

ORANGE COUNTY RAIL CROSSING SAFETY: SNAPSHOT OF A PROCESS

SUMMARY

Metrolink operates the commuter rail system that serves the Southern California region. It was established in 1991 as the Southern California Regional Rail Authority (SCRRA) in the counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura as a joint five-county venture. Today, three and a half million passengers use this service annually in Orange County. A substantial increase in the number of Metrolink trains that run through Orange County (one in each direction every 30 minutes) on the Orange County Line (from Los Angeles to Oceanside) is expected within the next three to five years, in addition to the existing Amtrak service to San Diego, on this corridor. This is expected to significantly impact the number of potential accidents at the 64 highway-rail grade crossings in Orange County.

The Orange County Transportation Authority (OCTA), the entity that partially funds Metrolink and oversees all Metrolink rail corridor services in Orange County, has undertaken a program to upgrade these grade crossings with a goal to reduce potential collisions. The purpose of this study is to examine the steps taken in this process and to summarize the progress of the program.

REASON FOR INVESTIGATION

The proposed increase in Metrolink service presents a challenge to all the organizations involved in this process. The upgrading of the grade crossings in a timely fashion, to knit seamlessly with the upgrade in commuter train service, presents the following questions:

- 1) Does the OCTA have the capacity to complete the construction in a timely fashion?
- 2) Will the proposed grade crossing treatments provide safe interaction between motorists, bicyclists, pedestrians and rail traffic?
- 3) How will the cost be shared between the OCTA and the impacted cities?
- 4) How will the cost of liability insurance be shared or assumed by the various parties?
- 5) What steps will be taken to mitigate the environmental impact of increased train service, and the noise associated with that service, particularly train warning horns at grade crossings?
- 6) How will the OCTA educate the public on the impact of this increase in service?

METHOD OF STUDY

The method of study included a review by the Grand Jury of the original Korve Grade Crossing Study engineering plan prepared for the OCTA in December of 2003. An exploratory meeting was conducted with selected staff members of the OCTA and led to a further series of interviews with the planning/engineering staffs of the following cities:

- Anaheim
- Fullerton
- Dana Point
- Irvine
- Orange

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- San Clemente
- San Juan Capistrano
- Santa Ana
- Tustin

Each of these meetings focused on the problems and viewpoints of individual cities with regard to grade crossing safety and Quiet Zone implementation. Quiet Zones typically include grade crossing treatments that eliminate the need to routinely sound train warning horns when approaching a crossing. Further interviews included members of private engineering and construction firms, Metrolink planning personnel and operating crews, Operation Lifesaver trainers, representatives of the California Public Utilities Commission, the Southern California Regional Rail Safety Team, and elected officials. The Grand Jury reviewed current upgraded diagnostic reports on all at-grade crossings in Orange County generated by teams from these agencies, as well as observing one in the field. A number of relevant websites on the internet were also reviewed.

BACKGROUND

There are three railroad subdivisions or “subs” (a geographic segment of track between two specific points) in Orange County that have Metrolink rail passenger service.

See Appendix 1: OCTA Map

The San Bernardino Subdivision is owned and operated by the BNSF Railway (formerly known as the Burlington Northern Santa Fe Railway). It connects San Bernardino to Los Angeles and in Orange County runs east-west from the Los Angeles County line through Buena Park, Fullerton, Placentia, Anaheim Canyon, and then to the Riverside County line before the city of Corona. Metrolink trains to and from Oceanside and Riverside to Los Angeles operate on this subdivision.

The OCTA is the property owner of the Orange and Olive Subdivisions. The Orange sub runs from Fullerton Junction in east Fullerton, southeastward through Anaheim, Orange, Santa Ana, Tustin, Irvine, San Juan Capistrano, Dana Point, and San Clemente to the San Diego County line. The Olive sub runs from the San Bernardino sub at Atwood in Placentia southward to a connection with the Orange sub in the city of Orange. Metrolink trains running between Riverside and Oceanside and between Oceanside and Los Angeles operate on these subdivisions. There are 64 at-grade rail crossings on these corridors.

The OCTA sponsored a report by the Korve Engineering Co. of Irvine, California, which was completed in December of 2003. The report inventoried the current automatic warning devices and other safety and protection equipment used at each crossing and provided recommendations and enhancements for both motorist and pedestrian safety. Finally, the report provided a ranking of the enhancements based on their impact to safety and a cost-benefit analysis.

The various treatments for upgrading railroad crossings in Orange County can be categorized into three groupings:

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- Tier 1 – the recommendations included in the Korve study,
- Tier 2 – city requested betterment and cosmetic improvements; and
- Tier 3 – Quiet Zone applications.

According to the Korve study there are two grade crossing treatment categories: Bicyclist-Pedestrian and Motorist.

Bicyclist-Pedestrian Treatments include the:

- installation of sidewalks to keep pedestrians out of the roadway;
- delineation of the dynamic envelope to inform pedestrians of the danger area (signs);
- pedestrian automatic gates to provide a physical barrier preventing individuals from encroaching on the tracks; and
- pedestrian channelization to guide individuals to a safe crossing location.

Motorist Treatments are further sub-categorized as:

- Crossing Geometry and Condition Treatments;
- Drive –Around Treatments; and
- Motor Vehicle on Trackway Treatments.

Crossing Geometry and Condition Treatments include:

- increasing sight distance to maximize visibility for crossing users to see warning devices on the approach to the crossing and to see approaching trains (ensuring that trees and other obstructions do not block motorists from seeing warning signs);
- improving crossing surfaces and maintaining paving surfaces consistent with the original application to encourage motorists to drive at safe posted speeds and not slow down for rough crossings;
- reapplying pavement markings at crossings when they have worn out; and
- improving signage to deter motorists from stopping on grade crossings.

Drive-Around Treatments include:

- installing raised medians to deter motorists from driving around lowered crossing gates;
- installing large pavement buttons or flexible bollards where raised medians are not possible due to roadway geometry; and
- installing four-quadrant gates to deter motorists from driving around crossing gates.

Motor Vehicles on Trackway Treatments include:

- installing additional side facing flashing light signals on driveways and parallel streets that are adjacent to the tracks;
- adding additional median flashing light signals or cantilever lights over the highway;
- replacing 8-inch flashing lights with 12-inch lights;
- upgrading signal preemption at crossings where the tracks diagonally cross two streets;
- relocating bus stops to reduce queuing across railroad tracks; and

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- installing pre-signals where clear storage of vehicles is not possible between crossings and the space between the downstream traffic signal and the track is less than the length of the vehicle.

This original study formed a baseline of safety for the motorist, bicyclists-pedestrians, and Metrolink travelers in Orange County. The estimated total cost of all crossing enhancements was \$20,842,500. The results of the study were sent to each of the cities affected along the three corridors for their comments and responses. These were all included in the Korve Study. Part of the understanding of this study was that the OCTA would fund approximately 88% of the costs to implement the enhancements and each affected city would fund the balance. These improvements are identified as Tier 1.

Between April and December 2006, the OCTA, Metrolink, a team of consulting engineers and the individual cities involved held diagnostic meetings at each rail crossing to improve the Tier 1 recommendations and to further identify “betterment” or cosmetic upgrades, not related to crossing safety, to be funded at the city’s expense. These additional upgrades are considered to be Tier 2 modifications by the impacted cities; however, the OCTA refers to them as improved Tier 1. The Grand Jury attended one diagnostic meeting and reported a broad and robust discussion at the grade-crossing site. Each Tier 1 recommendation was reviewed, and the affected city concerns and ideas were incorporated into the final diagnostic. Each diagnostic meeting included an introduction and review of existing conditions. Future problems were discussed and proposed alternatives reported. The Grand Jury noticed that the team remained at the site until all concerns were addressed and consensus was reached. In the case of the above, there was a final report issued by the engineering consultant in December of 2006, which included four alternatives with estimated costs ranging from a \$22.4 million grade-separated proposal to the recommended alternative proposal at \$1.2 million.

These meetings resulted in enhanced safety modifications for each of the at-grade crossings, which by this time had been reduced to 56 because several cities had independently undertaken grade crossing separation projects. A grade crossing separation project is one that includes a bridge over or under the railroad. Other areas not addressed by the original study, but which were included in the Tier 2 modifications, were improved bicycle and pedestrian crossings. The establishment of scope and cost estimates of enhancements, leading to a memorandum of understanding (MOU, a document that sets forth an agreement between two parties) between OCTA/Metrolink and each impacted city, was the final step in this process.

According to the master schedule of the OCTA/SCRRA Orange County Grade Crossing Safety Enhancement Program, all of the affected cities on the three railroad lines in Orange County should have completed MOUs by mid-January 2007. After this, four contract packages will be awarded, covering: (1) design/bidding phase, (2) Public Utilities Commission Application and Approval, and finally, (3) construction phase. The entire program is scheduled to be completed in mid-August 2008, at the same time the rolling stock is begins to arrive from the builders. The locomotives will begin to arrive at the end of 2007 and 150 passenger cars over the next two years. The 30-minute service plan is

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scheduled to begin in 2010. If this deadline is met, it is anticipated that the public will be well protected from grade crossing accidents.

Among the many upgrades proposed for each site at the diagnostic meetings, a foundation for Tier 3 or Quiet Zone was discussed. Tier 3 or Quiet Zone is grade-crossing treatments that eliminate the need for trains to sound their horns in warning on the approach to the crossing. Current Federal Railway Administration (FRA) rules require trains approaching a grade crossing to sound their horns in warning with a designated signal. The standard horn warning is two long honks of the horn, a short honk and a long honk continuing until the lead unit of the train is in the crossing. Despite the nostalgia for the lonely train whistle, with the increased amount of traffic on the affected lines and the expanded hours of operation for Metrolink trains, this cacophony has the potential to seriously degrade the environment for those who live close to any busy grade crossing, particularly in the evening hours.

The FRA's Final Train Home Rule of June 24, 2005 outlines two types of safety improvement options for upgrading a Quiet Zone to meet FRA safety standards: Supplemental Safety Measures (SSMs) and Alternative Safety Measures (ASMs). Supplemental Safety Measures include:

- Four-Quadrant Gate Systems;
- Medians or Channelization Devices;
- One-Way Streets with Gates; and
- Permanent Closure.

Alternative Safety Measures include:

- Modified SSMs (i.e., Non-Complying Medians, Three-Quadrant Gates, etc.);
- Engineered ASMs (i.e., Geometric Improvements); and
- Non-Engineered ASMs (i.e., Programmed Enforcement, Photo Enforcement, Education, etc.).

For example: To install a Quiet Zone treatment in the City of Orange there are two possible solutions: (1) install exit gates in both directions of a four quadrant gate system or (2) install a minimum raised island median at least 60 feet long and provide automatic gates on the approaches of each crossing. The City of Orange has requested that quiet zone applications be implemented for all the 16 grade-crossings in that city. The cost of this work is estimated at slightly more than \$17 million. The upgraded diagnostics have added increased costs to each of the grade crossings. Quiet Zone applications will add further to these costs. The chart below compares the costs with the enhanced Tier 1 diagnostics with Orange opting for Tier 3 Quiet Zone applications. The current OCTA Board has no Quiet Zone funding policy and all Quiet Zone applications are city sponsored. The recent passage of the Measure M extension begins in 2011. It includes an allowable but not required option for Quiet Zone funding.

Orange County Grade Crossing Improvement Program Summary

| | Improved Tier 1 Costs | | Draft Estimate Quiet Zone Costs* | |
|---------------------|-----------------------|------------|----------------------------------|---------------------|
| | | | Low End | High End |
| Anaheim | \$8,207,550 | note ** | \$34,155 | \$296,010 |
| Orange | \$16,592,050 | | \$637,560 | \$3,853,731 |
| Santa Ana | \$11,178,000 | | \$1,082,030 | \$2,504,700 |
| Tustin | \$879,750 | | \$557,865 | \$557,865 |
| Dana Point | \$703,800 | | \$455,400 | \$455,400 |
| Fullerton | \$2,711,700 | | \$284,625 | \$284,625 |
| Irvine | \$1,633,799 | | \$0 | \$1,129,920 |
| San Juan Capistrano | \$3,701,984 | | \$1,129,920 | \$1,129,920 |
| San Clemente | \$99,936 | | \$1,153,460 | \$1,153,460 |
| Total | \$45,708,569 | | \$5,335,015 | \$11,365,631 |

* **Note***: These costs are in addition to tier 1 costs.

* **Note ****: This figure includes \$4,719,600 in potential pedestrian gate costs

As of this writing, the OCTA Board has not set a Quiet Zone policy.

OBSERVATIONS

The interviews conducted by the Grand Jury included items such as the construction capacity of the potential firms which might be engaged in upgrading the grade crossings. The OCTA documents envision four contract packages with the construction phases beginning during late summer 2007 and completing a year later during the fall of 2008. It is anticipated that the rolling stock would begin arriving at about the same time. In a perfect world this seamless knitting of construction and service upgrade would be the ideal situation; however, evidence indicates that slippage in completion dates has already occurred.

Other interviews have raised questions on the costs of these proposed treatments. The original study estimated slightly over \$20 million for Tier 1 treatments for the original 64 crossings. At this time the improved Tier 1 treatments are indicated to cost over \$45 million, including Orange’s requested Tier 3 treatments. In the original program the OCTA had offered to fund approximately 88% of the costs; with Tier 2 and Tier 3 diagnostics now adding substantially to the cost; the question is whether the OCTA will maintain their commitment to fund the previously allocated amounts or hold at the previously allocated 88% funding commitment.

Other concerns expressed by elected officials include who will pay for the liability insurance of these grade crossings? The SCRRA maintains liability insurance for the Metrolink system. The costs of insurance are borne by all of SCRRA member agencies, including the OCTA, on an “all share basis” and are allocated to each county on a train-mile basis. Therefore, the more service in a county, the more train-miles, and the higher the percentage of cost that is paid by the county. If Quiet Zone applications are adopted by a city and it results in an increase in SCRRA’s insurance premium, the city would have to pay the incremental cost.

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A final concern expressed in interviews questions the role of educating the public about the potential danger that an increase in Metrolink service may incur. Metrolink has a Rail Safety Education program that visits schools and community organizations, and in concert with Operation Lifesaver, an organization supported by the railroads that utilizes volunteers, makes the public aware of the dangers of grade crossings and trespassing on railroad property. The various private (BNSF, Union Pacific, Pacific Harbor Lines) and public railroads (OCTA/Metrolink, Los Angeles Metro) meet monthly to discuss safety concerns and problems and look to mutually agreed solutions. This panel is unique in the industry. With the increase in service by Metrolink, a parallel increase in public education should be examined by the OCTA.

COMMENDATIONS

The staff of the Orange County Transportation Authority and Metrolink is to be commended for their refreshing openness and transparency of process that should serve as a model for other agencies. The OCTA-Metrolink team has a comprehensive program to upgrade 56 railroad crossings in Orange County that will strongly enhance the safety of Metrolink riders, motorists, pedestrians and bicyclists.

FINDINGS

In accordance with California Penal Code sections 933 and 933.05, each finding will be responded to by the government entity to which it is addressed. The responses are to be submitted to the Presiding Judge of the Superior Court. The 2006-2007 Orange County Grand Jury has arrived at the following findings:

F-1. The engineering firms involved in rail crossing safety have a strong record of accomplishment in this process and the capacity to complete this project in a timely fashion does not seem seriously in doubt; however, the OCTA has fallen behind in their schedule.

F-2. Impacted cities are strongly concerned about noise from OCTA/Metrolink train horns at railroad crossings. The cost of totally eliminating train horns county-wide through quiet zone corridor treatments of could be in the range of \$50-\$60 million.

F-3. It is unclear how the burden of cost for upgraded crossings will be shared by the OCTA and impacted cities.

F-4. OCTA/Metrolink has an excellent safety program to inform the public on issues of concern to the public, including first-responder teams.

Responses to Findings F-1 through F-4 are required from the Orange County Transportation Authority Board of Directors.

Responses to Findings F2 and F-3 are required from the city councils of Anaheim, Fullerton, Dana Point, Irvine, Orange, San Clemente, San Juan Capistrano, Santa Ana and Tustin.

RECOMMENDATIONS

In accordance with California Penal Code sections 933 and 933.05, each finding will be responded to by the government entity to which it is addressed. The responses are to be submitted to the Presiding Judge of the Superior Court. The 2006-2007 Orange County Grand Jury has arrived at the following findings:

R-1. The work proposed by the OCTA has fallen behind schedule. The OCTA should work with the affected entities to complete the construction on schedule by finalizing the various memoranda of understanding with impacted cities and vigorously proceed with the succeeding steps.

R-2. The OCTA should create a comprehensive Quiet Zone program to preserve the quality of the environment and property values adjacent to railroad tracks. If the OCTA can mitigate freeway noise with sound walls to preserve the quality of life adjacent to freeways, alternative public transportation modes that may negatively impact the environment and property values should also receive comparable considerations, such as Quiet Zone applications.

R-3. The burden of construction and inspection costs for these grade crossing treatments needs to be shared by the OCTA and impacted cities according to an agreed formula.

R-4. A timely and robust rail-safety education program in conjunction with Metrolink will have to be mounted by the OCTA, in various languages, to make the public aware of the increased service and potential risk at grade-crossings, and to counteract trespassing on railroad property. The upgrade in Metrolink service is unprecedented in local history and the impacted public should be made aware of the potential problems this may cause.

Responses to Recommendations R-1 through R-4 are required from the Orange County Transportation Authority Board of Directors

A Response to Recommendation R-3 is required from the city councils of Anaheim, Fullerton, Dana Point, Irvine, Orange, San Clemente, San Juan Capistrano, Santa Ana and Tustin.

REQUIRED RESPONSES

The California Penal Code specifies the required permissible responses to the findings and recommendations contained in this report. The specific sections are quoted below:

§933.05(a) For purposes of subdivision (b) of Section 933, as to each grand jury finding, the responding person or entity shall indicate one of the following:

- (1) The respondent agrees with the finding.
- (2) The respondent disagrees wholly or partially with the finding, in which case the response shall specify the portion of the finding that is disputed and shall include an explanation of the reasons therefore.

(b) For purposes of subdivision (b) of Section 933, as to each grand jury recommendation, the responding person or entity shall report one of the following actions:

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- (1) The recommendation has been implemented, with a summary regarding the implemented action.
- (2) The recommendation has not yet been implemented, but will be implemented in the future, with a timeframe for implementation.
- (3) The recommendation requires further analysis, with an explanation and the scope and parameters of an analysis or study, and a timeframe for the matter to be prepared for discussion by the officer or head of the agency or department being investigated or reviewed, including the governing body of the public agency when applicable. This timeframe shall not exceed six months from the date of publication of the grand jury report.
- (4) The recommendation will not be implemented because it is not warranted or is not reasonable, with an explanation therefore.

GLOSSARY

1. *Quiet Zone*: A corridor of railroad at least one-half mile in length equipped with grade crossing treatments that eliminate the need for the routine sounding train warning horns.
2. *Subdivisions (or "subs")*: A geographic segment of track between two specific points.
3. *Betterment or cosmetic upgrades*: Beautification treatments not related to safety.
4. *Grade-crossing separation projects*: Generally a bridge over or under a railroad that separates the railroad right-of-way from other cross traffic.
5. *Delineation of the dynamic envelope*: Signs and warning signals that inform pedestrians, bicyclists and motorists of the danger of grade crossings.
6. *Channelization*: Fences and other devices that direct individuals to a safe crossing location.
7. *Increasing sight distance*: Clearing obstructions that would hide safety warning devices and signage.
8. *Raised medians*: Curbs or barriers that prevent motorists from changing lanes at grade-crossings.
9. *Flexible bollards*: Rubber or soft plastic vertical "posts" that enhance medians and channelization of motorists.
10. *Four-quadrant grades*: Crossing grades that protect both the upstream and downstream highways and prevents "drive-around" violations.
11. *Signal preemption*: Signals that turn red at intersections adjacent to crossings at the approach of a train.
12. *Federal Railroad Administration's Final Train Home Rule of June 24, 2005*: A series of rules for the applications of Quiet Zones.
13. *Rolling Stock*: Locomotives and passenger cars.

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Appendix 1: OCTA Map

