinez Subdivision between Oak Street and Clay Street. According to the Federal Horn Rule, engineers of all trains must sound their train horns as they approach an at-grade crossing one quarter mile before the crossing. The horn sounding is a safety measure to alert all road users intending to cross the tracks that a train is approaching. In the future, the number of trains operating in the Jack London area is expected to increase, resulting in an increase in horn soundings. The implementation of a Quiet Zone for these six crossings would reduce existing and future noise impacts from train horn soundings.

A Quiet Zone may be established by the local authority (city, county, or state) having jurisdiction over traffic enforcement. To qualify for a Quiet Zone, the City of Oakland, in this case, must comply with the regulations established by the Federal Railroad Administration (FRA) on grade crossing safety devices and periodic reporting. In addition, a Quiet Zone requires the concurrence of the California Public Utilities Commission (CPUC) which shares railroad crossing safety oversight in California with the FRA. Ultimately, the train operators, in this case UP, BNSF, and Amtrak, must agree to comply with the Quiet Zone. Although a Quiet Zone allows train operators not to sound the horns at designated crossings, they continue to be responsible to sound the horns when, in their judgment, they encounter situations where it is necessary. For example, a train operator will blow the train’s horns to warn if pedestrians for whatever reason cross tracks in front of the train as it approaches them.

The FRA uses an assessment of risk to determine if the grade crossing safety devices used at a highway-rail crossing are sufficient to meet FRA risk standards. The measurements of risk are based upon the highway and railroad conditions at the crossing and are calculated with the FRA’s Quiet Zone Calculator. The data collected for this analysis, an evaluation of Quiet Zone scenarios, and a discussion of next steps for Quiet Zone implementation are included in the following sections:

- **Section 2**: Existing Conditions presents existing highway, railroad, and study area conditions that will be used in the Quiet Zone Calculator and for assessment of appropriate grade crossing safety devices.
- **Section 3**: Future Conditions presents changes to highway and railroad conditions that would be expected by Year 2030 that could affect implementation of a Quiet Zone.
- **Section 4**: Findings from a walk-through diagnostic of the proposed Quiet Zone by representatives of the FRA, the Port of Oakland, the UP, the CPUC and the City of Oakland.
- **Section 5**: An initial concept for a Quiet Zone.
- **Section 6**: Performance of the Quiet Zone describes the Quiet Zone process in detail and presents alternative Quiet Zone concepts for consideration.
- **Section 7**: Next steps toward implementation of a Jack London Square Quiet Zone are outlined.
SECTION 2: EXISTING CONDITIONS

This section presents the findings of the Existing Conditions analysis. It describes existing freight and passenger rail operations along the UP corridor in the Jack London Square area and details the City’s six at-grade railroad crossings that are being considered for a Quiet Zone along Embarcadero West/First Street. The understanding of rail operations and the circumstances applicable to each grade crossing are essential to the development of a plan to create a Quiet Zone. This section reviews rail operations and grade crossing conditions, including warning devices, vehicular traffic volumes, and accident experience. Land uses along the rail corridors, including area population and employment, and motor vehicle and rail traffic generators in the study area are also discussed.

Rail Operations
As noted, the UP Niles Subdivision tracks are used by UP and BNSF freight trains as well as Amtrak passenger trains. UP trains include intermodal (trailer and container on flatcar or double-stack car) and traditional carload trains (boxcar, tank car, flatcar, gondola, hopper car, auto carrier, etc.). BNSF trains on the Niles Subdivision are carload trains. Amtrak trains include the Capitol, San Joaquin, and Coast Starlight trains totaling 42 trains per weekday. Freight trains average approximately 19 per day. In all, there are 61 trains per weekday running through the Jack London Square area today.

Maximum allowable speeds are 15 mph for freight trains and 25 mph for passenger trains through the Jack London Square area.

Grade Crossing Conditions
Approach lanes of all crossings in the proposed Quiet Zone are equipped automatic warning devices consisting of gates and flashing lights. Medians exist on the north side of Oak Street and Broadway. Advance warning signs and pavement stripping exist at all crossings, though some of the stripping is well worn. Specific conditions at each of the six crossings are discussed below.

Oak Street and Embarcadero West/First Street – Oak Street is four-lane bi-directional (two lanes in each direction) with a raised center median. There are two gates here: one on the north side of the crossing controlling southbound Oak Street; and another south of the crossing controlling northbound Oak Street. There are three tracks at this crossing; all are active. There is a median on Oak Street north of the crossing, and there is a median/island on Oak Street south of the crossing. Embarcadero West/First Street tees into Oak Street about 40 feet south of the crossing.

Webster Street – Webster Street is a two-lane road north of the crossing; it becomes Embarcadero West/First Street south of the crossing. There are three gates here: one on the north side of the crossing controlling southbound Webster traffic; one south of the crossing on eastbound Embarcadero set on an island controlling a left turn onto northbound Webster; and another one south of the crossing on westbound Embarcadero controlling westbound Embarcadero traffic turning right onto northbound Webster or continuing westbound on Embarcadero. There are three tracks through this crossing; two are active.

Franklin Street – Franklin is a two-lane southbound-only street north of the crossing; it is a two-lane bi-directional street south of the crossing. There are three gates here: one on either side of Franklin Street north of the crossing controlling one-way southbound traffic on Franklin, and one south of the crossing controlling northbound Franklin Street. There are three tracks through this crossing; two are active.

Broadway – Broadway is four-lane bi-directional street with a raise median north of the crossing; it is a two-lane bi-directional street with potted shrubbery between the lanes south of the crossing. There are two gates here: one north of the crossing controlling southbound Broadway, and one south of the crossing controlling...
northbound Broadway. There is a median on Broadway north of the crossing. There are three tracks through this crossing; two are active.

*Washington Street* — Washington Street is a two-lane bi-directional street north and south of the crossing. There are two gates here: one north of the crossing controlling southbound Washington Street, and one south of the crossing controlling northbound Washington Street. There are three tracks through this crossing; two are active.

*Clay Street* — Clay Street is a two-lane bi-directional street north and south of the crossing. There are two gates here: one north of the crossing controlling southbound Clay Street, and one south of the crossing controlling northbound Clay Street. There are three tracks through this crossing; two are active.

**Embarcadero West/First Street/First Street Conditions**

Embarcadero West/First Street runs through the length of the proposed Quiet Zone. The street is a two-lane bi-directional street. Between Oak Street and Webster Street, Embarcadero is to the south of the UP tracks. Between Webster Street and Clay Street, the UP tracks are set in Embarcadero, to the effect that freight and passenger trains are “street running” there, that is, they share the roadway with motor vehicles. The traffic lanes are on either side (north and south) of the two active tracks: double-yellow stripping separates the tracks from the traffic lanes.

**Motor Vehicle Volumes**

As part of this report, vehicle counts were taken at all six crossings in the proposed Quiet Zone. The purpose of the effort was to identify the traffic that is crossing the railroad tracks. For example, traffic heading southbound on Broadway to Jack London Square as well as turning left onto eastbound Embarcadero is traffic that crosses the tracks. This is a key input into the FRA Quiet Zone Calculator discussed later in this report.

<table>
<thead>
<tr>
<th>Street Crossing</th>
<th>Daily Traffic Volume Crossing Tracks</th>
</tr>
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<tbody>
<tr>
<td>Oak Street</td>
<td>6,894</td>
</tr>
<tr>
<td>Webster Street</td>
<td>3,173</td>
</tr>
<tr>
<td>Franklin Street</td>
<td>584</td>
</tr>
<tr>
<td>Broadway</td>
<td>2,632</td>
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<tr>
<td>Washington Street</td>
<td>865</td>
</tr>
<tr>
<td>Clay Street</td>
<td>1,169</td>
</tr>
</tbody>
</table>

**Source:** Wilbur Smith Associates, 2011

**Accidents at Crossings in the Proposed Quiet Zone**

Between 1999 and 2009, there were 11 train-related accidents at crossings in the proposed Quiet Zone, according to FRA accident reports. Two were at Webster Street, one at Franklin Street, five at Broadway, one at Washington Street and two at Clay Street. Five of the accidents involved a car, three involved pedestrians, two involved trucks, and one involved a bicyclist. Three of the accidents resulted in injuries, and two resulted in fatalities; both of pedestrians at Broadway. The FRA accident reports can be obtained from the FRA website: http://safetydata.fra.dot.gov/officeofsafety/.
Land Uses in the Area

Land use within the study area has a varied history, which today includes a diverse mix of multiple uses, from produce warehousing to entertainment venues. The area also includes a mix of retail, medium and high-density housing, warehousing, office, and light industrial.

Population and Employment

Based on a demographic summary report from the City of Oakland, the study area has a total population of 2,060 – more than four times the total in the year 2000. The large increase in population is a result of several new housing developments. Over the past 10 years, 900 additional housing units have been constructed in the area, increasing from 265 units in 2000 to 1,167 units in 2010. The report also estimates the area has 300 businesses employing 4,400 workers.

Rail Traffic Generators in the Area

The major rail traffic generator near the Jack London Square area is the Port of Oakland. The Port’s main rail served facilities are to the west of the Quiet Zone. The Port generates mostly intermodal traffic, but has limited traditional carload traffic as well. The major rail facilities serving the Port are the UP’s Intermodal Yard, a mile west of Clay Street; and Joint Intermodal Terminal (JIT) used mainly by BNSF, less than two miles west of Clay Street. UP has a traditional carload yard, West Oakland Yard, less than a mile west of Clay Street and adjacent to the railroad’s intermodal yard; this is a switching yard and locomotive serving area.

Trains originating and terminating in the aforesaid UP facilities travel east through Jack London Square as well as north through West Oakland, Emeryville and Berkeley. BNSF JIT traffic only heads north. UP also has another switching facility, East Oakland Yard, a half mile east of Oak Street.

Amtrak has a maintenance facility adjacent to UP’s West Oakland Yard. Locomotives and cars used by the Capitol and San Joaquin trains are serviced there. Trainsets move to and from this facility through Jack London Square area on Embarcadero West/First Street. Amtrak California Zephyr trainsets are also maintained here. However, this equipment does not transit the Jack London Square area, as it arrives from and departs to the north.

SECTION 3: FUTURE CONDITIONS

Rail Operations

In recent years, international intermodal traffic has driven growth in freight train volumes to and from the West Coast. Growth of intermodal traffic outpaced that of most other types of rail traffic, as American consumers and business purchased ever more finished and semi-finished products from Asia. Theoretically, improving economic conditions should trigger a return to higher intermodal train volumes. However, ongoing improvements in the width of the Panama Canal (allowing bigger ships handling more containers) will divert some Transpacific container volumes which presently move between West Coast ports like Oakland to Midwest and Gulf Coast markets by rail. Additionally, Asian shippers are increasingly looking at routings through the Suez Canal to East Coast ports, with a resultant decline in volumes routed to West Coast ports and thence by train to inland destinations.

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Here, freight train volumes, both intermodal and carload, are assumed to grow at the same rate as the domestic economy, estimated here at 2 percent per year. Thus, the total train volume should increase from 19 per day today to 28 trains per day in 2030.

Amtrak corridor trains (the San Joaquin and the Capitols) on the Nile Subdivision are limited by agreement between Caltrans and UP. The maximum allowable number of trains on the Subdivision, 20, has been reached. More trains would require a new agreement. Still, it is reasonable to assume growth over the long term. Indeed, the Capitol Corridor Joint Powers Authority (CCJPA), operator of the Capitols, envisions two more Capitols in the future.

Accordingly, 72 trains per day are presumed to be operating through the Jack London Square area in 2030: 28 freight and 44 passenger.

Operating speeds of freight and passenger trains are unlikely to change by 2030, but the track configuration on Embarcadero West/First Street may. To accommodate the higher freight and passenger train volumes, UP may insist on reactivation of the third main track between Webster Street and Clay Street. Indeed, the reactivation may be UP’s sine qua non for allowing more passenger trains on the Niles Subdivision.

**Traffic Conditions**

Estimated motor vehicle movements crossing tracks in the proposed Quiet Zone in 2030 are summarized below. The estimates use calculated growth rates anticipated from the projected population increase in the study area from year 2010 to year 2015. As the study area is assumed to be relatively built out by 2015, a 1 percent growth rate was applied from years 2015 to 2030 to accommodate and account for steady internal growth.

<table>
<thead>
<tr>
<th>Street Crossing</th>
<th>Daily Traffic Volume Crossing Tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak Street</td>
<td>12,402</td>
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<tr>
<td>Webster Street</td>
<td>5,707</td>
</tr>
<tr>
<td>Franklin Street</td>
<td>1,051</td>
</tr>
<tr>
<td>Broadway</td>
<td>4,734</td>
</tr>
<tr>
<td>Washington Street</td>
<td>1,556</td>
</tr>
<tr>
<td>Clay Street</td>
<td>2,104</td>
</tr>
</tbody>
</table>


**Land Uses**

Future land use policy, as outlined by the City of Oakland's Estuary Policy Plan, includes intensified mixed use, high-density housing, and retail, dining and entertainment uses. It is reasonable to assume, therefore, that motor vehicle traffic on the Quiet Zone crossings and on Embarcadero West/First Street will increase.

A new Oakland Athletics baseball stadium has been discussed in the recent past for the Jack London Square area, but no study of environmental impacts, including traffic, has been conducted.

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3 Caltrans funds the corridor trains, which are crewed by Amtrak. Caltrans negotiated with the predecessor of UP, the Southern Pacific Railroad, for access to the Niles Subdivision for the corridor trains.

4 The CCJPA contracts with Amtrak for running the Capitol trains. Funding for operations and capital improvements comes from Caltrans. Comment on the additional two trains was provided by CCJPA, October 21, 2010.
Population and Employment
The City of Oakland demographics report projects a study area population of 3,192 in 2015, a 54.9 percent increase over the five-year period from 2010. Housing units are projected to increase by 57.8 percent to 1,841 from 2010 to 2015. It is reasonable to assume growth in employment, particularly with regard to businesses which will serve the increasing residential population. The Oakland report did not specifically site a projection for employment in the study area, however.

Rail Traffic Generators in the Study Area
The Port of Oakland will remain the major rail traffic generator in the area. Amtrak trains may increase slightly, as noted.

SECTION 4: DISCUSSION OF THE JULY 15TH DIAGNOSTIC
On July 15, 2010, representatives of the FRA, the CPUC, the UP, the Port of Oakland and the City of Oakland performed a diagnostic review of proposed Quiet Zone. The diagnostic team met at the Oak Street crossing and walked the length of the Quiet Zone to Clay Street. The major concerns and potential solutions identified by diagnostic participants are noted below.

Control Left Turns from Embarcadero West/First Street
With implementation of Quiet Zone comes a key issue expressed by the CPUC pertaining to motorists traveling along Embarcadero West/First Street making left turns onto side streets in front of parallel moving trains whose engineers will not be regularly sounding their horns. Since the motor vehicle travel lanes are in the curbside lanes, and the train tracks occupy the center lane areas, and left-turning traffic must cross over the tracks. Should a Quiet Zone be established, additional safety measures addressing this issue would need to be implemented, such as off-quadrant, no-left-turn, blank-out signs; no-left-turn blank-out signs on crossing approaches; side lights mounted on gates; and mountable barriers between traffic lanes and railroad tracks along Embarcadero West/First Street.

Marketplace Access/Egress Control
The CPUC identified an issue with motorists potentially crossing tracks upon leaving the Marketplace development on the south side of Embarcadero West/First Street near the Webster Street intersection. Safety enhancements would include right-turn-only stenciling and signage at the driveways and mountable barriers running along Embarcadero West/First Street to reinforce the separation between traffic lane and train tracks.

Loading Bay on Embarcadero West/First Street
Loading bays exist on the south side of Embarcadero West/First Street between Webster Street and Broadway. It may be necessary to reconfigure or eliminate loading bays to ensure that Embarcadero West/First Street traffic is not obstructed by the installation of mountable barriers.

Jack London Inn Driveways
Three driveways for the Jack London Inn garage exist on north side of Embarcadero West/First Street between Franklin Street and Broadway. Right-turn-only signs and the mountable barriers running along Embarcadero West/First Street would be appropriate safety devices to prevent drivers from crossing the tracks.
Americans with Disabilities Act Compliance/Pedestrian Safety

This analysis assumes all crossing improvements will be fully compliant with requirements of the Americans with Disabilities Act (ADA). With the implementation of a Quiet Zone, ADA requirements should be installed according to standard. These would include truncated domes, curb ramps, and audible signals. During the diagnostic many of CPUC’s comments expressed a concern with pedestrian safety while crossing Embarcadero. The ADA improvements will enhance pedestrian safety there. Other pedestrian improvements conceivably could be added (e.g., barriers and fencing). This noted, pedestrian safety per se is not a factor considered by the FRA for eligibility of Quiet Zone status.

Third Track on Embarcadero West/First Street

While the UP’s Niles Subdivision between Webster Street and Clay Street is a double-track main line, there is also a parallel out-of-service third track on the south side of these two tracks. Also, Embarcadero West/First Street is about 6 feet narrower between Washington Street and a point 80 feet west of the Webster Street crossing than it is between Clay Street and Washington Street. UP has indicated that these tracks may one day be returned to service. If trains were to operate again on the third track, it would create a major impact on traffic flow on the eastbound lane of Embarcadero West/First Street.

Some Horn Blowing Will Continue

Implementation of a Quiet Zone in Jack London Square would not result in a complete elimination of train horn noise. As noted in 49 CFR 222.23, “a locomotive engineer may sound the locomotive horn to provide a warning to animals, vehicle operators, pedestrians, trespassers or crews on other trains in an emergency situation if, in the locomotive engineer’s sole judgment, such action is appropriate in order to prevent imminent injury, death, or property damage.” It is likely that such instances will occur in the future as they do today despite a Quiet Zone designation. Therefore, horn blowing, possibly even at a significant level, should be expected in the future.

In addition, sounding the train horn is required when a stopped train begins moving, such as when a passenger train is leaving a station (Section 5.8.2 of the General Code of Operating Rules observed by Amtrak, UP, and most other North American railroads). Considering that the Jack London Square Amtrak Station will be within the Quiet Zone, the study area will continue to be affected by these horns.

SECTION 5: SAFETY MEASURE CONCEPTS FOR A QUIET ZONE THROUGH JACK LONDON SQUARE

A Four-quadrant Gate Solution

One way to qualify for Quiet Zone status would be to install a specific type of FRA-approved safety measures at each crossing in a Quiet Zone. These measures are known as Supplementary Safety Measures (SSM’s).

SSM’s are engineering improvements, which when installed at street-rail grade crossings within a Quiet Zone, reduce the risk of a train-motor vehicle collision at the crossings. SSM’s are installed to reduce the risk level either to the level as if the train horns were sounded at the location or to a level below the Nationwide Significant Risk Threshold (NSRT), which is defined in the following section.

For a November 4, 2010 Agenda Report for the City/Port Liaison Committee, Wilbur Smith Associates, a transportation planning firm retained by the City, developed a Quiet Zone concept assuming SSM’s at each crossing in the proposed Jack London Square Quiet Zone. Safety suggestions developed from the July 15th diagnostic review were included also.
The crossing safety improvements identified for each crossing in the Quiet Zone are noted on figures appearing in Appendix A on pages A1 through A6. Not included were various safety improvements suggested by the CPUC for the platforms in the Amtrak Station, as these improvements would be the responsibility of Amtrak and not the City.

Based on the conceptual plans, the cost estimate for the improvements totals to $11.2 million, a figure largely driven by the four-quadrant gate treatments at all the crossings. A breakdown of the cost estimate is provided in Appendix B. The cost estimate includes design and construction support costs and a contingency that is 30 percent of the construction cost.

Other SSMs
At an estimated $1 million for installation (not including contingencies and support costs), a four-quadrant gate is a relatively expensive SSM. Below are alternatives to four-quadrant gates:

- Grade separation
- Temporary closure (i.e., nighttime closure)
- Permanent closure
- Shorter gates with medians or channelization devices, also known as traffic separators
- One-way street conversions that allow for a lesser number of gates

Alternative Safety Measures
An Alternative Safety Measure (ASM) is a safety system or procedure provided by the appropriate traffic control authority which, after individual review and analysis, is determined by the FRA to be an effective substitute for the locomotive horn at specific highway-rail grade crossings. ASMs include:

- **Modified SSM** – An SSM that has in some way been adjusted to accommodate unique circumstances existing at a specific street-rail grade crossing that no longer conforms to the SSM requirements.

- **Engineering ASM** – Engineering improvements other than modified SSMs include improvements that address underlying geometric conditions (e.g., sight distance issues) that are a source of increased risk at the crossing.

- **Non-engineering ASM** – Photo enforcement or a consistent and systematic program of traffic enforcement, public education programs, or a combination thereof, that produces a measurable reduction of risk at designated Quiet Zone street-rail grade crossings.

Wayside Horns
One alternative which obviates the need for trains to blow their horns at crossings is installations of automated train horns, also known as wayside horns. These horns are mounted on poles at crossings and directed down the cross streets away from crossings. If they are in place, locomotive engineers do not have to blow their horns at crossings, as the wayside horn will blow automatically as trains approach and accomplish the same task of warning drivers, pedestrians and bicyclists of the oncoming train. Cost and installation of the horns are minor compared to the cost of some of the other improvements. With wayside horns, there is no requirement for new gates.

Strictly speaking, a wayside horn system is not an SSM. A wayside horn may be used in lieu of a locomotive horn at any highway-rail crossing equipped with an active warning system consisting of, at a minimum, flashing lights and gates. A wayside horn can be used within a Quiet Zone.
According to Railroad Controls Ltd. (RCL), a railroad systems engineering firm in Benbrook, Texas, wayside horns follow the same sounding pattern as the train horns, beginning when the train is a distance of a quarter mile from the crossing and continuing until the approaching train enters the grade crossing. Wayside horn systems come with a confirmation signal, typically a flashing light. When the locomotive engineer sees that the confirmation signal is flashing, he will not be required to sound his horn unless he detects an unsafe condition at the grade crossing.

The sound level of train horns is established per federal regulations at 110 decibels. The sound contour of a train horn versus a wayside horn is illustrated in Figure 2.

**Figure 2: Train and Wayside Horn Sound Contours**

While the area affected the wayside horns versus that affected by the train horns may be smaller, the noise will be concentrated at the crossings. Consequently, wayside horns may not be a good solution for some land uses such as for the residences near the crossings in the Quiet Zone.

One potential location for installation of wayside-horns could be on Clay Street. This is the most western crossing in the proposed Quiet Zone. Installation of the horns here would have the least effect on noise sensitive land uses, such as the new residential construction occurring south of east of Broadway and the Waterfront Hotel at the foot of Washington Street. Assuming SSM's at all other crossings, wayside horns here would enable the qualification of the Quiet Zone, as a wayside horn is considered a one-for-one replacement for train mounted horn blowing. The cost of a wayside horn system is estimated at $50,000, thus reducing the estimated cost of a Quiet Zone above by about $1 million.
Potential Pedestrian Safety Measures

As noted, pedestrian safety in the proposed Quiet Zone was a concern expressed by the CPUC. Pedestrian gate arms on new four-quadrant gates (assumed in the gate estimate in Appendix B) would enhance pedestrian safety, as would fencing and barriers at certain points. Median striping and mountable curbs with delineators would also serve as pedestrian deterrents mid-block. Application of such pedestrian safety enhancements should be considered if the City moves ahead with a Quiet Zone implementation in the Jack London Square area.

SECTION 6: PERFORMANCE OF A QUIET ZONE

The purpose of this section is to identify the potential grade crossing improvements – short of SSMs at each crossing – necessary for the qualification of a new Quiet Zone for the City of Oakland. The process for creating a new Quiet Zone as defined by the FRA is attached in Appendix C. In brief, the process requires that the Quiet Zone be qualified by meeting established risk measurements as described in the following section. Once the Quiet Zone is qualified, the local public authority having jurisdiction over traffic enforcement (in this case the City of Oakland) will install identified improvements and signage, submit proper notifications, provide updates to the National Grade Crossing Inventory, and provide periodic updates to the FRA. In addition, a Quiet Zone would require the concurrence of the CPUC, which shares safety oversight for crossings in California with the FRA, and of the UP.

Measurement of Risk

There are three measurements of risk used in the calculation of a Quiet Zone. They are:

- **The Nationwide Significant Risk Threshold (NSRT)**, which is calculated from collision data on a nationwide basis. The NSRT reflects the average level of risk at public highway-rail grade crossings equipped with flashing lights and gates and at which locomotive horns are sounded. The NSRT is routinely recalculated with the most recent update on December 29, 2010, when the NSRT was decreased from 18,775 to 14,007.

- **The Risk Index with Horns (RIWH)**, which is a measure of risk to the motoring public of accidents with trains despite locomotive horns being routinely sounded at every public highway-rail grade crossing within a Quiet Zone.

- **The Quiet Zone Risk Index (QZRI)**, which is the average risk index for all public crossings in a proposed Quiet Zone taking into consideration the increased risk caused by the absence of train horns and any decrease in risk attributable to the use of Supplementary or Alternative Safety Measures. The QZRI is the measurement used to determine if a Quiet Zone can be established and which, if any, improvements will be necessary.

RIWH and QZRI measurements of risk are calculated using the FRA’s Quiet Zone Calculator. The process for running the Calculator is described below. A Quiet Zone may be established if the QZRI is at, or below, the NSRT or the RIWH. The QZRI may be reduced by implementation of approved safety measures which have been rated by the FRA with a risk reduction credit. Using these credits, the QZRI can be reduced to a risk level to qualify for Quiet Zone status.

Use of Approved Safety Measures

The need for FRA approvals to establish a Quiet Zone and the frequency of periodic updates to continue the Quiet Zone will vary with the type of safety measures used. Periodic updates include 1) affirmation that the Quiet Zone continues to conform to the requirements of the Quiet Zone and 2) an up-to-date and accurate
Grade Crossing Inventory Form for each crossing within the Quiet Zone. The requirements for FRA approval and periodic updates fall into the following categories:

- If SSMs were added to the six public crossings in the Jack London Square Quiet Zone, the Quiet Zone would be qualified without additional FRA approval. (This is the scenario outlined in the preceding section.) The necessary improvements and notifications must be made before the horns are silenced. The periodic updates must occur. In addition, every 4½ to 5 years from the time the Quiet Zone is established, the City of Oakland must provide (1) affirmation that the Quiet Zone continues to conform to FRA requirements and (2) updated crossing inventory forms to the FRA. This reporting effort is estimated to consume one to two days of a city staffer's time to perform.  

- If SSMs are used at some but not every public crossing, the zone may also qualify for Quiet Zone status if the QZRI is lower than either the RIWH or the NSRT. If this is true, the Quiet Zone is qualified without additional FRA approval. The necessary improvements and notifications must be made before the horns are silenced. The periodic updates must occur every 2½ to 3 years from the time the Quiet Zone is established. Qualification by this process will require more frequent reporting to the FRA (every 2½ to 3 years) than if SSM's are used at each crossing.

- The QZRI may also be reduced by implementing one or more ASM's. The FRA must approve the use of ASMs and will do so if the QZRI will be reduced to a level at or below the RIWH or NSRT. The public authority must submit estimates of effectiveness for the ASM which may be based upon adjustments from the effectiveness levels provided by the FRA for SSM's or from actual field data derived from the crossing sites. It is recommended that the public authority consult with the FRA if considering the use of ASMs. The periodic updates must occur every 2½ to 3 years from the time the Quiet Zone is established. Affirmations and updated grade crossing inventory forms are required every 2½ to 3 years. The CPUC must also approve the use of any ASM's.

Application of the Quiet Zone Calculator

The FRA's Quiet Zone Calculator develops the QZRI (1) by assessing the risk at each crossing and (2) by averaging the cumulative risk over the number of crossings in a Quiet Zone. The Calculator determines the risk at each crossing given 15 variables:

1. Type of warning device
2. Number of highway vehicles per day
3. Total trains per day
4. Number of through trains per daylight hours
5. Total number of switching trains
6. Number of main tracks
7. Number of other tracks
8. Classification of roadway (urban or rural; arterial, collector, or local)
9. Paved roadway: yes or no
10. Maximum train timetable speed
11. Number of highway lanes
12. Existence of wayside horns
13. Existence of pre-existing SSM's

5 The time estimate was obtained from the City of Elk Grove, which recently completed a status report of its first Quiet Zone to the FRA. Elk Grove has two Quiet Zones and is investigating implementation of a third.
14. Number of years for accident data (5 years; motor vehicle-train accident data only)

15. Number of accidents during accident data years

To assess the risk of an Oakland Quiet Zone under existing conditions, the first 13 variables were entered manually. The Calculator provided the last two variables from a link with other FRA data. The results of the Calculator without improvements for existing conditions appear in Table 3. As shown, the resulting QZRIs are well above the NSRT and RIWH. Therefore, the study crossings today and more so in 2030 would not qualify for Quiet Zone status without the implementation of Supplementary Safety Measures.

<table>
<thead>
<tr>
<th></th>
<th>ADT</th>
<th>Trains/day</th>
<th>Risk</th>
<th>NSRT</th>
<th>RIWH</th>
<th>QZRI</th>
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<tr>
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<td></td>
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<tr>
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<td>61</td>
<td>27,548.21</td>
<td></td>
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<td>Washington Street</td>
<td>865</td>
<td>61</td>
<td>27,070.16</td>
<td></td>
<td></td>
<td></td>
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<td>Broadway</td>
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<td>244,971.69</td>
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<td>61,205.14</td>
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<td>155,800.27</td>
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<td>Oak Street</td>
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<td><strong>Future</strong></td>
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<td></td>
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<td>Clay Street</td>
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<td>32,707.06</td>
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<td>Washington Street</td>
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<td>35,206.18</td>
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<td>69,818.07</td>
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<td>50,883.70</td>
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</tr>
</tbody>
</table>

**Table 3**

Results of the Quiet Zone Calculator without Improvements

**Alternative Quiet Zone Concept**

Prior to evaluating alternative Quiet Zone concepts with the Calculator, a preliminary screening was done to assess the suitability of SSM’s beyond four-quadrant gates. The results of this analysis are shown in Table 4. Because of the lack of alternate access roadways, location of parallel adjacent roadways and the Oakland Estuary, and configuration of the crossings, many of the SSM’s would not be feasible, as discussed below. While wayside horns are not an SSM treatment *per se*, their feasibility is assessed in the table.
### Table 4

Preliminary Screening of SSMs and Wayside Horns beyond Four-Quadrant Gates

<table>
<thead>
<tr>
<th>SSM</th>
<th>Oak Street</th>
<th>Webster Street</th>
<th>Franklin Street</th>
<th>Broadway</th>
<th>Washington Street</th>
<th>Clay Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Separation</td>
<td>Not feasible. Would require either elevation or depression of railroad tracks to preserve street access.</td>
<td>Not feasible. Would require either elevation or depression of railroad tracks to preserve street access.</td>
<td>Not feasible. Would require either elevation or depression of railroad tracks to preserve street access.</td>
<td>Not feasible. Would require either elevation or depression of railroad tracks to preserve street access.</td>
<td>Not feasible. Would require either elevation or depression of railroad tracks to preserve street access.</td>
<td>Not feasible. Would require either elevation or depression of railroad tracks to preserve street access.</td>
</tr>
<tr>
<td>Medians</td>
<td>Not feasible. Would require closure of commercial driveway within 60 feet of gate arm on northwest corridor of crossing.</td>
<td>Not feasible. Would require closure of commercial driveway within 60 feet of gate arm on northwest corridor of crossing.</td>
<td><strong>Feasible</strong>, south of crossing. Unnecessary north of crossing, as Franklin is one-way southbound.</td>
<td><strong>Feasible</strong>, south of crossing. Median exists north of crossing, but a Jack London Inn driveway is within the 60-foot limit.</td>
<td><strong>Feasible</strong>, south of crossing. Not feasible, north of crossing, as parking garage entrance is within the 60-foot limit.</td>
<td>Not feasible. Commercial driveways are within the 60-foot limit.</td>
</tr>
<tr>
<td>Wayside Horns</td>
<td>Not feasible. Too close to housing units</td>
<td>Not feasible. Too close to housing units</td>
<td>Not feasible. Too close to housing units</td>
<td>Not feasible. Too close to housing units</td>
<td>Not feasible. Too close to housing units</td>
<td><strong>Feasible</strong>, closest housing units on 2nd Street and Washington Street</td>
</tr>
</tbody>
</table>
The potential of various SSM’s are discussed below:

- **Grade Separations**: Access to local businesses, the proximity of streets parallel to the Quiet Zone, existing land uses, and the nearness of the Estuary are constraints to grade separations of any of the six streets crossing the UP tracks. Theoretically, the UP tracks could be depressed in a trench or routed onto an elevated structure, but the costs of the former and visual impacts of the latter render these options undesirable, if not infeasible.

- **Street Closures**: SSM’s include temporary and permanent closures. Temporary closures could be done, most practically during nighttime hours. However, temporary closures would require individuals locking gates nightly, and opening them in the morning, and the lack of reliability implied in such a scenario is a fatal flaw. Access for local business makes permanent closures of streets impractical.

- **Medians**: The crossings at Oak Street, Webster Street, Washington Street north of the crossing, and Clay Street all have commercial driveways within 60 feet of the gate arm. According to 49 Code of Federal Regulations (CFR) Part 222.59 these driveways must would need to be closed or relocated, a proposition that will would likely cause problems for the businesses.

It is worth noting that access/egress to/from the below-ground Broadway Garage on Broadway south of the crossing is beyond the 60-foot limit, so a median could be installed there. On the north side, a median exists. However, the Jack London Inn driveway is just within the 60-foot limit. Still, that driveway is “downstream” from the crossing, opening onto northbound lane, and thus such a configuration (with medians on Broadway north and south of the crossing) may qualify as either a Modified SSM (an ASM), obviating another $1 million four-quadrant gate solution there.

Also, access/egress to/from the same garage on Franklin Street south of the tracks (the same garage accessed from Broadway) is just beyond the 60-foot limit and so medians could be installed there, potentially creating another Modified SSM, obviating the need for a four-quadrant gate installation and $1-million in cost there.

- **One-way Streeting**: Webster Street could be made one-way northbound north of the crossing, obviating the need for a four-quadrant gate solution there. Signage would be required preventing a right turn from a parking lot on the west side of Franklin north of the crossing. AC Transit buses regularly use southbound Webster Street to access Embarcadero Street, so bus routes would have to shift west to Franklin Street.

Franklin Street and Broadway could be made one-way as well south of Embarcadero: southbound for Broadway and northbound for Franklin. Under this scenario, a gate could be removed from the southeast quadrant of Broadway, but one more would be needed on the southwest quadrant of Franklin Street. A movable barrier on Broadway at Water Street exists and is in place frequently. This would need to be removed permanently to allow for through movement auto and truck movements from Broadway to Water Street to Franklin Street.

Clay and Washington Streets could also be made one-way streets south of Embarcadero: southbound for Clay and northbound for Washington. Under this scenario, a gate could be removed from the southeast quadrant of Clay Street, but one more would be needed on the southwest quadrant of Washington Street. The Oakland Fire Departments EMS facility is located at the southwest corner of

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6 The distance is 54 feet from the southern edge of the driveway to a point directly across Broadway from the location of the existing gate on Broadway’s southbound lane.
Clay Street and Water Street. With one-way streeting, EMS traffic approaching the facility would do so on Clay Street and exit via Water and Washington Streets.

- **Wayside Horns**: As seen in Figure 2, the sound contour of a wayside horn is limited for the most part to the streets approaching a crossing. There are no housing or hotel/motel units on the approaches to Embarcadero on Clay Street, which make their application there promising. Housing/hotel/motel units exist on or near approaches to the other five crossings.

**Practical Options**

While converting Webster Street to a one-way street northbound north of the crossing is possible, doing so would alter established traffic patterns in the area. Webster is two-way to Webster Place immediate south and below I-880. For this analysis, then, such a modification is considered less than desirable.

Converting Broadway and Franklin Street south of Embarcadero to a one-way couplet is also less than desirable, as motorists enter and exit the Broadway Garage underground parking structure from both streets.

Lastly, converting Clay Street and Washington Streets south of the crossing to a one-way couplet is less than desirable for two reasons. First, it would shift more traffic onto Water and Washington Streets, including all vehicles that park in the lot on the southwest corner of the Clay Street and Embarcadero crossing. Second, it would also restrict access/egress to the Oakland Fire EMS facility at the foot of Clay Street. Water Street would become one-way eastbound. Table 5 shows the traffic that would be diverted given a one-way couplet here. Vehicles currently utilizing northbound Clay Street, primarily to egress from the aforementioned parking lot, would be rerouted to use northbound Washington Street via Water Street.

<table>
<thead>
<tr>
<th>Table 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clay Street-Washington Street One-way Couplet Traffic Diversion</strong></td>
</tr>
<tr>
<td>Street Crossing</td>
</tr>
<tr>
<td>NB Clay Street</td>
</tr>
<tr>
<td>NB Washington Street</td>
</tr>
</tbody>
</table>

Accordingly, the more practical options beyond the all-four-quadrant-gate solution (Option 1) appear as Options 2 and 3 in Table 6. Option 3 was tested by the Quiet Zone Calculator.

<table>
<thead>
<tr>
<th>Table 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summary of Options for an Oakland Quiet Zone</strong></td>
</tr>
<tr>
<td>Oak Street</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Option 1</td>
</tr>
<tr>
<td>Option 2</td>
</tr>
<tr>
<td>Option 3</td>
</tr>
</tbody>
</table>

**Option 2** assumes four-quadrant gates at all Quiet Zone crossings except for Clay Street. At Clay Street, wayside horns would be implemented. This Quiet Zone configuration would qualify for Quiet Zone status: five of the crossing would be equipped with SSM’s, and Clay Street would have wayside horns – a one-of-one substitute for train horns. The cost estimate for this option is notably less than for Option 1.
Option 3 assumes four-quadrant gates at Oak Street, Webster Street, and Broadway, and no SSM’s at Franklin Street, Washington Street and Clay Street, which have lower traffic volumes. The Quiet Zone Risk Indices for this option are lower than the Risk Indices with Horns in both 2011 and 2030, as seen in Table 7. Accordingly, this option would qualify for Quiet Zone status. Of the three options, Option 3 is the low cost option.

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Option 3 Calculator Results</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2011</td>
</tr>
<tr>
<td>NSRT(^7)</td>
<td>14,007.00</td>
</tr>
<tr>
<td>RIWH</td>
<td>56,455.44</td>
</tr>
<tr>
<td>QZRI</td>
<td>32,779.39</td>
</tr>
</tbody>
</table>

A Potential ASM
Reducing costs further would be to install a median on Broadway south of the crossing rather than four-quadrant gates. As noted, the entrance to the Broadway Garage is more than 60 feet from the gate arm on the southeast quadrant and thus a median would be allowable here under the Quiet Zone regulations. Broadway north of the crossing would remain unchanged. The driveway to the Jack London Inn on the northeast quadrant is within 60 feet of where a gate arm on the northeast corner would be, were one to be installed, but the driveway is “downstream” from the crossing, opening onto the northbound lane going away from the crossing.

Such a configuration at Broadway would be an ASM, requiring review and approval by the FRA and more frequent reporting requirements. Still, if approved, it would serve potentially to reduce the cost of a Jack London Square Quiet Zone to $4.7 million.

It is important to note that SSMs (four-quadrant gates) at just Oak Street and Webster Street and no SSMs at the Franklin, Broadway, Washington and Clay generates a QZRI for the six-crossing Quiet Zone of 66,258.86, well above the RIWH. Thus, at a minimum, an FRA-approved ASM would be needed at Broadway.

SECTION 7: NEXT STEPS TOWARD QUIET ZONE IMPLEMENTATION
If the City of Oakland seeks to move forward with a Quiet Zone concept (e.g., Option 1, 2 or 3), the first requirement will be to provide a Notice of Intent to create a new Quiet Zone, which will trigger a 60-day comment period. The Notice of Intent will need to be provided to the railroads that would operate through the Quiet Zone and to the CPUC for their comment. The railroads (UP, BNSF and Amtrak) and the CPUC have 60 days to submit comments.

The Notice of Intent must include five items:

1. A listing of each crossing in the Quiet Zone.

\(^7\) It is not likely that the NSRT for 2011 (14,007.00) will be the same as that of 2030. It may be lower or higher, depending on the national experience with accidents at highway-rail crossings at the time. This variable does not take away from the analysis of Option 3, as the QZRI is still less than the RIWH.
2. A statement of the time period within which horn blowing restrictions would apply (i.e., 24 hours a day).

3. A brief explanation of Oakland’s tentative plans for implementing improvements within the Quiet Zone.

4. The name and title of Oakland’s contact person for the Quiet Zone project.

5. A list of names and addresses of each party that will receive a copy of the Notice of Intent.

Oakland will not be able to establish a Quiet Zone within the 60-day comment period unless the railroads and the CPUC waive their right to provide comment on the Notice of Intent.

After the 60-day comment period, Oakland would be able to issue a Notice of Quiet Zone Establishment. The purpose of this notice is to provide a means for Oakland to formally advise affected parties that a Quiet Zone is being established. The notices must be addressed to the railroads operating through the Quiet Zone, to the CPUC, and to the Assistant Administrator of the FRA. Just as for the Notice of Intent, there are numerous specific items which must be included, all cited in 49 CFR 222 Appendix C Section IV – Required Notifications.

Prior to the establishment of the Quiet Zone, the SSM’s must be designed and installed. As the design is initiated, it is necessary to contact the CPUC to request “Staff for Authorization to Alter a Highway-Rail Crossing Pursuant to General Order 88-B.” GO-88B requires CPUC staff to authorize changes “in the type or addition of an automatic signaling device, crossing gate, crossing flagman or other forms of crossing protection or reduction of hours during which any such protection is maintained, or other minor alterations.”

The CPUC staff will provide information on the GO 88-B process.

It is advisable that a second meeting of all interested parties be held to obtain direct input from the railroads, the CPUC and FRA at the initiation of the design phase. Specifically, this meeting would be to evaluate the proposed modifications to the crossings and identify any other matters that should be addressed as part of the modifications proposed. The City will then be able to determine whether CPUC staff is in agreement with the proposed modifications and allow the other parties to form a basis for providing the required evidence of agreement.

After the modifications are generally agreed to, it will be necessary to complete the GO 88-B authorization request form provided by the CPUC which among other things includes information about the applicant (the City of Oakland), the crossing(s) proposed to be altered, a description of the proposed alterations, a description of the public benefits to be achieved by the proposed alterations, an explanation about why a separation of grades is not practical, a description of the existing and proposed crossing warning devices, a statement of temporary traffic controls to be provided during construction and evidence of agreement among the interested parties.

After the approval is granted by the CPUC, construction of the improvements can be initiated. After construction, an updated crossing inventory form with the description of the crossing devices and conditions needs to be provided to the FRA prior to the implementation of the Quiet Zone.

Once the Quiet Zone has been established, Oakland will need to make periodic affirmations to the FRA that the Quiet Zone continues to operate under the FRA’s regulations and provide updates to the FRA’s crossing inventory form.
APPENDIX A
Quiet Zone Safety Improvement Figures
Pedestrian channelization is needed across tracks and for station platform users.

Provide protection for pedestrians on back-side of counterweights with bollards.

Four-quadrant gates with flashing light signals and bells.

Reconfigure median (may not be necessary with four-quadrant gates).

Install ADA improvements, including truncated domes and curb ramps.

Stripe crosswalk.

Close commercial driveway.

Extend barrier to prevent pedestrian crossing.

Install signage to prevent pedestrian crossing.
Quiet Zone Safety Improvement Figures

Channelization: mountable separation between road and tracks.

Signalize intersection.

Sign to prohibit pedestrian crossing across Embarcadero.

Webster Street Improvements

Install ADA improvements, including truncated domes, curb ramps, and audible signals.

Adequate bus turning radius.

Right turn only sign and stencil.

Four-quadrant gates with flashing light signals and bells.

Install raised median.

North
Franklin Street Improvements

- **Advance warning signs.**
- **Channelization:** mountable separation between road and tracks.
- **No left turn stencil.**
- **Off-quadrant left turn prohibition blank-out sign.**
- **Install ADA improvements, including truncated domes and curb ramps.**
- **Advance warning signs.**
- **Four-quadrant gates with flashing light signals, bells, and side-lights (far-side approach only).**
- **Left turn prohibition blank-out sign facing approaching traffic.**
- **Stripe railroad stencil.**
- **Advance warning signs.**
QUIET ZONE SAFETY IMPROVEMENT FIGURES

Channelization: mountable separation between road and tracks.

Left turn prohibition blank-out sign facing approaching traffic.

Off-quadrant left turn prohibition blank-out sign.

Signalize intersection.

Install ADA improvements, including truncated domes, curb ramps, and audible signals.

Four-quadrant gates with flashing light signals, bells, and side-lights (far-side approach only).

Left turn prohibition blank-out sign facing approaching traffic.

Off-quadrant left turn prohibition blank-out sign.

Accommodate bus turn radius.

Reconfigure loading bays adjacent to street.

Broadway Improvements

WilburSmith ASSOCIATES
Channelization: mountable separation between road and tracks.

Left turn prohibition blank-out sign facing approaching traffic.

Off-quadrant left turn prohibition blank-out sign.

Install ADA improvements, including truncated domes and curb ramps.

Four-quadrant gates with flashing light signals, bells, and side-lights (far-side approach only).

Left turn prohibition blank-out sign facing approaching traffic.

Off-quadrant left turn prohibition blank-out sign.
QUIET ZONE SAFETY IMPROVEMENT FIGURES

**Clay Street Improvements**

- Channelization: mountable separation between road and tracks. Additional curbing, delineation or reflective treatments should be considered to prevent driving on tracks.

- Accommodate heavy vehicle left turn.

- Left turn prohibition blank-out sign facing approaching traffic.

- Off-quadrant left turn prohibition blank-out sign.

- Install ADA improvements, including truncated domes and curb ramps.

- Stripe crosswalk.

- Four-quadrant gates with flashing light signals, bells, and side-lights (far-side approach only).

- Left turn prohibition blank-out sign facing approaching traffic.

- Off-quadrant left turn prohibition blank-out sign.
APPENDIX B
Quiet Zone Safety Improvement
Conceptual Cost Estimates
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<tr>
<th>Item Description</th>
<th>Units</th>
<th>Quantity</th>
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<td>Signize intersection</td>
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APPENDIX C
FRA Process for Creating a New Quiet Zone
APPENDIX C
FRA Process for Creating a New Quiet Zone
Chart 3 - Creating a New Quiet Zone or New Partial Quiet Zone using SSMs

Select crossings for inclusion in QZ → Obtain cooperation from all affected jurisdictions → QZ must be at least 1/2 mile long → Install gates and lights at all public crossings

Pvt xings with public access and/or pedestrian xings included?

- yes → Conduct diagnostic team review → Comply with diagnostic team's recommendations
- no → Update National Inventory to reflect existing conditions

Update National Inventory to reflect existing conditions

Submit Notice of Intent to Create New QZ

QZRI < NSRT?

- yes → QZs established on this basis subject to annual review → Send affirmation and updated inventory form to FRA every 2.5-3 yrs
- no → Install SSMs

Install SSMs

SSMs at every public xing?

- yes → Update National Inventory → Submit notification, silence horns, and install signage at all crossings → Send affirmation and updated inventory form to FRA every 4.5-5 yrs
- no → QZRI ≤ RiWH OR QZRI < NSRT?

QZRI ≤ RiWH OR QZRI < NSRT?

- yes → Update National Inventory → Submit notification, silence horns, and install signage at all crossings → Send affirmation and updated inventory form to FRA every 2.5-3 yrs
- no → ASM use requires FRA approval → Go to Chart 4A

Disclaimer: This summary of the rule is for informational purposes only. Entities subject to the rule should refer to the rule text as published in the Federal Register on August 17, 2006. Should any portion of this summary conflict with the rule, the language of the rule shall govern.
Chart 4A - Creating a Quiet Zone using Modified SSMs

from Charts 1B, 3

Only SSMs or Modified SSMs used?

no → go to chart 4B

yes → Determine effectiveness of proposed modified SSMs

Proposed QZRI ≤ RIWH or QZRI < NSRT?

no

yes → Send application to FRA and parties, include analysis and data

FRA approved?

no → Not qualified

yes → Install SSMs, modified SSMs

Qualified

Update National Inventory

Submit notification, silence horns, and install signage at all crossings

Send affirmation and updated inventory form to FRA every 2.5-3 yrs

Strongly advised to consult FRA

QZs established on the basis of comparison with the NSRT subject to annual review

FAQ:

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Conduct field study to obtain baseline violation rate

Implement ASM

Conduct field study to monitor change in violation rate (initial Violation Rate)

Determine ASM's effectiveness

Make improvements; install SSM's, modified SSM's

QZ < RIWH OR QZRI < NSRT

Send application to FRA and parties, include analysis and data

FRA approved?

Qualified!

Complete installation of SSM's, engineering ASMs

Update National Inventory

Submit notification, silence horns, and install signage at all crossings

Send affirmation and updated inventory form to FRA every 2.5-3 yrs

From Chart 4A...

QZs established on the basis of comparison with the NSRT are subject to annual review

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Chart 4C: Creating a Quiet Zone using non-engineering ASMs

From Chart 4A

- Develop plan for implementation and monitoring of ASM program
- Conduct field study to obtain baseline violation rate
- Implement ASM
- Conduct field study to monitor change in violation rate (initial Violation Rate)
- Determine ASM's effectiveness
- Make improvements; install SSMs, modified SSMs
- QZRI < RIWH or QZRI < NSRT
- FRA approved?
- Apply to FRA, include analysis and data
- Complete installation of SSM's, engineering ASMs
- Update National Inventory
- Notify Parties, silence horns, and install signage at all crossings
- Send affirmation and updated inventory form to FRA every 2.5-3 yrs

Qualified

Not qualified

QZs established on the basis of comparison with NSRT subject to annual review

Strongly advised to consult with FRA

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