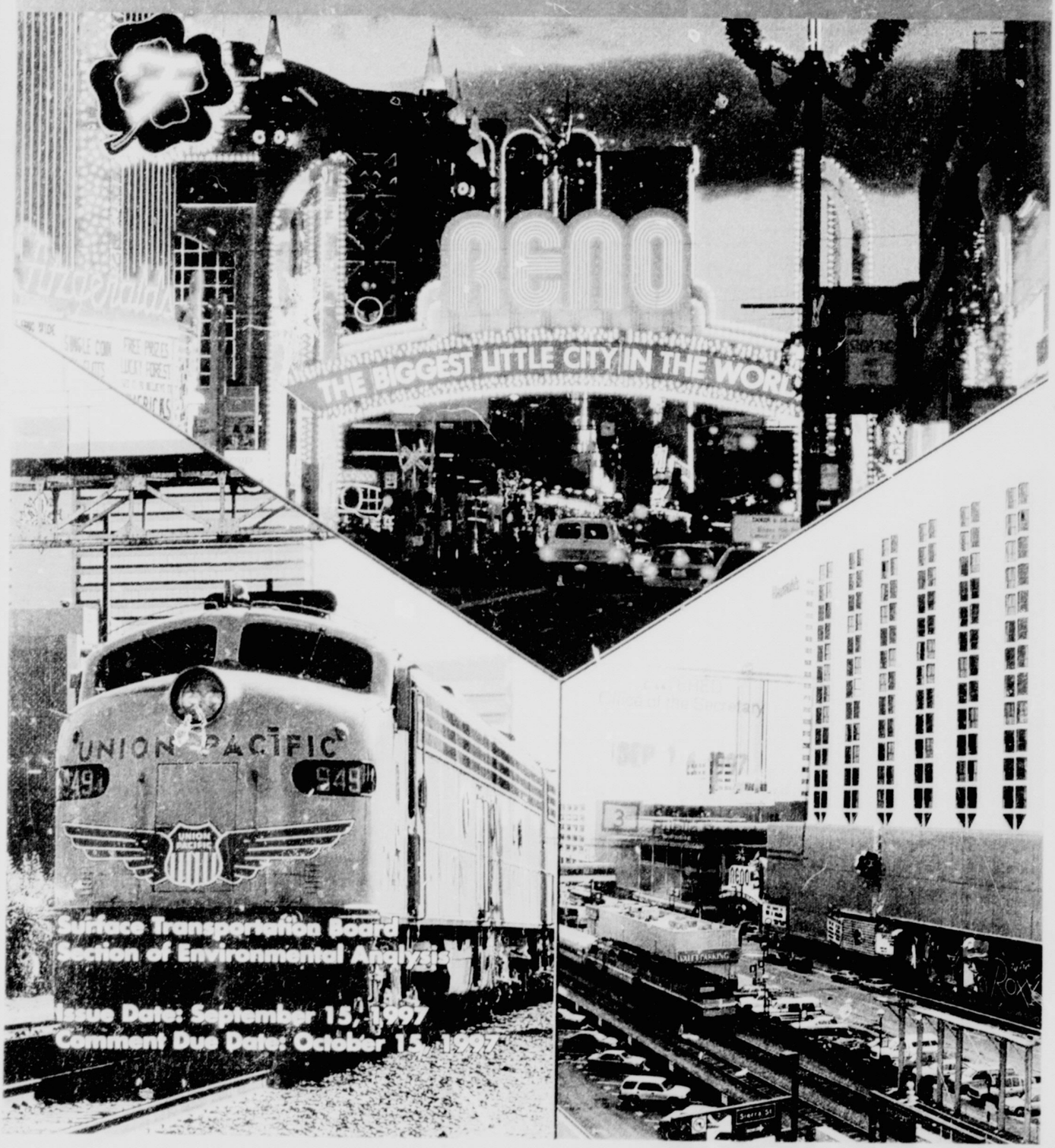
UP/SP Merger—Reno Mitigation Study

Preliminary Mitigation Plan

Reno, Nevada—September 1997



Surface Transportation Board
Section of Environmental Analysis

Issue Date: September 15, 1997
Comment Due Date: October 15, 1997

SURFACE TRANSPORTATION BOARD
Washington, DC 20423

Section of Environmental Analysis

September 15, 1997

Re: Finance Docket No. 32760, Union Pacific/Southern Pacific Merger; Issuance of Reno Mitigation Study Preliminary Mitigation Plan.

To: Interested Parties

The Section of Environmental Analysis (SEA) is pleased to provide you with the attached Preliminary Mitigation Plan (PMP) for the City of Reno and Washoe County. This PMP has been prepared by SEA pursuant to an 18-month mitigation study ordered by the Surface Transportation Board (Board) as a condition of its August 12, 1996 approval of the Union Pacific/Southern Pacific (UP/SP) merger.

SEA invites public review and comment on the PMP. All recommendations made by SEA in the PMP are **preliminary**. After considering public comments on the PMP, SEA will prepare the Final Mitigation Plan (FMP) for public review and comment. After full consideration of comments on the PMP and FMP, SEA will then make its final recommendations to the Board. The Board will make its decision after considering both the PMP and FMP, the final recommendations of SEA, and the public comments.

In order to accommodate all the citizens of Reno, two public information meetings will be held on October 9, 1997 to discuss and receive comments on the PMP. Both meetings will be held at Reno City Hall, 490 South Center Street, Reno, NV, and will provide the same information. The afternoon meeting will include an informal open house from 1:30 - 2:30 p.m., followed by a presentation and formal public meeting beginning at 2:30 p.m. The evening meeting will include an informal open house from 6:00 p.m. - 7:00 p.m., and a formal public meeting beginning at 7:00 p.m.

SEA acknowledges and appreciates all the efforts of interested parties involved in the PMP process. The PMP incorporates comments and recommendations received from many Federal, state, and local agencies, community leaders, business interests, the Union Pacific, and interested citizens. SEA invites you to submit specific written comments on the proposed environmental mitigation measures and the PMP. In addition to distributing copies of the PMP to interested parties, SEA has also made available copies of the PMP at the Reno and Sparks branches of the Washoe County Public Library.

Your written comments must be submitted to SEA by October 15, 1997, the close of the 30-day public comment period for the PMP.

To file comments please submit an original plus 10 copies to the Board at the following address:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, DC 20423-0001

Attn: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing - Reno

Thank you for your continued interest and participation in the mitigation study.

Sincerely yours,

Elaine K. Kaiser

Elaine K. Kaiser
Chief
Section of Environmental Analysis

EXECUTIVE SUMMARY

This report is the Preliminary Mitigation Plan (PMP) for the Union Pacific (UP) and Southern Pacific (SP) merger Reno Mitigation Study. It presents the history and background of the mitigation study, a description of activities performed, and a discussion of how the mitigation study team developed and evaluated potential environmental impacts and possible mitigation measures for merger-related increases in rail traffic in Reno and Washoe County. In this PMP, the Surface Transportation Board's (Board) Section of Environmental Analysis (SEA) makes **preliminary** recommendations for additional mitigation measures beyond those already imposed by the Board as part of the merger approval. SEA will consider all public comments on the PMP and issue a Final Mitigation Plan (FMP) for public review and comment prior to making its final recommendation to the Board. The Board will then decide what additional mitigation measures (if any) to impose on UP as part of the UP/SP merger.

Study Background

On August 12, 1996, the Board approved the UP/SP merger. During the merger review process, SEA issued an environmental assessment (EA) and a post environmental assessment (Post EA) that evaluated the potential environmental impacts associated with merger-related increases in train traffic in Reno and Washoe County. As a result of its environmental review, the Board concluded that the UP/SP merger would not have a significant impact on the quality of the human environment in areas affected by the merger as long as certain conditions were imposed as part of the merger approval.

In its Decision No. 44 approving the UP/SP merger, the Board imposed a number of conditions, including environmental conditions recommended by SEA. Among these conditions was Condition No. 22 requiring SEA to conduct an additional 18-month mitigation study in Reno, Nevada. The purpose of requiring the study was to develop additional mitigation measures, in addition to those system-wide and corridor-specific environmental mitigation measures already imposed in Decision No. 44, that are specifically tailored to address the unique circumstances of Reno, Washoe County, and the surrounding area encompassing the former SP rail line. The Board clearly stated that the study should focus only on *merger-related* train traffic and that "[m]itigation of conditions resulting from the preexisting development of hotels, casinos, and other tourist-oriented businesses on both sides of the existing SP rail line in Reno . . . are not within the scope of the [study]."

The Board has broad authority to impose conditions in railroad merger cases, but its power is not limitless. Any conditions imposed by the Board must be reasonable and must address issues directly related to the merger.

The National Environmental Policy Act (NEPA) requires that agencies take a "hard look" at the environmental consequences of their decisions, and this directive served as SEA's guide in conducting the Reno Mitigation Study (see Section 2).

Public Outreach

In October 1996, the SEA study team instituted a comprehensive public outreach program to parallel the study's technical activities. This program included the establishment of a diverse Reno Mitigation Task Force (which met monthly), consultation meetings with agency and elected officials and community leaders, and public meetings and open houses with extensive noticing, distribution of information materials, and media coverage. Key issues raised by the public focus on the potential environmental impacts of increased rail traffic (including traffic delay, vehicular and pedestrian delay and safety, hazardous materials transport, emergency vehicle access, and biological, air quality, and noise/vibration impacts); advantages and disadvantages of various proposed mitigation measures; Native American issues; business-related impacts; funding options; and study methodology and data.

SEA invites the public to review and comment on this PMP and on the FMP when it is issued.

Elected officials and staff members representing the City of Reno and Washoe County played an important role throughout the mitigation study, by providing frequent feedback and correspondence and participating regularly in task force meetings and the SEA study team's technical data gathering. The City of Reno filed a mandamus action in district court seeking to compel the Board to utilize Environmental Impact Statement procedures during the Reno Mitigation Study. Although this mandamus action was dismissed by the district court, the City of Reno has appealed the court's decision and has also filed in Federal court an environmental challenge of Decision No. 44. This challenge is currently pending in the Washington, D.C. U.S. Circuit Court of Appeals.

Throughout the mitigation study process, SEA has encouraged a privately negotiated resolution among UP and interested local parties. From February through June 1997, the City of Reno and UP were conducting negotiations to explore the feasibility and funding of building a depressed rail corridor through downtown Reno. As a result of differences over funding issues, the City of Reno withdrew from the negotiations in June 1997. In July, UP notified Reno officials that the City was welcome to participate in discussions that UP planned to pursue with downtown business interests. To date, there are no agreements between UP and the City of Reno (see Section 2).

Study Overview

SEA and its independent third-party contractor, which operated under the full direction and oversight of SEA, conducted the Reno Mitigation Study in three phases. During Phase 1, SEA collected necessary data, identified preliminary mitigation options, developed evaluation criteria, and conducted public outreach activities to identify key issues and concerns. During Phase 2, SEA evaluated potential merger-related environmental impacts and preliminary mitigation options and prepared this PMP for public review. During Phase 3, SEA will consider public comments and prepare a FMP, solicit additional public comments, and prepare final recommendations to the Board. Based on the full public record, SEA's recommendations, and public input, the Board is scheduled to review this issue in January or February 1998 and make its decision regarding what additional environmental mitigation measures (if any) to impose upon UP.

Reno Background Information: SEA's evaluation during the mitigation study included careful consideration of the historical background of the Reno and Washoe County area, local population and demographic characteristics, community events and characteristics, and the location of potential environmental impacts to residences and businesses. The analysis summarizes the extent of hotel/casino development that occurred north of the rail right-of-way since 1970, which specifically included an addition of approximately 6,000 hotel rooms. The SEA study team performed a detailed review of Reno's planning policies as outlined by the City of Reno and the Reno Redevelopment Agency (see Section 3).

UP Train Activities: Railroad operations that are the subject of the mitigation study include those activities on UP's (formerly SP's) Central Corridor route that bisects Reno and Washoe County. Although the UP/SP merger proposes to increase average daily train traffic by approximately 11.3 trains per day, Decision No. 44 places a limit on the increase in the number of freight trains allowed through Reno during the 18-month mitigation study. This limit is no more than a daily average count of 14.7 freight trains per day, which represents the 1995 baseline average of 12.7 trains per day plus an average of two additional freight trains. This train cap essentially preserves the environmental status quo in Reno during the mitigation study (see Section 4).

Data Collection: Contacting numerous agencies, associations, businesses, elected officials and UP representatives, the study team collected extensive data during Phases 1 and 2 of the Reno Mitigation Study. In addition to reviewing existing data, the SEA study team conducted field work in early 1997. This data collection followed the floods that required UP to temporarily close its parallel Feather River rail route on an emergency basis and to increase the number of trains passing through Reno and Washoe County. The emergency conditions provided SEA with an opportunity to directly observe and assess the effects of train traffic at a level approaching post-merger conditions. The study data collected included information regarding vehicular traffic and pedestrian levels and delay, train noise, and train speed. These data were jointly verified by the SEA study team, the City of Reno, and UP (see Section 5).

Potential Environmental Impacts: The SEA study team examined 11 potential environmental impact areas to evaluate the effect of the merger-related increase in train traffic. These impact areas, which reflect Board directives and the concerns of local interests identified through the Reno Mitigation Task Force, the public meetings, and other public comments, include the following:

- Traffic delay.
- Pedestrian safety.
- Emergency vehicle access.
- Train-vehicle accidents.
- Derailments/hazardous materials spills/water quality.
- Noise levels.
- Air quality.
- Train operations.
- Native American issues.
- Biological resources.
- Vibration.

The SEA study team analyzed each of these areas, developed criteria for evaluating and measuring potential environmental impacts, and identified possible mitigation measures to address issues of concern (see Section 6).

Broad Range of Mitigation Measures: The SEA study team evaluated a broad range of alternative mitigation options, including increased train speeds, underpasses, a depressed railway, an elevated railway, an I-80 bypass, and improved motorist and pedestrian safety measures. The SEA study team also evaluated a number of mitigation measures to address specific noise and air quality issues, hazardous materials transport, and Native American issues. SEA also examined grade crossings outside of the downtown area in the Woodland and Del Curto areas west of town. As shown on Table 7.3-1, the SEA study team began with a long list of optional mitigation measures and evaluated their effectiveness prior to preliminarily selecting a set of specific measures (see Section 7).

Categories of Potential Mitigation: In Decision No. 71 issued on April 15, 1997, the Board clarified its intent regarding mitigation requirements for the mitigation study. The Board defined the following two levels of mitigation to be developed: (1) Tier 1, those measures that will be mandated mitigation for UP to implement and fund entirely, and (2) Tier 2, those measures that are more far-reaching and for which implementation and funding would require voluntary participation of UP *and* other interested parties and can therefore not be mandated by the Board (see Section 8).

SEA's Preliminary Tier 1 Mitigation Recommendations: As detailed in Section 8 of this report and summarized again in Section 10, SEA's preliminary recommendation for mitigation measures for the Board to mandate are shown in Table ES-1. SEA emphasizes that these measures are still preliminary, and SEA invites full public review and comment.

Table ES - 1
Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public

Mitigation Measure	Proposed Board Conditions	Purpose
Increased Train Speeds	1. UP shall make the necessary operating changes and capital improvements such as centralized traffic control (CTC), track reconfiguration, and track rehabilitation, as appropriate in the Reno/Sparks, Nevada area, to enable trains to operate over the rail line segment between the east end of the Sparks yard (approximately Mile Post [MP] 247) and a point just west of Keystone Avenue (approximately MP 242) in Reno at a speed of 30 miles per hour. UP shall then operate, and require BN/SF to operate, all trains over the described rail line segment at a speed of 30 miles per hour **consistent with safe operating practices dictated by conditions present at the time each train traverses the segment.**	• To reduce total vehicular traffic delay to below pre-merger levels. • To further reduce air emissions from delayed vehicles. • To improve emergency vehicle response capability.
Train Location Color Video Displays	2. Subject to the written concurrence of the City of Reno, UP shall install in the new City of Reno emergency communications center (or another location if desired by the City) color video displays coordinated with the UP signal system circuitry showing the location of each train present on the rail line segment from approximately MP 245 on the west side of the Sparks Yard to MP 238 (approximately Woodland Avenue) on the west side of Reno.	• To improve emergency vehicle response capability.
Cameras and Video Monitors Showing Rail Line	3. Subject to the written concurrence of the City of Reno, UP shall install television cameras over or near the rail line along with corresponding video monitors at the same emergency communications center location that continuously show real-time conditions on the right-of-way through downtown Reno in the area bounded by and including the grade crossings at Keystone and Lake Streets.	
Discontinued Use of the Addition of "Helper" Locomotives in Woodland Area	4. UP shall discontinue the practice of adding "helper" locomotives in the Woodland Avenue area.	• To improve emergency vehicle response capability. • To reduce vehicular delay at Woodland Avenue.

Table ES - 1
Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public

Mitigation Measure	Proposed Board Conditions	Purpose
Four-quadrant Crossing Gates at Nine Locations	5. UP shall install four-quadrant crossing gates at rail-highway crossings at Sutro, Lake, Virginia, West, Arlington, Ralston, Washington, Vine, and Keystone streets.	• To reduce the risk of train-vehicle accidents.
Enhanced Rail Safety Programs	6. UP shall augment its safety training programs for drivers and pedestrians including: A. Supplementing its participation in the "Operation Lifesaver" Program, and B. Supplementing existing school educational programs in Reno and Washoe County (e.g., driver's training), and C. Establishing a safety training program for Reno's downtown employees.	• To reduce the risk of train-vehicle and train-pedestrian accidents.
Pedestrian Crossing Gate "Skirts" at Six Locations	7. UP shall install devices known as pedestrian crossing gate "skirts" on pedestrian crossing gates at Lake, Center, Virginia, Sierra, West, and Arlington streets.	• To reduce the risk of train-pedestrian accidents and enhance pedestrian safety.
Electronic Warning Signs for Pedestrians at Six Locations	8. UP shall install electronic warning signs for pedestrians at Lake, Center, Virginia, Sierra, West, and Arlington streets. These signs shall be designed and constructed so that they are clearly visible and easily read by pedestrians.	
Construction of a Pedestrian Grade Separation at Virginia Street	9. UP shall construct a pedestrian overpass or underpass at Virginia Street with street level access on both sides of the tracks	
Construction of a Pedestrian Grade Separation at Sierra Street	10. UP shall construct a pedestrian grade overpass or underpass at Sierra Street with street level access on both side of the tracks	

Table ES - 1
Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public

Mitigation Measure	Proposed Board Conditions	Purpose
Prehistoric and Historic Survey for Pedestrian Underpass(es) and Monitoring During Construction for Archeological Resources	11. Prior to construction of a pedestrian underpass at either Virginia or Sierra streets, UP shall conduct a survey of potential historic and prehistoric resources in consultation with the Nevada State Historic Preservation Office (SHPO). If any such resources are discovered during construction, UP shall cease construction and consult with the SHPO.	• To protect historic and prehistoric resources
Consultation with Native Americans	12. Prior to construction of a pedestrian underpass at either Virginia or Sierra streets, UP shall consult with Native American interests regarding possible impacts to Native American resources from underground construction. If any such resources are discovered during construction, UP shall immediately stop construction and consult with Native American interests and the SHPO.	
Installation of a high, wide, shifted load detector at MP 240	13. UP shall install a high, wide, shifted load detector at MP 240 for both mainline tracks.	• To supplement the already imposed, comprehensive hazardous materials mitigation measures and provide additional preventive measures for hazardous materials incidents. • To further protect the Truckee River and Reno's water supply. • To further protect threatened and endangered species in the Truckee River.
Installation of a Hot Box Detector at MP 240	14. UP shall install an additional hot box detector on the westbound track at MP 240.	
Establishment of a Community Advisory Panel	15. UP shall establish a Community Advisory Panel, consisting of representatives of the Reno/Sparks/ Washoe County community, including Native Americans, who are willing to work with UP management on a regular basis to review safety, environment, and health issues associated with rail operations, particularly as they relate to the transport of hazardous materials.	• To promote additional communication and exchange of information regarding UP rail operations in general and the transport and handling of hazardous materials in particular.

Table ES - 1 Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public		
Mitigation Measure	**Proposed Board Conditions**	**Purpose**
Certification to the Board and Notice to the City of Reno and Washoe County of UP's Compliance with Certain Installation Requirements	16. When compliance has been completed for each of the installations required in Conditions 1, 2, 3, 5, 7, 8, 9, 10, 13, and 14 above, UP shall certify such completion to the Board, with copies to the City of Reno, and Washoe County. Each certification shall be made within two weeks of the date of compliance for each condition.	• To certify to the Board and advise the City of Reno and Washoe County that UP has complied with these mitigation measures
Environmental Mitigation Status in Quarterly Reports	17. UP's quarterly reports to the Board shall include the status of compliance with the environmental mitigation measures pertaining to Reno and Washoe County for the duration of the Board's oversight proceeding. Copies of these reports shall also be provided to the City of Reno and Washoe County.	• To assure continued monitoring and oversight of the status of the environmental mitigation measures.

At this time, SEA finds that the above-mentioned, preliminary Tier I mitigation measures, if imposed by the Board and funded and implemented by UP, would further reduce the potential environmental effects in Reno. SEA currently believes that, with the above preliminary Tier I mitigation measures and the system-wide and regional mitigation measures imposed in Decision No. 44 that benefit Reno and Washoe County, the potential environmental effects in Reno and Washoe County of the merger-related increased freight train traffic would not be significant.

Tier 2 Mitigation Measures: Section 8 also outlines the more far-reaching mitigation measures that could still be considered by UP and the interested parties. These measures would provide mitigation beyond the potential effects of increased rail traffic in Reno. Examples of Tier 2 mitigation measures would be the depressed railway or the relocation of the rail line to a new rail line on the I-80 corridor. If the interested parties reach any formal agreement regarding Tier 2 measures, the Board will consider the agreement and impose the terms of such agreement on UP as appropriate (see Section 8).

Funding Analysis: Tier 1 mitigation measures, by definition, are to be funded solely by UP. Although the Board cannot mandate Tier 2 measures, it directed SEA during the mitigation study to investigate possible funding sources for Tier 2 mitigation measures. SEA's work regarding funding included identifying and evaluating existing transportation funding structures on the Federal, State and local levels and providing technical information to assist and facilitate funding discussions among interested public and private parties (see Section 9).

Public Comment on the Preliminary Mitigation Plan

SEA encourages broad participation in the review and comment of this PMP. Interested agencies and persons are invited to file comments regarding the PMP by submitting a signed original comment and 10 copies to the following address:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, D.C. 20423-0001

Attention: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing - Reno

Acknowledgments

At this time, SEA wishes to thank Federal, State, City, and local agency and elected officials, UP representatives, members and alternates of the Reno Mitigation Task Force, and interested citizens who have devoted so much of their time and effort to work with SEA throughout the Reno Mitigation Study.

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Section 1
INTRODUCTION

1.1 Background

On August 12, 1996, the Surface Transportation Board (Board), in its Decision No. 44, Finance Docket No. 32760 (Appendix A), approved the Union Pacific (UP)/Southern Pacific (SP) merger subject to conditions, including environmental conditions. The environmental conditions included a further 18-month mitigation study for the City of Reno, Washoe County, and the surrounding area in Nevada, encompassing the former SP rail line. The study is to develop appropriate supplemental mitigation for this area in addition to the environmental mitigation that already has been imposed in Decision No. 44.

To preserve the environmental status quo, the Board placed limits on the increase in the number of freight trains allowed through Reno during the 18-month mitigation study. The limit restricts the number of trains to an average count of 14.7 freight trains per day, which represents the 1995 baseline average of 12.7 trains per day plus an average of two additional freight trains.

As required in Decision No. 44, the Board's Section of Environmental Analysis (SEA) prepared this Preliminary Mitigation Plan (PMP). The Board also mandated preparation of a mitigation plan for Wichita, Kansas, which SEA has prepared and issued concurrently with this PMP.

Under the sole direction and supervision of SEA, an independent third-party contractor team (SEA study team) assisted SEA in conducting this Reno Mitigation Study. In this PMP, SEA provides its **preliminary** evaluation and recommendations. In preparing this PMP, SEA reviewed and considered the issues and concerns raised by all interested parties.

1.2 Public Review Process of Mitigation Plan

This PMP is being distributed to the public, with a 30-day review and comment period. After reviewing the public comments on the PMP, SEA plans to issue a Final Mitigation Plan in December 1997, which will also be available to the public for review and comment. The Board will consider the public comments and the Preliminary and Final mitigation plans in imposing final mitigation measures in a decision expected to be issued in February/March 1998. Table 1-1 provides a projected schedule for the mitigation plan.

1.3 Overview of Preliminary Mitigation Plan

Section 2 of the PMP provides an overview of the merger, the jurisdiction of the Board, the environmental review process to date, conditions already placed on UP under the merger, and public outreach conducted during the study.

Table 1-1 Projected Schedule for Reno Mitigation Plan	
September 15, 1997	SEA issues Preliminary Mitigation Plan, followed by a 30-day public review and comment period.
October 8, 1997	SEA conducts Reno Task Force meeting to receive comments on the Preliminary Mitigation Plan from the task force.
October 9, 1997	SEA conducts two public meetings in Reno to receive comments on the Preliminary Mitigation Plan and invite oral and written comments.
October/November 1997	SEA considers all public comments and prepares Final Mitigation Plan.
December 1997	SEA issues Final Mitigation Plan, followed by a public review and comment period.
February/March 1998	Board issues its decision imposing final additional environmental mitigation for Reno and Washoe County.

Section 3 describes the study area, its characteristics, a brief history of Reno, and a summary of City planning policies regarding railroads. Section 4 discusses railroad operations in the Reno and Washoe County area and provides the projected freight train traffic under the merger. Section 5 identifies the activities undertaken by SEA and its study team to collect necessary information and data for this study and provide for input from all interested parties. Section 6 provides a geographically focused analysis of the potential environmental impacts on Reno, Washoe County, and the surrounding area of the increased freight train traffic associated with the merger. This section supplements the environmental analysis presented in the Environmental Assessment (EA) and Post Environmental Assessment (Post EA) that were prepared by SEA pursuant to the National Environmental Policy Act (NEPA) for the UP/SP merger. Evaluation criteria and methodology are provided, along with preliminary recommendations regarding potential mitigation measures for the potential environmental impacts. Section 7 explains the mitigation options that have been reviewed and considered by SEA and discusses the effectiveness of these options in mitigating potential environmental impacts. This section also discusses additional potential environmental impacts that would be associated with the mitigation options.

Section 8 includes SEA's **preliminary** recommended mitigation options for consideration by the Board. Mitigation measures are classified into two categories: (1) those that would be fully funded solely by UP, and (2) those that could be implemented only with voluntary shared funding agreed to by UP and various parties. Section 9 outlines possible sources of shared funding. Section 10 outlines SEA's **preliminary** formal conditions proposed for Board consideration.

1.4 How to File Comments.

SEA welcomes public and agency comments on this PMP. Written comments on the PMP should be submitted by October 15, 1997. To file comments, please submit an original plus 10 copies to the Board at:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, D.C. 20423-0001

Attention: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing - Reno

Section 2
STUDY BACKGROUND AND PURPOSE

2.1 Overview of the Merger

On November 30, 1995, the Union Pacific Railroad Company (UP) and Southern Pacific Transportation Company (SP) applied to the former Interstate Commerce Commission (ICC) for authority to merge their operations into a single Union Pacific Railroad Company. The merger proposed the creation of a single rail system with 34,000 miles of track in 24 states. A primary objective of the merger was to create a rail carrier that would be more competitive and efficient, resulting in benefits to shippers and the public. The merger application included plans covering the rerouting of train traffic within the combined system, the consolidation of yards and terminal facilities, changes in activities at rail yards and intermodal facilities, abandonment of some rail line segments, and construction of new rail line segments.

2.2 Surface Transportation Board Jurisdiction

In December 1995, Congress abolished the ICC and transferred certain of its railroad functions, including the merger functions at issue here, to the Surface Transportation Board (Board). The Board is a decisionally independent, adjudicatory body organizationally housed within the United States Department of Transportation (DOT), with jurisdiction over certain surface transportation and economic regulatory matters (primarily rail). The Board's decisions are reviewable in the United States Court of Appeals under the Hobbs Act, 28 U.S.C. §2321 and §2342.

The applicable decision standards for railroad merger applications are codified in 49 U.S.C. §11321-27 (formerly 49 U.S.C. §11341-51, the Interstate Commerce Act). The Act's single and essential standard of approval is that the Board find the transaction to be consistent with the public interest. To determine the public interest, the agency balances the benefits of the merger against any competitive harm that cannot be mitigated by conditions.

An existing railroad can increase its level of operations and make improvements to its rail lines without coming to the Board and without limitation. Thus, if UP and SP had not proposed this merger, SP on its own could have increased the number of trains on its line in Reno to any level it considered appropriate.

The Federal Railroad Administration (FRA) is the agency with primary expertise and jurisdiction in railroad safety and has promulgated numerous regulations that the Board considers in assessing railroad safety issues and imposing safety conditions in railroad mergers (see Section 4.1).

Because the review and approval of the UP/SP merger is a major Federal action, the proposed merger is subject to environmental review under the National Environmental Policy Act, NEPA, 42 U.S.C. §4321, *et. seq.* The Board has adopted environmental rules consistent with NEPA to guide its environmental review of proposed mergers, 49 CFR 1105 (1996). Those rules generally

call for the preparation of an Environmental Assessment (EA) for railroad merger cases, 49 CFR 11105.6(b)(4)(1996). The EA is prepared by the Board's Section of Environmental Analysis (SEA), with assistance of an independent third-party contractor, and considers information supplied by the applicant, comments from interested parties and government agencies, and the results of SEA's independent investigations and verification, 49 CFR 1105.7; 1105.109(b)(d)(1996).

The EA is made available for public review and comment. The Board then considers the EA, the public comments, and any post-EA recommendations of SEA before rendering its final decision in the proceeding, 49 CFR 1105.10(b)(f)(1996).

In developing and evaluating environmental mitigation options, SEA and the Board are also guided by the historical authority of the ICC and Congressional intent for railroad regulation. Over the last 20 years, Congress has reduced the regulatory role of the ICC and the Board to promote competition and efficiency throughout the national railroad network. The United States Congress provides its policies regarding railroad regulation in the 1995 ICC Termination Act (Pub. L. No. 104-88; December 29, 1995), which states in part:

"In regulating the railroad industry, it is the policy of the United States Government--

(1) to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail;

(2) to minimize the need for Federal regulatory control over the rail transportation system and to require fair and expeditious regulatory decisions when regulation is required;

(3) to promote a safe and efficient rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Board;

(4) to ensure the development and continuation of a sound rail transportation system with effective competition among the rail carriers and with other modes, to meet the needs of the public and the national defense;

(5) to foster sound economic conditions in transportation and to ensure effective competition and coordination between rail carriers and other modes;

(6) to maintain reasonable rates where there is an absence of effective competition and where rail rates provide revenues which exceed the amount necessary to maintain the rail system and to attract capital;

(7) to reduce regulatory barriers to entry into and exit from the industry;

(8) to operate transportation facilities and equipment without detriment to the public health and safety;

(9) to encourage honest and efficient management of railroads;

(10) to require rail carriers, to the maximum extent practicable, to rely on individual rate increases, and to limit the use of increases of general applicability;

(11) to encourage fair wages and safe and suitable working conditions in the railroad industry;

(12) to prohibit predatory pricing and practices, to avoid undue concentrations of market power, and to prohibit unlawful discrimination;

(13) to ensure the availability of accurate cost information in regulatory proceedings, while minimizing the burden on rail carriers of developing and maintaining the capacity of providing such information;

(14) to encourage and promote energy conservation; and

(15) to provide for the expeditious handling and resolution of all proceedings required or permitted to be brought under this part." (Section 10101)

The Board licenses railroads as common carriers, meaning that the railroads are required to accept goods and materials for transport from all customers upon reasonable request and at a reasonable rate.

The Board has broad authority to impose conditions in railroad merger cases under 49 U.S.C.§11324(c). However, the Board's power to impose conditions is not limitless. To survive judicial review, the record must support the imposition of the condition at issue. Moreover, there must be a sufficient nexus between the condition imposed and the proposed merger, and the conditions must be reasonable.

These considerations apply with particular force where a condition is sought to mitigate environmental damage that results from a merger that satisfies all of the substantive standards for approval. It is well-outlined that NEPA does not require an agency to arrive at any particular substantive results, but only requires that agencies take a "hard look" at the environmental consequences of their decision for railroad mergers. It has long been agency policy to focus on the potential environmental impacts related to changes in rail traffic patterns on existing lines. The agency's practice consistently has been to mitigate only those conditions that result directly from the merger. The Board (like the ICC) has not imposed mitigation measures to remedy preexisting conditions that might make the quality of life in a particular community better, but are not a direct result of the licensing of the merger before the Board.

On April 15, 1997 in Decision No. 71 (see Appendix B), the Board clarified that two tiers of mitigation measures will be considered in developing final mitigation measures. Specifically, the final environmental mitigation will include, in addition to the mitigation that has already been imposed, the following: (1) Tier 1, or baseline mitigation, which the Board will require UP to implement and entirely fund, and (2) Tier 2 alternative mitigation measures that might be a more far-reaching solution for all concerned but that will be binding only if there is a voluntary agreement by UP and other interested parties to share costs or expend greater resources.

In short, for the Reno Mitigation Study, SEA has considered a broad range of environmental mitigation options (in addition to those that have already been imposed in Decision No. 44). These mitigation options include measures that would be mandated by the Board and solely funded by UP, and others that would require voluntary participation or funding from UP and other entities. SEA also has worked to foster discussions and negotiations among affected parties to reach mutually acceptable solutions to potential environmental impacts and other local concerns.

2.3 Environmental Review Process for UP/SP Merger

SEA is responsible for the preparation of the environmental review of all mergers including the UP/SP merger. SEA reviews each merger application separately and makes its environmental recommendations to the Board based on the specific circumstances of each case.

In compliance with the Board's environmental rules, 49 CFR 1105.6(b)(4)(1996), SEA prepared a comprehensive, five-volume EA of the proposed UP/SP merger on April 12, 1996, which was distributed in 35 states, the District of Columbia, and Canada to approximately 1,600 interested parties for review and comment. The agency's environmental review process included an extensive public outreach program. SEA established a toll-free environmental hotline; prepared and distributed fact sheets and information packets about the merger; notified more than 500 Federal, state, and local agencies; and conducted phone consultations and more than 150 site visits. Newspaper advertisements, press releases, and Federal Register notices were issued to facilitate public involvement.

SEA received approximately 160 comments following issuance of the EA (including comments filed by the City of Reno). To address those comments, and other environmental comments received throughout the environmental review process, SEA performed additional environmental analysis, which culminated in the issuance of a detailed post environmental assessment (Post EA) issued on June 24, 1996. In the Post EA, SEA refined the discussion and mitigation recommended in the EA.

As pertinent here, SEA had conducted site visits to the Reno and Sparks area, during which concerns such as noise levels, grade crossing activity, and safety were evaluated. Thus, SEA recommended numerous general and regional mitigation measures addressing safety, hazardous materials transport, air quality, and noise that pertain to Reno and other areas potentially affected by increased rail traffic as a result of the merger.

SEA concluded that, overall, the merger would result in several environmental benefits, including a system-wide annual net reduction of consumption of 35 million gallons of diesel fuel (based on 1994 figures) from rail operations and truck-to-rail operations, system-wide improvements to air quality from reduced fuel use, and a reduction in long-haul truck miles, highway congestion and maintenance, and motor vehicle accidents.

SEA also concluded that the merger and related rail line abandonments and constructions could have potential environmental effects regarding safety, air quality, noise, and/or transportation, including the transportation of hazardous materials. In the EA and Post EA, SEA proposed

extensive mitigation measures, including the Reno Mitigation Study, that address environmental concerns that were raised, e.g., issues raised by the City of Reno. The specific mitigation imposed is discussed in more detail below. SEA concluded that, with the Post EA mitigation measures, the proposed merger would not significantly affect the quality of the human environment on a system-wide, regional, or local basis. Therefore, SEA concluded that a full environmental impact statement (EIS) was not needed here.

Notwithstanding the extensive analysis that already had been done to identify environmental concerns and arrive at appropriate mitigation for Reno, SEA determined that a further, more focused mitigation study for Reno should be undertaken. SEA recommended: (1) an 18-month further study of additional mitigation measures for Reno, and (2) that during the mitigation study period, UP should be permitted to add only an average of two additional freight trains per day to the affected rail line segment. SEA explained that this increase would be below the threshold level for environmental analysis in the Board's environmental regulations. (For nonattainment areas such as Reno, the Board's rules permit railroads to operate up to three additional trains per day.) Therefore, the environmental status quo essentially would be preserved in Reno during the mitigation study period.

On August 12, 1996, the Board issued its written decision approving the merger (Decision No. 44), which gave extensive consideration to environmental issues. The Board agreed that the mitigation measures in the Post EA, including the environmental conditions applicable to Reno, will adequately mitigate the potential environmental impacts identified during the environmental review process, and it imposed those measures here. In addition, the Board adopted SEA's recommendations concerning the additional Reno mitigation study, including the recommendation that freight rail traffic increases be limited to an average of two additional trains a day, pending completion of the study.

The Board rejected the argument of various parties that a full EIS should have been prepared, noting that the environmental mitigation measures imposed in this case are far-reaching and comprehensive. The Board concluded that no EIS is required, because the environmental mitigation conditions specifically address the potential environmental impacts associated with the merger and ensure there will be no significant environmental effects.

In Decision No. 44, the Board set up a process that will provide for full public participation during the Reno Mitigation Study. The Board explained that SEA will issue preliminary and final mitigation plans for Reno that will be made available to the public for review and comment before being submitted to the Board for its review and approval. The Board will then issue a decision imposing additional specific mitigation measures. This entire process will be completed within 18 months of consummation of the merger (i.e., March 1998).

In the meantime, to preserve the environmental status quo, the Board placed limits on the increase in the number of freight trains allowed through Reno during the 18-month mitigation study. The limit is no more than a daily average count of 14.7 freight trains per day, which represents the

1995 baseline average of 12.7 trains per day plus an average of two additional freight trains.[1] The two additional trains are below the threshold for environmental analysis in the Board's environmental rules. This traffic cap essentially stays the merger as to Reno by ensuring that no adverse effects to the environment will occur pending determination of the exact additional mitigation measures to be required for Reno.

The City of Reno has filed an environmental court challenge of Decision No. 44 in Federal court, which is pending in the D.C. Circuit in No. 96-1418, *City of Reno vs. STB*. Previously, Reno had filed a mandamus action in district court seeking to compel the Board to utilize EIS procedures in conducting its further environmental mitigation study for Reno. By decisions issued in September and November 1996, the district court dismissed Reno's mandamus action for lack of jurisdiction and denied Reno's motion to transfer the action to the Ninth Court. The City has appealed the district court's decision to the Ninth Circuit. In July 1997, the City of Reno held a press conference reaffirming its desire for a site-specific EIS for Reno in this ongoing mitigation study.

2.4 Merger Conditions and Mitigation Measures

In Decision No. 44, the Board imposed system-wide and corridor-specific mitigation conditions on UP. These mitigation measures were developed to mitigate potential system-wide and corridor-specific environmental impacts, including potential environmental impacts on Reno. The mitigation measures address safety, hazardous materials/emergency response, air quality, and noise. System-wide and corridor-specific mitigation measures imposed by the Board that are directly applicable to Reno include the following:

- Condition 1: Track inspection requirements.
- Condition 2: Tank car inspection programs at all appropriate facilities.
- Condition 3: Establishment of a toll-free telephone number for signal malfunctions.
- Condition 4: Establishment of a toll-free telephone number for emergency response forces.
- Condition 5: Development of hazardous materials and emergency response plans.
- Condition 7: Development of an emergency response training program for communities.
- Condition 10: Preparation of an implementation plan for UP security forces in Truckee Meadows.
- Condition 11: Visible smoke reduction.
- Condition 14: Implementation of EPA draft emissions standards for diesel-electric locomotives, and assignment of these locomotives to the Central Corridor (which includes Reno).
- Condition 15: Consultation with local and state air quality officials (including in Washoe County and Nevada)
- Condition 17: Equipment of trains with two-way end of train devices (on Central Corridor).
- Condition 18: Consultation with FRA to develop a priority list for upgrading grade crossing signals, where necessary (including in Nevada).

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[1] The limit does not include Amtrak operations, local switching trains, "helper" locomotive units, or the operation of emergency trains.

In addition, Condition 22 (Figure 2.4-1) directs SEA to conduct an 18-month study to arrive at a tailored mitigation to address the unique circumstances of Reno in addition to the system-wide and regional mitigation measures that have been imposed. SEA's final mitigation study and recommended mitigation measures (which will be developed in consultation with the public) are intended to further address increased rail traffic on the existing UP (formerly SP) rail line in Reno. The Board directed a similar mitigation study and a train cap of an average of two additional freight trains per day in Wichita, Kansas.

In Decision No. 44, the Board specifically directed "that the studies will focus only on the mitigation of the environmental effects of additional rail traffic through Reno and Wichita resulting from the merger. Mitigation of conditions resulting from the preexisting development of hotels, casinos, and other tourist-oriented businesses on both sides of the existing SP rail line in Reno, or the preexisting switching operations that are a primary source of the congestion associated with the existing UP line in Wichita, are not within the scope of the studies."

2.5 Benefits of the Merger

The approval of the UP/SP merger substantially changed the nation's railroad system west of Illinois and the Mississippi River. In the merger proceedings, UP/SP identified several beneficial and operational improvements of the merger, including:

- Improved, direct routes through major rail corridors.
- Consolidation of redundant rail line segments and facilities.
- Capital investment to improve system capacity and efficiency.
- Increased efficiency of rail yards and intermodal facilities.
- Reduced switching of rail cars and improved shipping times.

In the Post EA, SEA noted that system-wide consolidation and efficiency improvements would reduce the impacts on the human and natural environment. These system-wide improvements are expected to result in the following environmental benefits:

2.5.1 Energy

- System-wide net reduction of 35 million gallons of diesel fuel (based on 1994 operations) from rail operations and truck-to-rail diversions.

2.5.2 Air Quality

- System-wide improvements to air quality resulting from reduced use of fuel.
- System-wide efficiency improvements for rail operations and truck-to-rail diversions.

Figure 2.4-1 Surface Transportation Board Condition No. 22 for UP/SP Merger

22a. UP/SP shall operate no more than a daily average count of 14.7 freight trains per day through the City of Reno. (This reflects the Base Year daily average of 13.8 trains -- 12.7 freight trains and 1.1 passenger trains -- plus 2 additional freight trains.) The addition of two freight trains per day does not exceed the Board's threshold for environmental analysis at 49 CFR 1105.7(5)(ii). The 14.7 average train count per day does not include the following types of movements: (1) maintenance-of-way trains, (2) light locomotive movements, (3) local and industry switching train movements, (4) emergency trains operated under detour authority, for snow removal, for fire or other natural disaster purposes, and wreck removal purposes. This condition will be effective upon consummation of the merger and will continue in effect for 18 calendar months in total.

22b. For the purpose of monitoring the preceding condition, UP/SP shall file on a monthly basis with the Board verified copies of station passing reports of train movements through Reno, NV, for each day of each preceding month in the specified 18-month period. These reports shall also identify those train movements, specified in the above condition, that are excluded from the 14.7 trains per day average count.

22c. UP/SP, in consultation with and subject to the approval of SEA, shall retain an independent third-party consultant to prepare a specific mitigation study to address the potential environmental effects on the City of Reno of the additional rail freight traffic projected as a result of the proposed merger. This study shall be prepared under the sole direction and supervision of SEA. It shall include a final mitigation plan based on a further study of the railway, highway, and pedestrian flows and associated environmental effects on the City of Reno. This study would tailor mitigation to address environmental effects such as safety, hazardous materials transport, air quality, noise, and water quality. UP/SP shall comply with the final mitigation plan developed under this study.

The study, which shall be completed within 18 months from the date of consummation of the merger, shall include the following:

- Projected post-merger increases in rail freight traffic on the Sparks to Roseville line segment.
- Consultations with the City of Reno, Washoe County, the Federal Railroad Administration, affected Native American Tribes, and other appropriate Federal, state and local agencies, and other interested parties.
- Consultations with UP/SP.
- Review of existing information and studies including those prepared by the City of Reno, Washoe County and UP/SP.
- Independent analyses.
- With respect to vehicular and pedestrian safety, mitigation measures that identify the number and location of highway/rail grade separations and rail/pedestrian grade separations in downtown Reno.
- Funding options.
- Submission of a draft study to the public for review and comment and then issuance of a final mitigation study.

22d. SEA will submit the final mitigation study and its recommendations to the Board, which shall then issue a decision imposing mitigation. In the event UP/SP and the City of Reno and other appropriate parties reach agreement on a final mitigation plan, UP/SP and the City of Reno shall immediately notify SEA, and the Board will take appropriate action consistent with such an agreement.

2.5.3 Transportation/Safety

- System-wide improvements from truck-to-rail diversions, reducing long-haul truck-miles by 283 million miles, which in turn would reduce roadway congestion, maintenance, and motor vehicle accidents.
- Removal of approximately 550 grade crossings and associated safety improvements.

UP/SP also pointed to several other environmental benefits that would occur in those areas where rail line segments would be abandoned, such as:

- Reduced human disturbance of the natural environment and gradual reestablishment of natural vegetation.
- Reduced loss of wildlife from train-animal collisions.
- Reduced noise exposure to adjacent land uses.

The Board fully considered these benefits in the approval of the merger.

2.6 Study Organization

2.6.1 Role of Independent Third-Party Contractor

The Reno Mitigation Study is being conducted by SEA with the assistance of an independent third-party contractor. The President's Council on Environmental Quality regulations, 40 CFR 1506.5(c)(1996), allow a Federal agency to select a contractor to prepare an environmental document, provided that: (1) the contractor is selected solely by the lead agency, (2) the contractor has no conflict of interest, (3) the contractor executes a disclosure statement prepared by the lead agency specifying that the contractor has no financial or other interest in the outcome of the project, (4) the responsible federal official furnishes guidance and participates in the preparation of the document, (5) the responsible federal official independently evaluates the document prior to approval, and (6) the responsible federal official is responsible for the scope and content of the document. SEA has applied these standards to its independent contractor in the preparation of this Preliminary Mitigation Plan (PMP).

The contractor's scope of work, approach, and activities are under the sole supervision, direction, and control of SEA. SEA's involvement, oversight, guidance, and participation in the development of the PMP has been extensive, including frequent meetings, briefings, and discussions concerning the methodology, data collection, analyses, and recommendations contained in this PMP. Further, SEA independently reviewed the PMP prior to its release to the public.

Although retained by UP/SP, SEA selected the contractor. SEA selected De Leuw, Cather & Company (DCCO) and associated subconsultants as the independent third-party contractor. Prior to selection, SEA reviewed in depth the qualifications of the lead firm and all technical subconsultants. In addition, the third-party contractor and its subconsultants provided in January

1997, statements that they have no conflict of interest. SEA supplied the City of Reno with appropriate information concerning the third-party contractor and subcontractor. However, information relating to compensation was not provided, because SEA is not involved in matters of compensation for independent third-party contractors.

2.6.2 Study Objectives

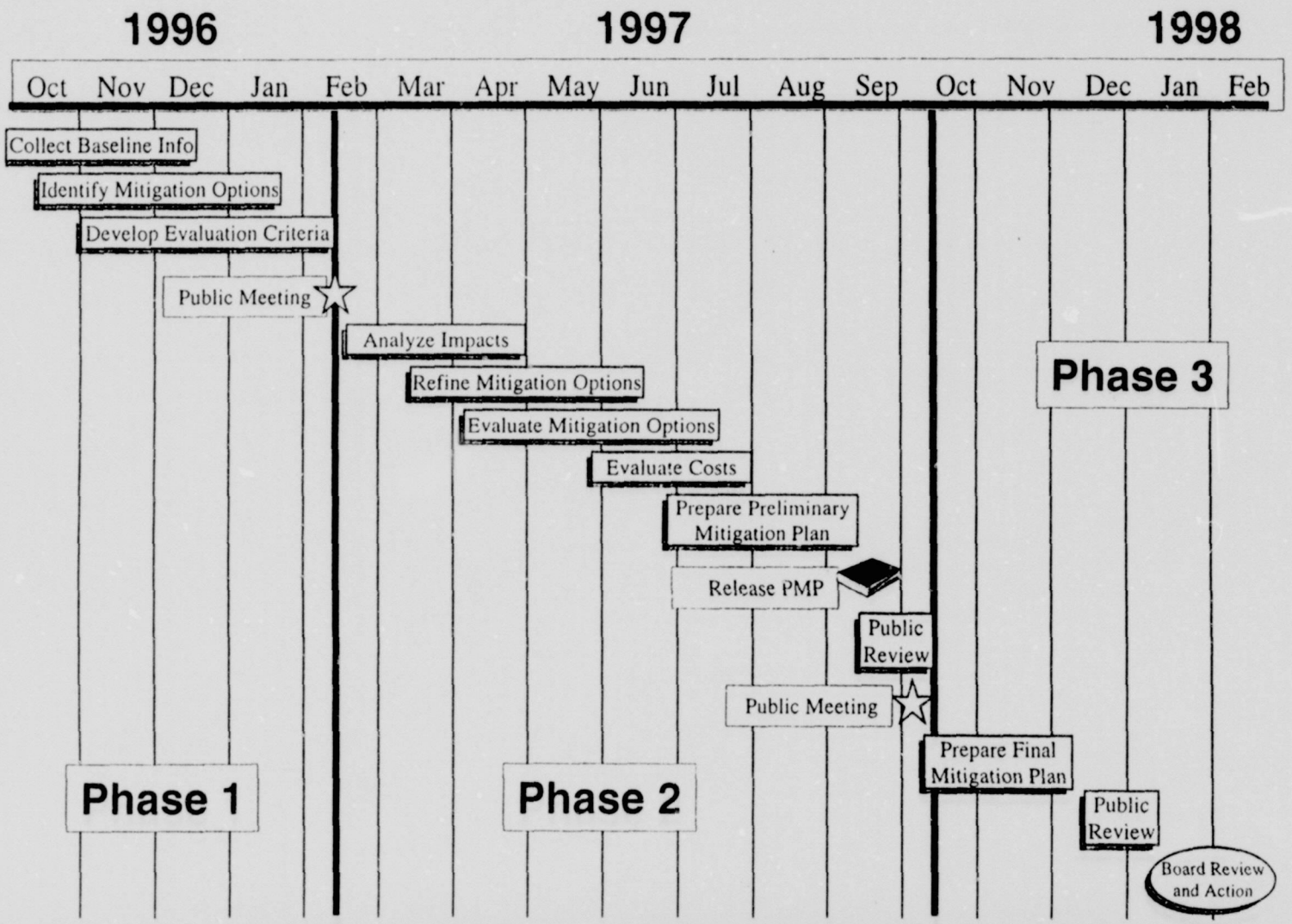
SEA and its study team began the mitigation study in October 1996. In an effort to develop a specifically tailored mitigation plan for Reno as directed by the Board, SEA established the following objectives for the study:

- Focus on the effects of increased merger-related rail traffic on the existing UP (formerly SP) line to arrive at additional specifically tailored mitigation for communities in and around Reno to ensure that localized environmental issues are effectively addressed.
- Identify the number and precise location of highway/rail grade separations and rail/pedestrian grade separations, if warranted.
- Consider additional mitigation to supplement the mitigation already imposed to address air quality effects on Reno resulting from the merger.
- Examine private and public funding options to share the cost of additional mitigation.
- Provide a forum to exchange ideas and concerns.
- Explore independent and innovative mitigation options for Reno.
- Facilitate the negotiation of an independent, mutually acceptable agreement among the parties.
- Provide an opportunity for public input throughout the study process.

To meet these objectives within the mandated time frames, SEA divided the study into three phases. During Phase 1, SEA collected necessary data, identified preliminary mitigation options, developed evaluation criteria, and conducted public outreach activities to identify key issues and concerns. During Phase 2, SEA evaluated preliminary mitigation options and prepared this PMP for public review. During Phase 3, SEA will consider public comments and prepare a Final Mitigation Plan (FMP), solicit additional public comments, and prepare final recommendations to the Board. Then the Board will issue its decision imposing final additional environmental mitigation measures for Reno. Figure 2.6.2-1 shows the schedule for these study activities.

2.7 Public Involvement Process

Decision No. 44 specified that SEA's mitigation study include consultations with a variety of city, county, state, and Federal agency representatives and other interested parties (Condition 22.c). These consultations have occurred through meetings and correspondence with agencies. In addition, the SEA study team coordinated a comprehensive public outreach program to apprise the public of the study and provide a forum for all interested parties to present their views and concerns. The Reno Mitigation Task Force, an advisory group established in January 1997, has also provided a forum for the exchange of information and ideas.


1996
1997
1998
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb
Collect Baseline Info
Identify Mitigation Options
Develop Evaluation Criteria
Public Meeting
Analyze Impacts
Refine Mitigation Options
Evaluate Mitigation Options
Evaluate Costs
Prepare Preliminary Mitigation Plan
Release PMP
Public Review
Public Meeting
Prepare Final Mitigation Plan
Public Review
Board Review and Action
Phase 1
Phase 2
Phase 3

2.7.1 Goals

The purpose of SEA's public outreach program during the Reno Mitigation Study is to maintain a two-way flow of information between the SEA study team and interested parties in Reno, Sparks, and Washoe County. In order to increase public awareness of the mitigation study and to ensure that the issues of the general public would be heard and addressed by SEA study team members, SEA set the following public involvement goals:

- To exchange information and ideas.
- To distribute on a regular basis appropriate information regarding the study process, general information, data collection and analysis, and potential mitigation options.
- To establish and maintain contact with agency and other officials representing the City, County, and State; leaders of local businesses, neighborhood organizations, and community groups; Native American interests; and members of the media and the general public.
- To provide frequent opportunities for individuals to assess the study progress and to submit oral and written comments to SEA for consideration by the SEA study team and the Board.

2.7.2 Reno Mitigation Task Force

In cooperation with the City of Reno, Washoe County, the Governor's Office, hotel/resort owners' representatives, and other interested parties, SEA established the Reno Mitigation Task Force as an advisory group. The task force serves as a local forum to provide input throughout the study, to disseminate appropriate study information to the community, and to help define community issues. The task force has 19 members and designated alternates and includes a broad range of views, including representatives of the City of Reno, City of Sparks, Washoe County, regional and State agencies; the Governor's Office; and residential, business, casino, Native American, environmental, Union Pacific, warehousing, distribution, and other economic interests (See Appendix C for a list of task force members).

While the SEA-sponsored task force meetings are not subject to Nevada's public meeting law, SEA makes every effort to post all meeting agendas in advance. Meetings are fully open to the public and media, who regularly attend the meetings.

The task force has met monthly (seven times from January to July 1997) to discuss the progress of the mitigation study, technical information, and potential mitigation options. The task force has fulfilled the role that SEA envisioned in the preparation phase of the PMP. Meetings have promoted dialogue between interested parties and have provided opportunities for technical presentations to be made by SEA study team members, railroad representatives, and City and County officials. Specific topics for discussion at the meetings have included: increased train traffic resulting from emergency flooding conditions on the Feather River; local train survey data and verification of the data; jurisdiction and authority of the Board; interstate commerce issues; train projection methods, assumptions and results; noise and air quality issues; funding issues; and such potential mitigation options as highway/rail grade separations, increased train speeds, and a depressed railway. While diverse opinions exist among the task force members, the input received has helped to define the preliminary issues to be studied in the PMP.

The City representatives and several other task force members requested that additional task force meetings be held in the summer, that the entire study schedule be extended, and that the public review period be longer than 30 days. SEA conducted a task force meeting in July, but not in August, given the need to focus on finalizing the PMP so it would be ready for public review and comment in September. SEA plans to hold both a task force meeting and two public meetings on the PMP in October.

SEA did not modify the overall study schedule, because of the Board's direction to complete the 18-month study in February/March 1998. SEA provided a public review period for the PMP of 30 days to provide interested parties with a reasonable opportunity to present their views.

Task force members requested that they receive information materials in advance of the meetings, and SEA complied with that request when possible. The task force inquired about why there were differences in information provided to the Reno Mitigation Task Force and Wichita's parallel Mitigation Committee, and SEA explained that the studies have different issues and somewhat different schedules.

2.7.3 Briefings and Public Meetings

At the start of the study in October 1996, SEA study team members held a series of introductory meetings with City, County, and State agencies; elected officials; and community business leaders. During these meetings, SEA distributed an information packet containing background information about the study and details of the study's purpose. These materials are contained in Appendix D, except for materials that have been updated or already included in this report.

SEA held two open houses and public meetings in Reno on February 13, 1997, to allow for public review of preliminary mitigation options and maps illustrating the study area. Two meetings were conducted to maximize attendance by local residents, recognizing that Reno's tourist and gaming industries operate 24 hours a day. At the meetings, SEA staff and study team members made presentations detailing the history of the UP/SP merger, the role of the Board, an overview of railroad operations nationwide and locally, the proposed process for Phase 1 and Phase 2 of the mitigation study, and opportunities for public participation in the study. Materials in Appendix D were provided for the public.

Approximately 175 people attended the public meetings. SEA study team members answered questions and heard comments from those present. SEA provided comment sheets so that anyone interested could submit written comments to the Board. SEA incorporated these public comments into the public meeting summary, which was distributed to local and State officials as well as to members of the Reno Mitigation Study Task Force. This PMP takes into consideration the oral comments from the public meetings and the task force meetings, and the written comments submitted during and after the meetings.

SEA has scheduled another task force meeting and two public meetings for October 1997 to receive comments on the PMP.

2.7.4 Noticing

Before the February 13, 1997 open house/public meetings, SEA coordinated efforts with City and County officials and members of the Reno Mitigation Study Task Force to ensure the widest possible notification of the meeting. SEA sent meeting notification to more than 200 agency representatives and elected officials, business and economic interests, and other interested parties.

To inform the general public about the open house/public meetings, SEA ran a display ad twice in the *Reno Gazette-Journal* and sent meeting notices to local media outlets. SEA also issued a press release and placed a notice in the *Federal Register* announcing the meeting purpose, date, and location.

SEA plans similar notification efforts to accompany the publication of this PMP and to announce the public meetings scheduled for October 1997.

2.7.5 Media

In October 1996, members of the media who attended introductory meetings with the City of Reno received an information packet containing background information about the study, details of the study's purpose and schedule, and contact information for SEA study team members. Throughout the study, local media representatives have attended the Reno Task Force meetings. Local television stations and a *Wall Street Journal* reporter attended certain task force meetings. SEA has continued to provide, whenever possible, information upon request and during site visits to journalists from local newspapers and radio and television stations. In addition, the public meetings held in February 1997 were covered on SNCAT, a local television station in Reno.

SEA study team members have also monitored local newspaper reports of mitigation study-related issues. Close attention to media coverage has allowed the SEA study team to identify and respond to issues of public concern promptly as they arose. On March 28, 1997 and April 28, 1997, Elaine K. Kaiser, Chief of SEA and Project Director, wrote letters published in the *Reno Gazette-Journal* to clarify information regarding the mitigation study.

2.7.6 Public Review and Comment

SEA will provide a 30-day period for public review and comment on this PMP following the document's distribution on September 15, 1997. During this time, SEA encourages individuals to submit comments regarding the preliminary conclusions and mitigation options as presented in the plan.

To file comments, please submit an original plus 10 copies to the Board at:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, D.C. 20423-0001

Attention: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing - Reno

The public will also have an opportunity to review and comment on the FMP, which is scheduled for distribution in December 1997. All comments submitted to SEA at the above address will be entered in the public record and will be available to the Board as it makes its final decision regarding additional mitigation measures for the City of Reno and Washoe County, following the conclusion of the study.

2.8 Key Study Issues Raised by the Public

Since the beginning of the Reno Mitigation Study, SEA has maintained a dialogue with local and State officials, as well as interested members of the public. To facilitate this dialogue, SEA provided a variety of opportunities for public input through participation in public meetings and open houses, meetings of the Reno Task Force, ongoing opportunity to submit comments throughout the study process, and phone consultations with SEA study team members. SEA also has received numerous letters requesting information or raising concerns, all of which have been considered by SEA and the study team.

Appendix E contains a list of the major issues raised by the public to date. The list summarizes most written comments and letters, input received at the public meetings in February 1997, and input received at the seven task force meetings held to date. The list is organized by topic and identifies where in the PMP the topic is discussed.

The public input process in Reno has highlighted the diversity of opinion that exists regarding the UP/SP merger. During the course of the study, SEA has obtained input from the task force (which is a diverse body as described in Section 2.7.2), the City of Reno, the downtown and casino interests, parties that live or work adjacent to the railroad right-of-way, parties that depend on the railroad for business or economic interests, and other government and transportation agencies.

City of Reno officials and staff have been the most active in the public input process. The City has expressed concerns about the impact of increased rail traffic on the overall public health and safety of the community. Key issues raised by the City of Reno include pedestrian safety, emergency vehicle response, hazardous materials transport, the potential for derailments or train accidents, traffic delay, noise, air quality, endangered species, Native American issues, potential

impacts on the tourist industry, and funding. The projected number, length, and variation in future trains were also identified as issues by the City. The City of Reno has submitted extensive correspondence, which has been included in the public record. SEA has considered all of the City's written submittals in preparation of the PMP. SEA has responded to the City's comments in written correspondence, in task force meetings, and by provision of information in the PMP.

Initially, in actions taken on March 12, 1996 prior to the merger approval, the Reno City Council expressed support for the railroad to be rerouted to the I-80 corridor. Later in the study process, the City focused on a proposal to construct a depressed railway. At its February 18, 1997 meeting, the Reno City Council directed the City Manager to negotiate with UP representatives emphasizing the downtown depressed railway as the city's primary objective and to pursue all forms of funding sources. The City Council further directed that the City's litigation with the Board be continued and that the I-80 Corridor not be ruled out. On June 17, 1997, the City passed Resolution 5368 declaring the depressed railway project as a priority for the City of Reno. (Appendix F provides recent Reno City Council actions regarding UP/SP merger mitigation options.) From further studies done on the depressed railway, it has been estimated to cost in excess of $180 million. UP has offered to contribute $35 million to partially fund a depressed railway. However, the City has asked that UP pay $100 million. At the time of issuance of this PMP, this funding issue was not resolved (see Section 2.9).

Notwithstanding the parties' disagreements on how to fund a depressed railway, which SEA has announced would be a Tier 2 mitigation measure (only binding if there is a voluntary agreement to share cost), in the spring of 1997, Reno City officials and staff indicated that the City views a depressed railway as the most viable outcome. City staff members have further stated that the City does not consider requiring UP/SP to construct highway/rail grade separations in Reno to be acceptable mitigation. The City has serious concerns about another potential mitigation option, i.e., that of increasing train speeds. The City of Reno staff have actively participated in the task force meetings, and these views have been restated in the press.

The City of Sparks has focused its attention on potential impacts to the Sparks rail yard.

Washoe County has requested that the condition of existing railroad crossings and emergency access to areas with single access across the tracks be evaluated. The County has also suggested that a system be developed to alert emergency response providers with train location information. Other issues identified by the County include derailments, spills, and water quality, including possible impacts to the County's water supply system.

The Governor's office and other State agencies have expressed an interest in economic effects and in health and safety concerns.

Downtown business and casino owners have been very interested in issues regarding potential traffic delay, pedestrian safety, noise, impacts on tourism, funding for mitigation measures, and potential construction impacts of the mitigation options. The Downtown Improvement Association has requested that the option of an elevated railway be deleted from further study. The association is interested in all aspects of the depressed railway concept.

Native American interests have expressed concerns regarding hazardous materials transport, emergency response, noise, air quality, water quality, and endangered species. The Reno-Sparks Indian Colony has expressed concerns about SEA's consultation process and has stated its intent to participate in the City of Reno's lawsuit (see Section 2.3).

UP, through its participation in task force meetings and written submittals, has provided input on train traffic projections, initial feasibility of a depressed railway, and the feasibility of increasing train speeds. UP has also stated its views that UP is not responsible for mitigating preexisting conditions that occurred prior to the merger.

Some citizens have submitted letters in support of UP and the merger.

Section 2.8.1 provides an overview of key issues raised by the public organized into the following topics: potential environmental impacts, other potential impacts, train operations, comments in support of railroad activities, study scope and Board jurisdiction, potential mitigation measures, and cooperation among the parties.

2.8.1 Summary of Potential Environmental Impacts Identified by the Public

Emergency Response Delays

Police, fire, and ambulance representatives and Native American interests have expressed concern that local emergency response times may increase as a result of emergency vehicles having to wait longer and more often at railroad tracks while trains pass. Although emergency services exist on both sides of the tracks, the City has indicated that it believes emergency service response is a major community issue. Businesses have noted that Commercial Row provides the only access to the Old Reno Casino, creating a potential problem with fire truck accessibility during construction of a depressed railway option.

Pedestrian Safety

The existing UP (formerly SP) tracks bisect the downtown Reno area, and casinos and businesses have developed around the rail line. Downtown business interests have expressed concern that casino visitors and employee pedestrians are inconvenienced waiting for trains to pass. Others have noted that there have been accidents caused by vagrants loitering on the tracks. Pedestrian safety issues have been voiced regarding both existing conditions and the situation that will occur once UP increases rail traffic in Reno after the rail traffic cap is lifted. The City has requested that the impact of increasing train speeds on pedestrian safety be evaluated. State transportation officials have also noted a number of violations of pedestrian crossing gates.

Traffic Delays

Community members and business owners have expressed concerns that residents and tourists may be delayed as a result of an increase in number and length of trains through Reno. There is also concern that trains may block access to local businesses and workplaces for extended

periods of time. Some commentors noted that traffic on Keystone Avenue, a primary north-south route that crosses the tracks at grade, experiences delays.

Reno has experienced an upswing in growth in the century since the railroad's inception. The population increase has precipitated increased congestion, and some citizens feel this could be aggravated by the addition of more trains. City representatives have suggested that, for the analysis of potential vehicular traffic delay, 1995 vehicular traffic levels should be used as the baseline rather than Year 2000 traffic levels, which are used in the PMP for traffic analyses (see Section 6.2.1). On the other hand, UP has stated that vehicular traffic levels prior to 1995 should be used to evaluate potential delay impacts of pre- and post-merger train levels. As the basis for this position, UP cites the Board's Decision No. 44, which indicates that the mitigation study should not address preexisting conditions.

Hazardous Materials

There is local concern that an increase in trains running through Reno would increase the risk of hazardous spills. Some residents want specific measures to be taken to address potential toxic spills, beyond the minimum required by Federal standards. The City and Native American representatives are concerned that increased rail traffic along the Truckee River could affect threatened and endangered species due to the increased potential of hazardous materials spills. During consultation with the United States Fish & Wildlife Service (USFWS), it confirmed the existence of two species of concern in the study area: the Federally listed endangered fish, the cui-ui (*Chasmistes cujus*) and the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi),* also known as *Salmo clarki henshawi*, which inhabit Pyramid Lake, a tributary of the Truckee River.

Derailments

Some citizens have claimed that an increase in number and length of trains could result in a parallel increase in train derailments.

Air Quality

The Washoe County area is nonattainment for ozone, carbon monoxide, and PM_{10}. Increased air pollution in the area as a result of automobile exhaust from motorists waiting at blocked crossings is a key air quality issue.

Noise and Vibration

Some hotels in downtown Reno have received customer complaints about train noise. Local residents and business owners want the Board to mitigate noise from train horns. Residents of the Woodland area are especially disturbed by train horns.

Parties have commented that train wheels should be tested for noise levels and repaired if found faulty, and requests have been made that decibel limits should be mandated for wheel noise.

Local officials have asked the Board to review its standards for what are considered "noise receptors" (schools, hospitals, retirement homes), suggesting that commercial property and hotels be included. It was also suggested by the City that the night-weighted noise averages for calculating potential noise impacts may not apply in this study, because Reno operates as a 24-hour town. The noise descriptor used in the analysis is L_{dn}, which is the time-average of the noise levels obtained over a 24-hour period, with a 10-decibel penalty added to the nighttime levels (10:00 p.m. to 7:00 a.m.). This adjustment is intended to account for the increased sensitivity to nighttime noise events.

Preexisting Conditions

UP representatives have stated that the Board's Decision No. 44 specifically clarifies that UP is not responsible for mitigation of conditions resulting from pre existing development of hotels, casinos, and other tourist-oriented businesses adjacent to the rail line in Reno.

2.8.2 Other Potential Impacts Identified by the Public

Property Value

Local business and casino owners have expressed concern that mitigation options requiring construction will inconvenience customers. The Downtown Improvement Association has discouraged building an elevated track downtown because of concern about excessive noise and traffic congestion.

Quality of Life

Community, business, and neighborhood organization leaders are concerned that increased train traffic may have negative impacts on the development of the downtown area and convenient access to Reno's neighborhoods. At the initiation of this study, access to the Woodland area was from West 4th Street via Woodland Avenue, with no outlet past the tracks. Residents noted that an increase in the number of trains could jeopardize the expedient response by emergency vehicles to this area.

Warehousing and Distribution

The warehousing and distribution industries play a major role in Reno's local economy. Although Reno Lumber Service states that it lies in the direct path of the proposed depressed railway construction project, it has expressed support for this option. The owner of a local paper company noted that the railroad is relied upon for timely delivery by many local businesses.

2.8.3 Train Operations

Data

Local officials have questioned the accuracy and reliability of the data being used in the mitigation study regarding projected future train numbers, lengths, and speeds through Reno. They

have also requested information on projected variations in these numbers in the future. UP has provided detailed explanations of their train projection methodology and information on why it considers the projections to be reasonable.

UP's Projections

There is a concern that, after the 5-year period of Board oversight of the merger, which is pursuant to Decision No. 44, UP will not be required to maintain the level of its currently predicted train counts, lengths, and speeds. Rather UP would be allowed to increase the numbers of trains as much as market forces or freight needs require. City officials are concerned that they will have no means to keep UP committed to the level of activity stated in current projections.

2.8.4 Comments In Support of Railroad Activities

Comments received during the mitigation study recognized the benefits of railroad operations in Reno. Some citizens noted that the railroad served as a foundation for the development of northern Nevada. Members of the public criticized the City of Reno for lack of foresight in permitting building adjacent to the tracks. Others expressed concern that limiting the number of trains could interfere with the railroad's profitability. Some citizens noted that the railroad is the City's largest taxpayer.

2.8.5 Scope of Study and Board Jurisdiction

Study Scope

City representatives expressed concern that the mitigation options under consideration have been formulated prematurely by SEA before there is full agreement on the potential environmental impacts of the merger. City officials would like the Board to prepare a site-specific EIS for the Reno area. Some citizens expressed concern that SEA's analysis may have overlooked certain issues such as the potential environmental impacts on the Woodland area. Others have stated that increased rail traffic from the Port of Oakland, California as a result of the expanded UP Oakland operations needs to be studied, and they have questioned the use of 25.1 as the post-merger average number of trains that would operate through Reno. In 1995, a daily average of 12.7 SP freight trains operated through Reno prior to the merger.

Jurisdiction Over Other Parties

The City has expressed dissatisfaction with the Board's Tier 1 (UP mandated and solely funded) and Tier 2 (voluntary and shared funding) mitigation approach, as defined in Decision No. 71. Representatives of City agencies question whether the Board has the authority to require the City of Reno or other parties to fund mitigation options, or otherwise participate in mitigating the potential environmental impacts of UP's increased train traffic levels.

Some task force members requested that the study distinguish between the roles of the FRA, the Nevada Public Service Commission (NPSC), and the Board.

2.8.6 Mitigation Measures

Options

Area residents expressed an interest in knowing what criteria the Board will use when choosing from among the various mitigation options. They also requested that the SEA study team consider potential environmental impacts caused by the mitigation options themselves and define who would be responsible for mitigating those potential environmental impacts.

Depressed Railway

Many community members felt that lowering the tracks would be the best solution for all concerned. The Reno City Council has endorsed the depressed railway as a priority for the City and the City's primary objective for downtown. Those in favor of building a depressed railway feel that this option would solve potential noise impacts, facilitate access to local businesses, unite a community split by the railroad, and improve downtown streets such as Lake, Center, Virginia, Sierra, West, Arlington, Ralston, Washington, Vine, and Keystone. Parties who question the viability of the proposed depressed railway fear the trench would create groundwater problems, jeopardize business with noisy construction, not address problems with Arlington and Lake streets, and be subject to flooding and litter. Others state that enclosing the tracks in a tunnel and extending them further west would be a good solution.

Elevated Tracks

The Downtown Improvement Association has asked that the elevated track option not be considered downtown for fear of losing customers and has concerns regarding construction noise and dust. Woodland area residents, however, felt this measure would alleviate access concerns in their neighborhood.

Highway/Rail Grade Separations

Some Reno residents want overpasses, pointing to Sparks as an example of an area where train delays are minimal due to overpasses. The expressed downside to overpasses is that they can create negative aesthetic impacts and may not be easy to construct without adverse impacts.

Some citizens favored the construction of underpasses, especially at Evans and Keystone avenues. Underpasses could be built one at a time to minimize inconvenience.

Rerouting of trains

Early in the study, the City of Reno stated that rerouting trains to a new rail line route parallel to I-80 and bypassing the downtown area would be a viable solution.

Funding

Although several individuals commented that the Board should require UP to pay entirely to mitigate the potential environmental impacts of the railroad merger, others suggested that the City, State, and Federal government and the casinos should all take some responsibility. The City also suggested that UP's profit margins be taken into account by the SEA study team when recommending mitigation measures.

Compliance

City officials requested that the post-merger limit placed on train traffic (an average of two additional freight trains per day above the 1995 daily average) during the study be maintained until the chosen mitigation measures can be implemented. City officials also questioned who would ensure compliance with the required measures and wanted to know what recourse the City would have against UP if it failed to implement the mitigation measures. This is discussed in Section 8.4.3.

2.8.7 Cooperation Among Parties

Some individuals commended UP for taking the first step in offering funding for a mitigation measure, and they recommended that local government follow suit. Some citizens noted if UP is given an incentive, mitigation measures could be quickly implemented. Safety, noise, and pollution issues would be best addressed together by both the City and UP. Others have indicated that the City of Reno should drop its lawsuits and exist peacefully with the railroad.

2.9 Private Negotiations

Throughout the mitigation study process, SEA has encouraged a private resolution. UP and the City of Reno were in private negotiations to explore the feasibility and funding of the depressed railway from February through June 1997. UP offered $35 million to partially fund the depressed railway. The City of Reno then requested that UP increase its funding to $100 million and UP declined.

The City of Reno withdrew from negotiations in June 1997, because additional funding was not offered by UP as requested by the City. At that time, UP stated it was still willing to continue to negotiate with the City at any time. In July 1997, UP notified the City that it planned to pursue discussions with downtown business interests, and UP invited the City via a letter to participate in those discussions. At the time of the issuance of this PMP, the City and UP have not reached any formal mitigation agreements that were submitted to SEA for review.

Section 3
STUDY AREA

3.1 Introduction

This section provides an overview of the Reno and Washoe County, Nevada study area, its history, and community characteristics. Planning policies contained in adopted City plans that pertain to the railroad are also summarized.

3.2 Community Characteristics

3.2.1 Historical Background [2]

Located in Washoe County, the City of Reno has historically been the regional center for goods, services, education, and cultural and recreational activities serving the smaller communities in northern Nevada and northeastern California.

The town was originally developed more than a hundred years ago by the transcontinental North American Railroad, which chose the site for its strategic location and natural suitability for commerce. In 1868, the Central Pacific Railroad purchased a tract of land and established the street grid and town platting that still exists in contemporary downtown Reno.

Initially, Reno grew as a classic railroad town. Local commerce and the City core developed from east to west along Commercial Row, adjacent to the rail corridor. Residential areas were situated beyond the tracks to the north, and Virginia Street was the main north-south artery through town. The central business core gradually shifted to the south, away from the tracks to Virginia Street between the train station and the Truckee River.

Reno remained primarily a railroad town until the early 1930s when the legalization of gambling and a growing number of casinos shifted the economic emphasis from rail-based commerce to tourism. The growth of the legalized gaming industry continued to expand south of the railroad tracks until after World War II.

In 1947, the City Council adopted the "Red Line Ordinance," which restricted casino gambling to a commercial district along Virginia Street. This restriction prevented the development of casinos elsewhere in the City. Although the boundaries of the Red Line area expanded during the 1950s and 1960s, the designated gambling district remained south of the tracks.

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[2] Background information for this section was obtained from the following sources:

Prof. Paul F. Starrs, Ph.D. and Associates, *Downtown Reno & The Railroad - A Report of the Project on Historical Growth & Development of Downtown Reno*, Nevada, June 1997.

Reno City Council and Planning Commission, *Draft City of Reno Master Plan Part One: Growth and Development*, November 1996.

In 1970, the Reno City Council removed the original Red Line Ordinance, thereby permitting gaming establishments outside of the designated downtown district. The removal of this ordinance triggered the rapid growth of new casinos and hotels during the 1970s and 1980s as well as the migration of development north of the railroad tracks. This northward growth movement was also encouraged by the construction of I-80 between Seventh and Eighth streets and the availability of affordable land north of the tracks. Table 3-1 shows the hotels/casinos north of the rail right-of-way that were approved for development since 1970. This northward expansion meant that the railroad tracks were again in the center of the downtown area. Figure 3-1 is an aerial view of the downtown Reno area.

Table 3-1
Hotels Developed North of Rail Right-of-way Since 1970

Hotel	Year Developed	Number of Rooms
Eldorado	1970-75	248
Sundowner	1970-75	300
Gold Dust Hotel/Casino	1978	101
Circus Circus	1978	102
Sands (addition)	1979	163
Eldorado (addition)	1979	283
Sundowner (addition)	1980	293
Gold Dust Hotel/Casino	1980	19
Circus Circus (addition)	1981	986
Gold Dust Hotel/Casino	1982	120
Sands (addition)	1983	282
Circus Circus (addition)	1985	986
Eldorado (addition)	1989	366
Silver Legacy	1995	1,720
	Total Hotel Rooms	**5,969**

Source: *Downtown Reno & The Railroad*, Prof. Paul F. Starrs, Ph.D. and Associates, 1997, pg. 22.

Auto-oriented subdivisions and outlying retail centers now surround downtown Reno and its traditional neighborhoods. However, the downtown remains an important economic center supported by the tourist industry.

SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

PRELIMINARY MITIGATION PLAN

UP SP Merger Mitigation Study Reno

September 1997

FIGURE 3-1

Downtown Reno Area, 1995

3.2.2 Population and Demographic Characteristics

Demographic characteristics for the City of Reno and Washoe County are derived from the 1990 U.S. Census of Population and Housing[3] and from forecasts prepared by the Washoe County Department of Community Development.[4]

Population

Between 1980 and 1990, Washoe County grew by 61,044 people to a total population of 254,667, a 32 percent increase over ten years. The population grew at a similar rate for the City of Reno, from 100,756 in 1980 to 133,850 in 1990. Population forecasts prepared by Washoe County indicate that the City of Reno will grow to 172,003 by the year 2000, a 29 percent increase over ten years, and that the County will grow by 26 percent to a total population of 321,500.

Ethnic Mix

Ethnic composition for the City of Reno is derived from 1990 Census data. The racial categories are as follows: Caucasians (86 percent); Afro-American (three percent); American Indian/Eskimo/ Aleutian (one percent); Asian/Pacific Islander (five percent); and other races (five percent). Persons of Hispanic origin, representing 11 percent of the population, were sampled separately and are included in more than one ethnic category.

Age and Gender

In 1990, 12 percent of Reno's population was 65 years or older, and 19 percent was less than sixteen years of age. Fifty-one percent of the population was male; 49 percent were female.

Households

In 1990, there were 57,286 households in the City of Reno, with an average of 2.25 persons per household. Family households represented 56 percent of the total households.

Employment

An estimated 78,794 civilians, age sixteen and over, constituted Reno's labor force in 1990. Of this total, 74,448 persons were employed and 4,346 (six percent), were unemployed. The above-defined labor force includes individuals who reside in the City of Reno, but may or may not commute to jobs elsewhere. Forty-five percent of the employed labor force were women.

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[3] U.S. Department of Commerce, Bureau of the Census, *1990 Census of Population and Housing*.

[4] Washoe County Department of Community Development, *Washoe County Consensus Forecast, 1995-2015*, July 1995.

Technical, sales, and administrative support occupations represented 33 percent of the labor force. Managerial and professional specialty occupations represented 25 percent of the labor force. Service occupations represented 23 percent of the labor force; operators, fabricators, and laborers were 10 percent; precision production, craft, and repair occupations represented eight percent; and farming, forestry, and fishing occupations made up one percent of the labor force.

Fifty-four percent of the employed labor force was in the service industries; 21 percent in wholesale and retail trade; eight percent in transportation, communications, and other public utilities; six percent in manufacturing; six percent in construction; one percent in agriculture, forestry, and fisheries; and less than one percent in mining.

Income

The 1990 median household income for the City of Reno was $28,388. Based on the 1990 Census, poverty status was determined for 10 percent of the households in the City.

3.2.3 Housing and Businesses

Residential Characteristics

In 1990, there were 61,384 total housing units in the City of Reno. Forty-five percent were single-family units; 47 percent multi-family; six percent mobile homes; and two percent other. Owner-occupied units represented 40 percent of the total. Renter-occupied units composed 53 percent, and seven percent of the units were vacant.

Forty-seven percent of Reno's housing stock was built between 1960 and 1980. The median year for construction of housing units was 1973. Twenty-four percent of the housing was built prior to 1960 and approximately 30 percent after 1980. The median owner-occupied household value for the City of Reno in 1990 was $109,800; and the median gross rent was $492.

Business Characteristics [5]

Gaming and tourism are the primary industries and mainstay of Reno's economy. In 1995, gross gaming revenues were close to $693 million.

The Reno-Sparks Convention Center encompasses 370,000 square feet of convention space and other support facilities, including the Pioneer Center for the Performing Arts, the Reno Livestock Events Center, Lawlor Events Center, and the new National Bowling Stadium.

The City of Reno *Fact Finding Report*[5] notes that, "downtown Reno is a high-density commercial and recreational area with 13,075 licensed hotel and motel rooms within one-half mile

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[5] Background information for this section was obtained from: Kleinfelder, SEA (Incorporated), Strategic Project Management, Inc., Nolte and Associates, Inc., *Railroad Merger Study Fact Finding Report*, prepared for the City of Reno, March 1996.

of the tracks. . ." Two new entertainment resorts have recently been added: The Silver Legacy and Harrah's Hampton Inn Hotel.

Several special tourism events are hosted by the City, including the Great Reno Balloon Races, Hot August Nights, and the National Championship Air Races.

A variety of other industries are based in the Reno area, including Blue Cross/Blue Shield, Gannett Company, International Game Technology, Porsche North America, Ricoh Corporation, Reno Air, and State Farm Insurance Company.

Three major hospitals, which provide emergency treatment and a wide-range of medical care to the region, are located in the Reno area.

The City of Reno is home to the University of Nevada with an enrollment of more than 12,000 students and to a variety of cultural opportunities including the Reno Philharmonic Orchestra and two ballet companies.

Reno's geographical location places it in a natural position for the warehousing and distribution industries. It is centrally located within a 13-state region and serves as a hub for cities like Portland, Seattle, San Francisco, Los Angeles, Phoenix, Albuquerque, and Salt Lake City. These industries are a major contributor to the overall economy of Reno and Washoe County. In 1995, UP/SP brought in or took out over 35,000 cars or trailers of freight.

3.3 Key Planning Policies

The SEA study team reviewed the City of Reno's and the Redevelopment Agency's planning documents to determine how their policies relate to the railroad. This section summarizes these policies. Reviewed documents include:

- City of Reno, *Amendment to the Redevelopment Plan for the Downtown Redevelopment Area Reno, Nevada 1990*, December 14, 1990.
- City of Reno, *City of Reno Master Plan Part One: Growth and Development*, November 1, 1996.
- City of Reno, *City of Reno Master Plan Part Two: Community Design Handbook*, November 1, 1996.
- City of Reno, *Plan Report Downtown Redevelopment Area Reno, Nevada 1990*, November 27, 1990.
- City of Reno, *Reno, Nevada Downtown Development Plan*, March 4, 1983.
- City of Reno, *Revised Project Report Railroad Merger Mitigation Alternatives*, July 10, 1996.
- City of Reno Redevelopment Agency, *Center City Housing Strategy for the City of Reno*, November 7, 1995.
- City of Reno Redevelopment Agency, *Reno Downtown Traffic/Parking Study*, December 1995.

- City of Reno Redevelopment Agency, *The Blueprint: A Revitalization Strategy for Downtown Reno*, December 8, 1992.

Several documents prepared prior to the merger address physical conditions adjacent to the existing railroad track through downtown Reno. For example, *The Blueprint: A Revitalization Study for Downtown Reno* states that ". . . minimize[ing] the effects of the railroad on the downtown . . ." is a major issue regarding redevelopment of the entertainment core area.[6] The study proposes improvements along the railroad corridor such as street lighting and landscaping (trees and honeysuckle along chain-link fences) along the railroad right-of-way.[7] The *Amendment to the Redevelopment Plan for the Downtown Redevelopment Area Reno, Nevada 1990* has similar proposals:[8]

- Encourage attractive landscaping adjacent to the tracks whenever possible.
- Promote the reduction of the dust adjacent to the tracks by encouraging dust-free surfaces.
- Promote a mechanism to maintain a clean track side.
- Encourage the improvement of the visual quality of fencing and maintenance of fencing for safety.

The City's redevelopment plans also identify railroad-related impacts on noise and public health and safety as a concern. The *Amendment to the Redevelopment Plan* has policies stating the following: "encourage the railroad to reduce and/or abate noise caused by the crossing signs and train 'whistle'" and "encourage the abatement of noise caused by trains."[9] The *City of Reno Master Plan Part Two: Community Design Handbook* policy number UC-12 states: "To protect the health and safety of its visitors, any potential adverse effects of the railroad line must be identified and mitigated."[10]

Several policies suggest that the City of Reno be proactive in working with the railroad in planning and problem solving. This is evident in the *Amendment to the Redevelopment Plan*'s policy to "encourage working relationships with the Southern Pacific Railway Company to improve

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[6] City of Reno Redevelopment Agency, *The Blueprint: A Revitalization Strategy for Downtown Reno* (December 1992), "Entertainment Core."

[7] City of Reno Redevelopment Agency (December 1992), "Railroad Treatment (Present & Proposed)."

[8] City of Reno Redevelopment Agency, *Amendment to the Redevelopment Plan for the Downtown Redevelopment Area Reno, Nevada 1990* (November 1990), pg. 26.

[9] City of Reno Redevelopment Agency (November 1990), pp. 22, 26.

[10] City of Reno, *City of Reno Master Plan Part Two: Community Design Handbook* (November 1996), pg. 11.

conditions at and adjacent to the tracks."[11] The *City of Reno Master Plan Part Two* also contains policies supporting involvement with the railroad: [12]

- CD-46: Work with the railroad in planning new lines and spurs. Discourage new railroad lines and spurs through residential areas.
- UC-17: Work with the railroad company to coordinate schedules to minimize rail traffic through Reno during peak hours.

Other policies address reuse or refurbishment of railroad buildings. The *City of Reno Master Plan Part Two* policy number UC-16 states "Identify and encourage the refurbishment and reuse of existing buildings along the railroad tracks and public acquisition of railroad right-of-way along the river for public purposes."[13] Policy number UC-14 is more specific: "Encourage and assist in the refurbishment of the building now used by Amtrak to make it an attractive facility for visitors and an asset to the downtown area."[14] The *Amendment to the Redevelopment Plan* outlines these policies: [15]

- Identify existing railroad buildings that could be reused by the public or private sector and work to promote the purchase of these from the railway companies.
- Promote the investigation, and support of, the refurbishment of the railway station on Commercial Row to make it an attractive facility to visitors.

The *Reno Downtown Traffic/Parking Study* identifies the railroad as a major traffic constraint in the downtown area.[16] The study states that Amtrak trains arriving and departing cause traffic interruption. The study suggests relocating the Amtrak station and forming a multimodal transportation hub that also provides bus service. [17]

The study indicates that freight trains have a larger impact to downtown traffic.[18] Lowering the tracks below grade through the downtown area is an option that continues to be considered by the City. The idea of underpasses at Arlington and/or Evans Avenue has been discussed, to a limited

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[11] City of Reno Redevelopment Agency (November 1990), pg. 26.

[12] City of Reno (November 1996), pp. 10, 12.

[13] City of Reno (November 1996), pg. 12.

[14] Ibid., pg. 12.

[15] City of Reno Redevelopment Agency (November 1990), pg. 26.

[16] City of Reno Redevelopment Agency, *Reno Downtown Traffic/Parking Study* (December 1995), pg. 48.

[17] City of Reno Redevelopment Agency (December 1995), pg. 49.

[18] Ibid., pg. 49.

extent, as an alternative to lowering the tracks. [19] The *Amendment to the Redevelopment Plan* also contains policies addressing the impacts of trains on vehicular and pedestrian traffic: [20]

- Promote the investigation of tunneling under the tracks to provide for enhanced vehicular and pedestrian traffic circulation.
- Encourage shorter trains coming into the area so as not to disturb and disrupt vehicular street traffic.

Other policies suggest passenger trains as part of the solution to traffic. The *Amendment to the Redevelopment Plan* states: "Encourage the establishment of 'shuttle' trains from Reno to Sparks,"[21] while the *City of Reno Master Plan Part Two* policy number UC-13 suggests: "Encourage and promote Amtrak passenger service to downtown Reno." [22]

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[19] City of Reno Redevelopment Agency (December 1995), pg. 50.

[20] City of Reno Redevelopment Agency (November 1990), pp. 26, 29.

[21] City of Reno Redevelopment Agency (November 1990), pg. 26.

[22] City of Reno (November 1996), pg. 12.

Section 4
RAILROAD OPERATIONS

4.1 Regulation of Interstate Railroads

Railroads and their operations are governed by three primary government agencies. As noted in Section 2, the Surface Transportation Board (Board) governs railroad mergers and related activities, including railroad rail line abandonments and constructions, and to a limited extent, rates and service.

The Federal Railroad Administration (FRA) is the agency with primary expertise and jurisdiction in railroad safety. The Federal Railroad Safety Act of 1970 gave the Secretary of the Department of Transportation (DOT) rulemaking authority over all areas of railroad safety and conferred all the powers necessary to detect and penalize violations of any rail safety law. This authority was subsequently delegated to the Administrator of the FRA. Commencing in 1893, Congress began enacting laws concerning discrete rail safety problems. FRA has issued implementing regulations and/or interpretations under each of the statutes written since 1893. FRA regulations cover such topics as dispatching procedures, track safety standards and safe track speeds, train crew hours of service, accident reporting, and inspection and testing of train cars and locomotives, railroad signals, and trains. FRA regulations are found in 49 CFR 200-268 (1996). Violation of the statutes or implementing regulations generally subjects the railroad to liability for a civil penalty ranging from $500 to $20,000 per violation for every day the offense continues. FRA has issued substantive safety regulations in more than twenty subject areas, and the FRA enforces DOT hazardous materials regulations for rail facilities and operations.

State safety participation regulations, 49 CFR 212(1996), establish standards and procedures for state participation in investigative and surveillance activities under the Federal railroad safety laws and regulations. The principal role of the state safety participation program is to provide an enhanced investigative and surveillance capability through the participation of state agencies in safety compliance inspections. The Nevada Public Service Commission (NPSC) participates in investigative and surveillance activities with respect to particular rules, regulations, orders, or standards issued under the regulatory authority of the Federal Railroad Safety Act of 1970. Certified NPSC inspectors can enforce FRA regulations, but they cannot assess penalties, issue emergency or compliance orders, or institute, or cause to be instituted, actions for collection of civil penalties or for injunctive relief. The NPSC also has a major public education program for railroad safety, including its "Operation Lifesaver" program, which is provided through the State of Nevada. In addition, the NPSC reviews railroad compliance with Nevada administrative and regulatory statutes.

Local cities and communities have no regulatory approval authority over railroad mergers, or over the construction and operation of rail lines that are part of the interstate rail network (See 49 U.S.C.§1132 (a)). A transaction approved under 49 U.S.C. §11323-25 (the merger statute) is exempt from state or local law "as necessary to let that rail carrier carry out the transactions . . . and operate properly."

4.2 Rail Activities in Reno and Surrounding Area

Union Pacific (UP) Railroad's (formerly SP's) Central Corridor route bisects Reno and Washoe County. This is a major transcontinental route linking Midwest locations such as Chicago, Kansas City, and St. Louis with California cities such as Oakland, Sacramento, and Stockton.

Figure 4.2-1 shows the total UP route system. Figure 4.2-2 shows the portion of the UP system between Oakland and Salt Lake City. The Central Corridor Route is referred to by other names that include "the Overland Route" and the "Donner Pass route." The former Southern Pacific (SP) route is historically important because it is a part of the nation's first east-west transcontinental railroad.

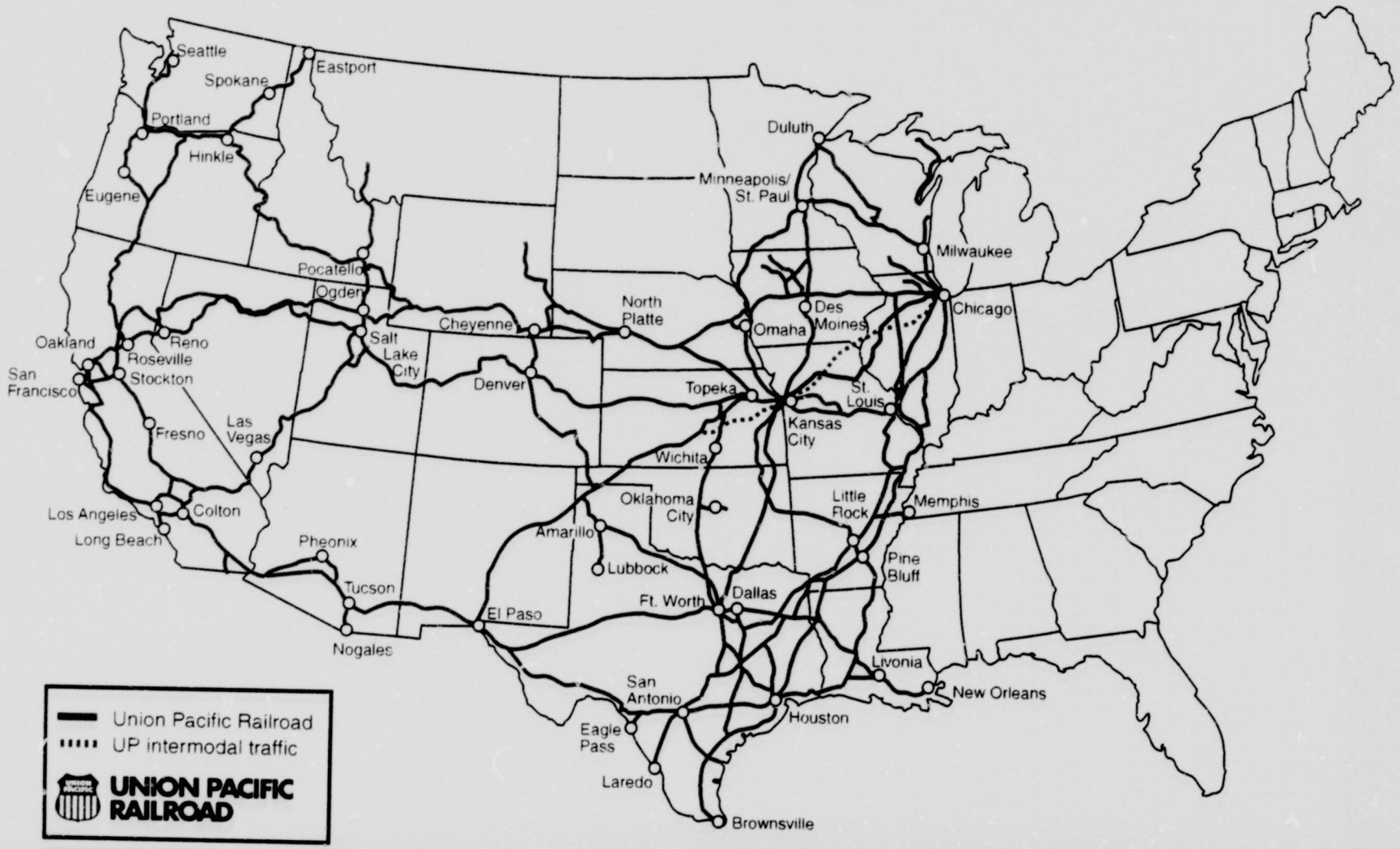
The rail line through Washoe County has double tracks from the California border eastward through Reno and the Sparks Yard to Vista, which is about two miles east of Sparks. Eastward from Vista to the Washoe County line, the rail line has single track with frequent passing sidings. The double track segment has an automated block signal (ABS) system, while the single track segment is controlled using a centralized traffic control (CTC) system.

The Sparks Yard is the major rail facility in the area. It is a crew change point, and every through freight train stops there. Main components of the yard include five one-mile long arrival/departure tracks, a number of shorter support tracks, an intermodal loading/unloading facility, Amtrak car service tracks, and yard office buildings.

Freight trains generally pass through downtown Reno at 20 mph, which is the established train speed limit for this segment of track. Freight train movements through downtown Reno are designed to be continuous, i.e., they do not stop as a matter of practice. Stops may occur because of unusual occurrences or situations, e.g., an eastbound train may be delayed awaiting clearance into the yard. There is little switching activity in downtown Reno. UP's switch engines make two to four trips per week through town.

Amtrak's *California Zephyr* stops twice daily at the Reno passenger station (one train in each direction). These stops can take 15 minutes or longer and block vehicular traffic on Center Street. The Board has no jurisdiction of Amtrak's operations.

The number of trains passing through Reno has varied over the years. For example, an SP dispatcher's train sheet for Reno/Sparks Line, June 5, 1947, shows 40 daily freight and passenger trains. From that period to the 1980s, traffic declined to about 24 daily trains. During this period, UP acquired the Western Pacific Railroad, providing the UP with its own route between Ogden-Salt Lake City and California. Thus, SP lost a major source of interchange traffic at Ogden. This, in connection with the declining financial position of SP, led to a further decline in traffic levels. By 1994, the average daily through freight train count in Reno was 12.7 freight trains. Because of traffic reroutes, traffic in 1996 declined further to an average of approximately 11.0 trains a day. Section 4.4 presents projected freight train levels in the future under the merger.


Seattle
Spokane
Eastport
Portland
Hinkle
Eugene
Duluth
Minneapolis/
St. Paul
Milwaukee
Pocatello
Ogden
North
Platte
Chicago
Des
Moines
Omaha
Cheyenne
Oakland
Reno
Roseville
Salt
Lake
City
San
Francisco
Stockton
Denver
Topeka
St.
Louis
Kansas
City
Fresno
Las
Vegas
Wichita
Oklahoma
City
Little
Rock
Memphis
Los Angeles
Colton
Long Beach
Amarillo
Pheonix
Lubbock
Pine
Bluff
Tucson
Dallas
Ft. Worth
El Paso
Nogales
Livonia
San
Antonio
New Orleans
Houston
Eagle
Pass
Laredo
Brownsville
Union Pacific Railroad
UP intermodal traffic
UNION PACIFIC
RAILROAD

Salt Lake City to Northern California

4.3 Train Cap Imposed During Mitigation Study

As part of Decision No. 44, the Board placed limits on the increase in the number of freight trains allowed through Reno during the 18-month mitigation study period. As shown in Figure 2.4-1, the limit imposed by the Board during the study is no more than a daily average count of 14.7 freight trains per day. This daily average limit represents the 1995 baseline average of 12.7 trains per day plus an average of two additional freight trains. It does not include Amtrak operations, local switching trains, "helper" locomotive units, or the operation of emergency trains.

The Board permitted UP/SP to add only an average of two additional freight trains a day to the affected rail line segment, because this increase is below the threshold level for environmental analysis in the Board's environmental regulations. For air quality nonattainment areas such as Reno, the Board's environmental rules permit railroads to operate up to three additional trains per day. Therefore, the environmental status quo essentially has been preserved in Reno pending the determination of the exact additional mitigation measures to be required for Reno in this mitigation study.

4.4 Train Projections

Table 4.4-1 shows the existing baseline (1995) and the anticipated Year 2000 train traffic through Reno. A daily average of 13.8 trains passed through Reno in 1995, which includes an average of 1.1 Amtrak trains daily.[23]

Table 4.4-1
Average Daily Freight Train Volumes Through Reno (1995 and Projected Future Year 2000)

Source of Train	Number of Trains		
	1995 [1]	Projected for Five Years Following UP/SP Merger [2]	Increase
Amtrak	1.1	1.1	0.0
Burlington Northern/Santa Fe	0.0	4.0	4.0
Union Pacific/Southern Pacific	12.7	20.0	7.3
Daily Total	**13.8**	**25.1**	**11.3**

Notes: [1] Based on train statistics provided by UP/SP.
[2] Based on UP/SP Operating Plan and verified statements filed with the Board, 1995 and 1996.

With the merger, in the Year 2000, the average number of daily through trains is expected to increase from 13.8 to 25.1 trains per day. This includes a daily average of 20 UP through freight

[23] Amtrak train operations are not under the jurisdiction of the Board. Amtrak's California Zephyr now operates daily one passenger train in each direction. For consistency between the merger application, the Environmental Assessment (EA), and Post EA, the 1.1 average Amtrak trains per day is shown in this Section.

trains and four Burlington Northern/Santa Fe (BN/SF) trains,[24] with an assumed continuation of an average 1.1 Amtrak trains daily.[23] When Amtrak is excluded, the total is 24 freight trains per day.

Therefore, an increase of 11.3 through freight trains is projected to occur by the Year 2000 under the merger, including 7.3 UP freight trains and four BN/SF freight trains. These projected train traffic levels are based on the UP/SP operating plan and its verified statements filed with the Board and were formulated using computer models developed by UP (see Section 4.4.1).

The City of Reno has stated that the projected number should be 38 trains per day. This number uses 22 (rather than 13.8) trains per day as the baseline and projects train levels to the Year 2015 (rather than 2000). The 1995 average daily through freight trains was 12.7 trains per day, and, as noted in Section 4.4.5 below, the average daily traffic for eight months in the year 1996 was 10.8 trains per day. Based on its experience in rail mergers, the Board's Section of Environmental Analysis (SEA) has found that train traffic projections beyond a five-year period are speculative, at best.[25] SEA, therefore, used the train projections contained in Table 4.4-1 as the basis for its analysis in this PMP of potential environmental impacts and possible mitigation measures for increased train traffic levels in Reno resulting from the merger. Additional rationale for this approach is provided in the following sections.

4.4.1 Train Projection Methodology

As part of its application to the Board for the merger, UP used detailed computer modeling to develop its train and traffic density projections, starting with 100 percent of the 1994 train traffic counts for the full UP/SP system and a one percent waybill sample for off-system moves. An outside consultant to UP then simulated the flow of this traffic through the merged railroad system (34,000 miles of route) to develop line densities. Individual cars were routed through the system, based on the most efficient route between origination and destination.

The model also tracked yard activity and assigned cars to particular tracks and trains. Tonnage and number of car parameters were set for various types of trains (e.g., bulk, intermodal, manifest, and auto trains). The model used a set of basic assumptions to estimate traffic diversions from/to other railroads. Use of these "extended haul rules" is similar to what has been done in other mergers.

Development of train densities involved a number of progressive steps (iterations). First, train densities were put into a computer model replicating 1994 conditions. Adjustments were then made to reflect traffic changes resulting from the BN/SF merger and the settlement agreements included as part of the UP/SP merger proceedings. In addition, UP's rail traffic department and outside consultants retained by UP provided estimates of new traffic resulting from the proposed merger. These data were included in the rail traffic model. The result was a detailed and

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[24] Under the merger, BN/SF now has trackage rights along the line through Reno.

[25] UP provided a five-year train traffic projection as part of its merger application; other merger applications have provided only three-year projections.

comprehensive post-merger train traffic density projection developed using state-of-the-art analytical techniques.

In assessing rail traffic projections, the Board generally looks at projections of three years in railroad mergers. Here, UP provided five-year projections, stating that this represents UP's projections for its reasonably foreseeable future for a combined UP/SP system.

Table 4.4.1-1 shows the specific types of freight trains and their projected frequency through Reno, based on UP's projections.

Table 4.4.1-1
Projected Average Daily UP/SP Trains Through Reno in Year 2000

Train Identifier	Predicted Frequency	Type	Predicted Length in Feet
CHMIV	Daily	Automotive	4,725
CSOAZ	Daily	Intermodal	5,660
DUOAT	Daily	Intermodal	5,110
G1OAD	Daily	Double stack	4,720
G1OADB	Three times per week	Double stack	4,720
G1STX	Five times per week	Double stack	1,035
G2OAD	Daily	Double stack	4,900
KSBEV	Daily	Automotive	3,570
MINPV	Daily	Automotive	3,540
NPRV(1)	Daily	Manifest	5,275
NPRV(2)	Daily	Manifest	4,500
OACST	Five times per week	Intermodal	2,160
OACSZ	Five times per week	Intermodal	3,545
OADUT	Daily	Intermodal	4,790
OAG1D	Daily	Double stack	6,860
OAG1D6	Once per week	Double stack	6,765
OAG1D8	Once per week	Double stack	6,765
RVAS	Daily	Manifest	4,770
RVNP(2)	Five times per week	Manifest	6,120
RVPRB	Daily	Manifest	2,845
RVSC	Daily	Manifest	2,685
SCRV	Daily	Manifest	4,915
STCST	Five times per week	Intermodal	990

Source: UP/SP Operating Plan and verified statements filed with the Surface Transportation Board in 1995 and 1996.

The weighted average length of trains for these projected trains is 4,300 feet. The projected height for double stack container trains (using "high-cube" domestic containers) is 20 feet, 2 inches -- the maximum permissible under American Association of Railroads (AAR) Mechanical Division standards. The current height of double stack trains through Reno is 19 feet, 2 inches.

4.4.2 Rate of Train Traffic Increases

Based on the model results, the number of UP/SP freight trains passing through Reno is not expected to increase immediately. Rather the increase is expected to be gradual between 1995 and the projection Year 2000. Projected increases would require changes to the Roseville Rail Yard (in California) and increased tunnel clearances in the mountains west of Reno.

4.4.3 Independent Review

As a part of the review process for the EA and Post EA, SEA's study team interviewed UP officials regarding the methodology and databases that were used to develop the train projections. To further verify the data, SEA's study team performed reasonableness checks on rail line segments to confirm continuous traffic flows. During the course of the pre-merger proceedings, traffic density figures were supplemented twice in verified statements from UP to reflect changes resulting from the BN/SF settlement agreement and the Chemical Manufacturers' Association settlement agreement. The new figures were also tested for reasonableness by the SEA study team. Based on this independent review, SEA has accepted the UP projections.

4.4.4 Port of Oakland

The Port of Oakland, California has announced plans for the development of a major new container terminal on property formerly used by the U.S. Navy. This facility is referred to as the Joint Intermodal Facility (JIT). Plans for this facility include a number of tracks where double stack intermodal trains would be loaded/unloaded. The City of Reno has expressed concern that this facility will be a major source of new intermodal rail traffic that will be routed through Reno.

The SEA study team reviewed planning documents for the JIT and found that it is proposed to be constructed in three phases. In Phase I, a temporary JIT would be constructed to replace the existing railroad intermodal facilities so that construction on marine terminal facilities can begin. The Phase I temporary JIT is expected to be in service by late 1999. Currently, Phase I is under design, but construction has not begun. A Phase 2 expansion is planned to be operational by mid-2001. Phase 3, the final build-out, is expected to be in service by early 2005.

Ship channels leading to the proposed terminal are too shallow to permit unrestricted movement of the largest container ships. Some ships must move at a high tide and these ships are key to the competitive position of the ports and shipping lanes serving the trans-Pacific trades. It took more than ten years to obtain permits and complete the last dredging project at the Port of Oakland. The Environmental Impact Statement (EIS) for the new channel dredging project is scheduled for completion in 1998, and a five-year construction schedule is being sought.

In light of these factors, major expansion at the Port of Oakland plans appears to be beyond the reasonably foreseeable Year 2000 train projection horizon. UP train traffic projections accounted for merger-related growth and the BN/SF intermodal traffic share at Oakland. UP did not modify its train traffic projections in anticipation of the proposed new Oakland intermodal facilities, which are clearly not merger-related. Last year, international container traffic at the Port of Oakland actually declined by 13 percent.

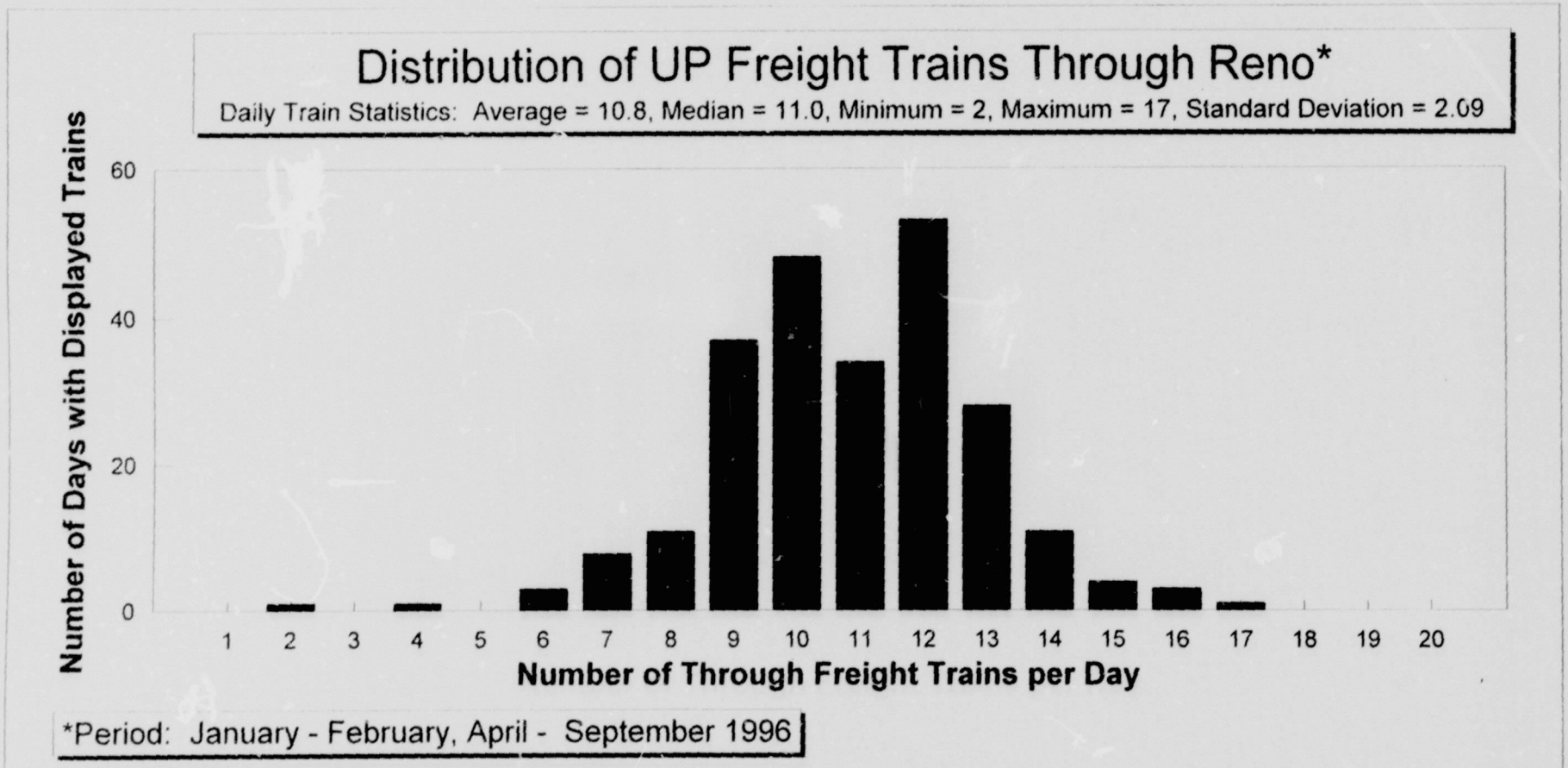
4.4.5 Variations in Daily Train Numbers

The City of Reno requested that variations in the number of projected trains in the future be identified. Given that future numbers are more speculative, the most reasonable way to identify possible variations in average daily train counts appeared to be a review of train count variations in the recent past. SEA therefore requested from UP actual counts of the number of freight trains passing through Reno on a daily basis for a sample period in the year 1996. UP provided such data for the months of January through February and April through September 1996. Other months for that year were not available.

Based on an analysis of these eight months of data, freight trains passing through Reno illustrated the following characteristics:

- Average number of freight trains = 10.8 per day.
- Median number of freight trains = 11 per day.
- Minimum number of freight trains = 2 per day.
- Maximum number of freight trains = 17 per day.
- **Standard deviation of daily freight trains = 2.09.**

Figure 4.4.5-1 shows the number of days that a given number of freight trains passed through Reno. Table 4.4.5-1 provides the actual freight train counts on a daily basis for the eight-month period.


Distribution of UP Freight Trains Through Reno*
Daily Train Statistics: Average = 10.8, Median = 11.0, Minimum = 2, Maximum = 17, Standard Deviation = 2.09
Number of Days with Displayed Trains
0
20
40
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Through Freight Trains per Day
*Period: January - February, April - September 1996

Number of Through Freight Trains on UP/SP Mainline in Reno, NV in 1996

Daily Train Statistics: Average = 10.8, Median = 11.0, Minimum = 2, Maximum = 17, Standard Deviation = 2.09

DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS	DATE	FREIGHT TRAINS
01-Jan	2	01-Feb	9	01-Apr	11	01-May	10	01-Jun	11	01-Jul	10	01-Aug	10	01-Sep	15
02-Jan	14	02-Feb	8	02-Apr	10	02-May	12	02-Jun	10	02-Jul	12	02-Aug	10	02-Sep	10
03-Jan	12	03-Feb	13	03-Apr	13	03-May	11	03-Jun	9	03-Jul	10	03-Aug	9	03-Sep	10
04-Jan	10	04-Feb	10	04-Apr	9	04-May	10	04-Jun	9	04-Jul	9	04-Aug	11	04-Sep	7
05-Jan	10	05-Feb	12	05-Apr	12	05-May	10	05-Jun	13	05-Jul	12	05-Aug	9	05-Sep	12
06-Jan	15	06-Feb	9	06-Apr	10	06-May	12	06-Jun	12	06-Jul	9	06-Aug	13	06-Sep	12
07-Jan	16	07-Feb	12	07-Apr	11	07-May	11	07-Jun	14	07-Jul	12	07-Aug	13	07-Sep	9
08-Jan	14	08-Feb	10	08-Apr	12	08-May	10	08-Jun	8	08-Jul	14	08-Aug	10	08-Sep	12
09-Jan	11	09-Feb	13	09-Apr	12	09-May	8	09-Jun	11	09-Jul	12	09-Aug	10	09-Sep	12
10-Jan	10	10-Feb	12	10-Apr	11	10-May	16	10-Jun	11	10-Jul	12	10-Aug	9	10-Sep	10
11-Jan	13	11-Feb	13	11-Apr	10	11-May	11	11-Jun	10	11-Jul	11	11-Aug	12	11-Sep	11
12-Jan	13	12-Feb	14	12-Apr	13	12-May	9	12-Jun	10	12-Jul	11	12-Aug	16	12-Sep	13
13-Jan	12	13-Feb	12	13-Apr	8	13-May	12	13-Jun	13	13-Jul	10	13-Aug	9	13-Sep	6
14-Jan	12	14-Feb	13	14-Apr	12	14-May	12	14-Jun	8	14-Jul	10	14-Aug	9	14-Sep	11
15-Jan	12	15-Feb	7	15-Apr	11	15-May	10	15-Jun	7	15-Jul	9	15-Aug	12	15-Sep	9
16-Jan	14	16-Feb	10	16-Apr	9	16-May	8	16-Jun	9	16-Jul	10	16-Aug	10	16-Sep	11
17-Jan	12	17-Feb	14	17-Apr	13	17-May	10	17-Jun	13	17-Jul	12	17-Aug	12	17-Sep	12
18-Jan	8	18-Feb	13	18-Apr	8	18-May	11	18-Jun	14	18-Jul	14	18-Aug	10	18-Sep	10
19-Jan	13	19-Feb	10	19-Apr	9	19-May	11	19-Jun	11	19-Jul	4	19-Aug	9	19-Sep	9
20-Jan	10	20-Feb	10	20-Apr	12	20-May	12	20-Jun	13	20-Jul	9	20-Aug	12	20-Sep	9
21-Jan	11	21-Feb	9	21-Apr	10	21-May	11	21-Jun	12	21-Jul	12	21-Aug	11	21-Sep	13
22-Jan	9	22-Feb	8	22-Apr	9	22-May	10	22-Jun	13	22-Jul	10	22-Aug	11	22-Sep	10
23-Jan	8	23-Feb	9	23-Apr	10	23-May	12	23-Jun	11	23-Jul	11	23-Aug	12	23-Sep	12
24-Jan	7	24-Feb	7	24-Apr	9	24-May	13	24-Jun	9	24-Jul	11	24-Aug	6	24-Sep	10
25-Jan	10	25-Feb	11	25-Apr	13	25-May	12	25-Jun	9	25-Jul	9	25-Aug	12	25-Sep	9
26-Jan	15	26-Feb	8	26-Apr	11	26-May	12	26-Jun	9	26-Jul	10	26-Aug	12	26-Sep	9
27-Jan	10	27-Feb	6	27-Apr	13	27-May	11	27-Jun	10	27-Jul	13	27-Aug	7	27-Sep	12
28-Jan	9	28-Feb	7	28-Apr	12	28-May	12	28-Jun	7	28-Jul	12	28-Aug	13	28-Sep	11
29-Jan	17	29-Feb	12	29-Apr	11	29-May	12	29-Jun	14	29-Jul	11	29-Aug	10	29-Sep	13
30-Jan	12			30-Apr	10	30-May	13	30-Jun	12	30-Jul	9	30-Aug	15	30-Sep	9
31-Jan	11					31-May	13			31-Jul	12	31-Aug	14		
Average	**11.4**		**10.4**		**10.8**		**11.2**		**10.7**		**10.7**		**10.9**		**10.6**

Section 5
DATA COLLECTION

5.1 Purpose and Activities

The Surface Transportation Board's (Board's) Section of Environmental Analysis (SEA) study team collected extensive data during Phases 1 and 2 of the Reno Mitigation Study. Data collection was designed to assure a complete and focused understanding of issues as well as potential environmental impacts of the increase in freight train traffic through Reno and Washoe County as a result of the merger, and to allow for a careful evaluation of possible mitigation options. General data collection efforts are summarized in Section 5.2. Train survey collection activities are discussed in Section 5.3.

5.2 Agency and Public Contacts

The SEA study team contacted numerous agencies, associations, businesses, railroad representatives, and elected officials (listed in Table 5.2-1) to obtain their views and compile relevant information. The types of information gathered and issues raised during meetings and telephone consultations are summarized in Table 5.2-1 below.

Table 5.2-1
Businesses, Associations, Agencies, and Legislators Contacted

Businesses, Associations, Agencies, and Legislators Contacted	Types of Information/Issues
Businesses	
• Amtrak (Oakland, California)	Business, operational issues
• Circus Circus Hotel/Casino (Reno, Nevada)	Business, economic issues
• Dermody Properties (Reno, Nevada)	
• Eldorado Hotel/Casino (Reno, Nevada)	
• Environmental Management Associates (representing Reno, Nevada)	City environmental issues
• Fitzgerald's Hotel/Casino (Reno, Nevada)	Business, economic issues
• Flamingo Hilton Hotel/Casino (Reno, Nevada)	
• G & S Investment Company/Scout Development Corporation	Engineering data
• Harrah's (Reno, Nevada)	Business, economic issues
• John Ascuaga's Nugget Hotel/Casino (Sparks, Nevada)	
• MADCON Consultation Services, (representing Reno, Nevada)	City environmental issues
• Nolte and Associates (representing Reno, Nevada)	Engineering data
• Paula Berkley and Associates (Reno, Nevada)	Native American issues
• Pyramid Engineering (representing Reno, Nevada)	Engineering data
• Sands Regency Hotel/Casino (Reno, Nevada)	Business, economic issues, engineering data
• Silver Legacy Hotel/Casino (Reno, Nevada)	Business, economic issues
• Strategic Project Management (representing Reno, Nevada)	Engineering data

Table 5.2-1
Businesses, Associations, Agencies, and Legislators Contacted

Businesses, Associations, Agencies, and Legislators Contacted	Types of Information/Issues
Businesses (Continued)	
• Summit Envirosolutions (representing Reno, Nevada)	City environmental issues
• Union Pacific (Omaha, Nebraska)	Business and railroad issues and data, train prediction model, train speed feasibility analysis, historical railroad issues
• WESTEC (Reno, Nevada)	Engineering data
Utility Companies	
• Nevada Bell	Engineering data
• Santa Fe Pacific Pipelines	
• Sierra Pacific Power Company	
• Sprint/MCI/AT&T	
• TCI Cable	
Associations	
• Economic Development Authority of Western Nevada (Reno, Nevada)	Business, economic issues
• Nevadans for Fast & Responsible Action (Reno, Nevada)	Policy issues
• Regional Emergency Medical Services Authority -- REMSA (Reno, Nevada)	Emergency services information
• Reno Downtown Improvement Association (Reno, Nevada)	Business, economic issues
• Reno-Sparks Chamber of Commerce (Reno-Sparks, Nevada)	
• Reno-Sparks Indian Colony	Native American issues
• River Banks Homeowners	Neighborhood issues
• Pyramid Lake Paiute Tribal Council	Native American issues
• Washoe Tribal Council	
Agencies -- City of Reno	
• City Attorney's Office	Zoning ordinances
• City Manager's Office	City policy positions
• Community Development Department	City master plan
• Department of Public Works	Street standards, engineering drawings
• Fire Department	Emergency services information including district maps
• Police Department	
• Redevelopment Agency	Redevelopment plans
Agencies -- City of Sparks	
• Planning & Community Development (Sparks, Nevada)	City of Sparks' issues, including viability of warehousing industry
Agencies -- Washoe County	
• County Manager	County issues, including outlying, single access point RR crossings
• Department of Community Development	
• Department of Comprehensive Planning	
• Assessor's Office	Property data (assessed value, ownership)

Table 5.2-1 Businesses, Associations, Agencies, and Legislators Contacted	
Businesses, Associations, Agencies, and Legislators Contacted	**Types of Information/Issues**
Agencies -- Regional	
• District Health Department (Reno, Nevada)	Air quality data
• Reno - Sparks Visitor's Convention Authority	Engineering data
• Regional Transportation Commission (Reno, Nevada)	Transit information
Agencies -- State of Nevada	
• Department of Transportation (Carson City, Nevada)	Traffic data
• Division of Environmental Protection (Carson City, Nevada)	Environmental issues
• Governor's Office (Carson City, Nevada)	State policy position
• Public Service Commission (Carson City, Nevada)	Commission jurisdictional data
Agencies -- Federal	
• Federal Railroad Administration (Monterey, California & Washington, D.C.)	Regulatory program data
• Fish and Wildlife Service (Reno & Gardiner, Nevada)	Information regarding threatened and endangered species and train spills in Truckee River
Legislators -- Local	
• City Council Members (Reno, Nevada)	City policy and issues
• Mayor (Reno, Nevada)	
Legislators -- County	
• County Commission Chair	County issues, including groundwater contamination
Legislators -- State	
• State Senators	State policy issues
• State Assembly Members	

5.3 Field Work -- Train Data Survey

Data compilation involved not only consultations with and collection of data from agencies, corporations, and other interests identified above, but also site visits in which actual conditions in Reno and the surrounding area were observed. Some of the most useful information for analysis of potential environmental impacts was gathered during the field work that occurred following the early-1997 floods in northern California. Due to the floods, Union Pacific (UP) had to close, on an emergency basis, the Feather River rail route between January 6, and March 4, 1997 and increase the number of trains passing through Reno.[26] This provided the SEA study team with an opportunity to actually observe and assess the effects of train traffic at a level (approximately 20 freight trains per day) approaching that projected to exist in post-merger conditions.

[26] Condition 22(a)(4) of Decision No. 44, provided that the train cap of two additional trains did not apply to emergency trains operated under detour authority, for snow removal, fire, and other natural disaster purposes.

During the increased train activity in Reno and Washoe County, the SEA study team conducted a survey of train traffic through Reno on the UP/SP mainline from 7 a.m. on Monday, February 3, 1997 through 7 a.m. on Monday, February 10, 1997. During this period, the SEA study team also measured train noise and speed and counted vehicular traffic crossing the tracks on Keystone, Arlington, Sierra, Virginia, and Center streets. Pedestrians blocked by trains were also counted for these five streets. The following sections discuss train data collection methodology and results.

5.3.1 Methodology

Train and Traffic Survey

Figures 5.3.1-1 and 5.3.1-2 show entry forms used for the train data survey. Figure 5.3.1-1 shows the entry spaces for data and illustrates the area around the railroad grade crossings of the downtown streets of Arlington, Sierra, Virginia, and Center. Figure 5.3.1-2 shows the entry spaces for data and illustrates the area around the Keystone Avenue grade crossing. Data recorded on the forms during the survey included the following:

1. Observed street grade crossing.
2. Date.
3. Train direction.
4. Gate down time.
5. Observed elapsed time.
6. Gate up time (optional).
7. Number of train cars.
8. Number of locomotives.
9. Cars queued by the closed gate on the north side of the tracks.
10. Cars queued by the closed gate on the south side of the tracks.
11. Pedestrians queued by the closed gate on the north side of the tracks.
12. Pedestrians queued by the closed gate on the south side of the tracks.
13. Surveyor's name.
14. Notes.

For items 9 and 10, the surveyor had the option of showing the length of the queue of cars delayed by the train by marking the map. Surveyors recorded data in two 12-hour shifts, beginning at 7 a.m. and 7 p.m. After the survey, the SEA study team screened, verified, and entered the data into a computer database.

Data verification involved a joint effort among representatives of the City of Reno, UP, and the SEA study team and included a comparison of survey results with videotapes of grade crossings that were filmed independently by the City of Reno. UP furnished actual train length data that were added to the database. Appendix G includes a full printout of the train survey database.

UP/SP MERGER MITIGATION STUDY RENO

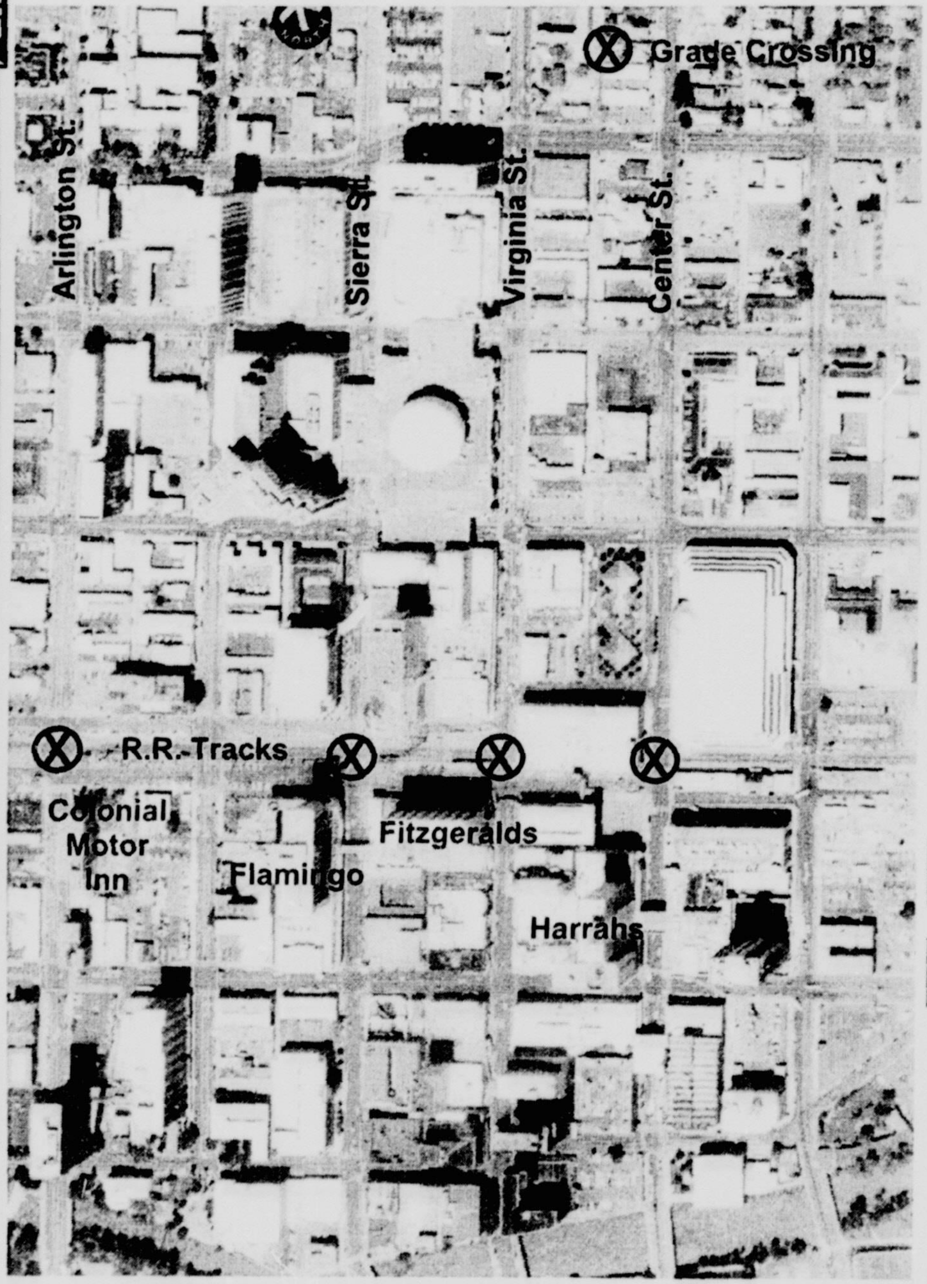
SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

September 1997

PRELIMINARY MITIGATION PLAN

FIGURE 5.3.1-1

Sample Data Entry Form-Arlington through Center Streets



1. STREET CROSSING:

☐ KEYSTONE ☐ ARLINGTON ☐ SIERRA ☐ VIRGINIA ☐ CENTER

2. DATE:

☐ MON. 2/3/97 ☐ TUES. 2/4/97 ☐ WED. 2/5/97 ☐ THURS. 2/6/97 ☐ FRI. 2/7/97 ☐ SAT. 2/8/97 ☐ Sun. 2/9/97

3. GATE DOWN TIME:

☐ AM ☐ PM

	HOUR	MIN	SEC
START		:	:

	HOUR	MIN	SEC
END		:	:

	MIN	SEC
ELAPSED	:	

4. NUMBER OF TRAIN CARS AND LOCOMOTIVES:

	NUMBER
☐ LOCOMOTIVES	
☐ TRAIN CARS	

5. WHEN GATE OPENS

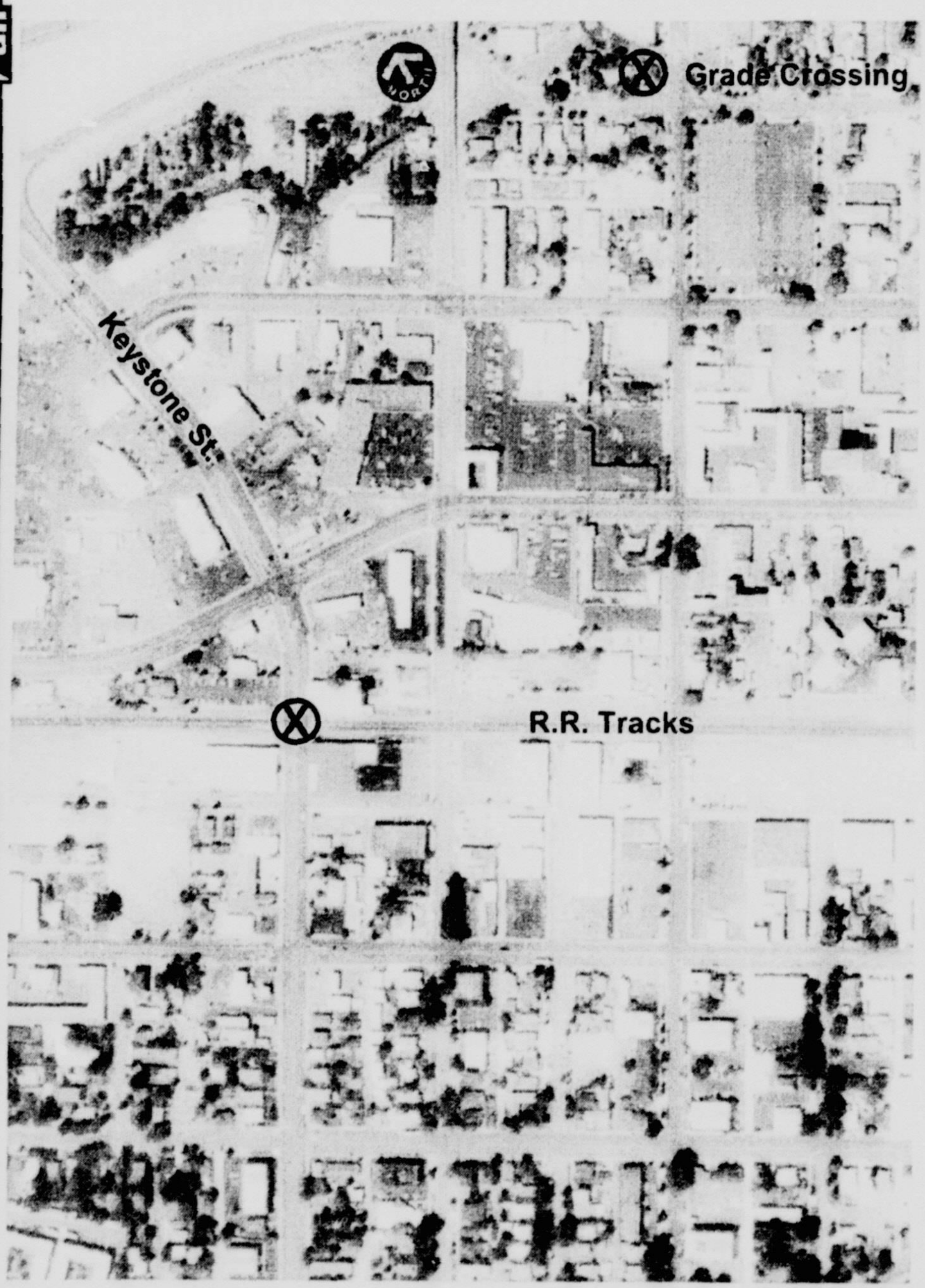
WAITING TO GO NORTH	NUMBER
☐ PEDESTRIANS	

MARK AERIAL FOR CARS

WAITING TO GO SOUTH	NUMBER
☐ PEDESTRIANS	

MARK AERIAL FOR CARS

NAME



1. STREET CROSSING:

☐ KEYSTONE ☐ ARLINGTON ☐ SIERRA ☐ VIRGINIA ☐ CENTER

2. DATE:

☐ MON. 2/3/97 ☐ TUES. 2/4/97 ☐ WED. 2/5/97 ☐ THURS. 2/6/97 ☐ FRI. 2/7/97 ☐ SAT. 2/8/97 ☐ Sun. 2/9/97

3. GATE DOWN TIME:

☐ AM ☐ PM

	HOUR : MIN : SEC
START	: :

	HOUR : MIN : SEC
END	: :

	MIN : SEC
ELAPSED	:

4. NUMBER OF TRAIN CARS AND LOCOMOTIVES:

	NUMBER
❐ LOCOMOTIVES	
❐ TRAIN CARS	

5. WHEN GATE OPENS

WAITING TO GO NORTH	NUMBER
❐ PEDESTRIANS	

MARK AERIAL FOR CARS

WAITING TO GO SOUTH	NUMBER
❐ PEDESTRIANS	

MARK AERIAL FOR CARS

NAME

FIGURE 5.3.1-2
Sample Data Entry Form-Keystone Street

During the train survey, the SEA study team counted vehicular traffic on the five surveyed streets. The survey included mechanical counts of street traffic volumes by 15-minute periods. The SEA study team corrected some minor gaps and entered these data into a database (Appendix H). The following sections include summary graphs from the survey databases. Traffic data were verified by review of the videotapes, including a review of sample situations on several streets to define a relationship between approaching traffic volumes and average dissipation rates of vehicles delayed by trains.

Train Noise and Speed Measurements

The SEA study team conducted train noise and speed measurements in Reno during the survey week. On-site noise measurements took into account site-specific sound issues such as actual train/horn equipment, shielding due to buildings, ground absorption, and the variability of train horn sounding sequences. Noise measurements included the following:

- Long-term measurements: The survey team measured two locations for wayside train and horn noise during several 24-hour periods at two locations. The purpose of these measurements was to document train noise events during the train survey week and to provide actual measurements of the 24-hour L_{dn} (the day-night average noise level used for identification of potential noise impacts in the study).
- Ambient Measurements: The survey team measured ambient noise (i.e., the noise environment without trains).
- Short-term measurements: The survey team took hand-held noise measurements at three distances along a radial extending perpendicularly from the tracks at eight locations to characterize site-specific sound issues.

The SEA study team used a radar gun to determine speeds of 17 trains at the short-term noise measurement locations.

5.3.2 Train Data Survey Results

Train and Traffic Surveys

The findings from the train and traffic surveys are summarized in the following paragraphs. Figure 5.3.2-1 summarizes the number of trains passing through downtown Reno between 7 a.m., February 3, and 7 a.m., February 10, 1997. The survey recorded an average of 20 through freight trains per day. The recorded data indicate an average of 1.7 Amtrak trains per day and 3.6 other types of trains per day including work trains, local freights, locomotives traveling light, and inspection vehicles. Over the survey week, there was a minimum of 18 and a maximum of 23 freight trains per day. The average freight train length for the survey week was 4,600 feet.

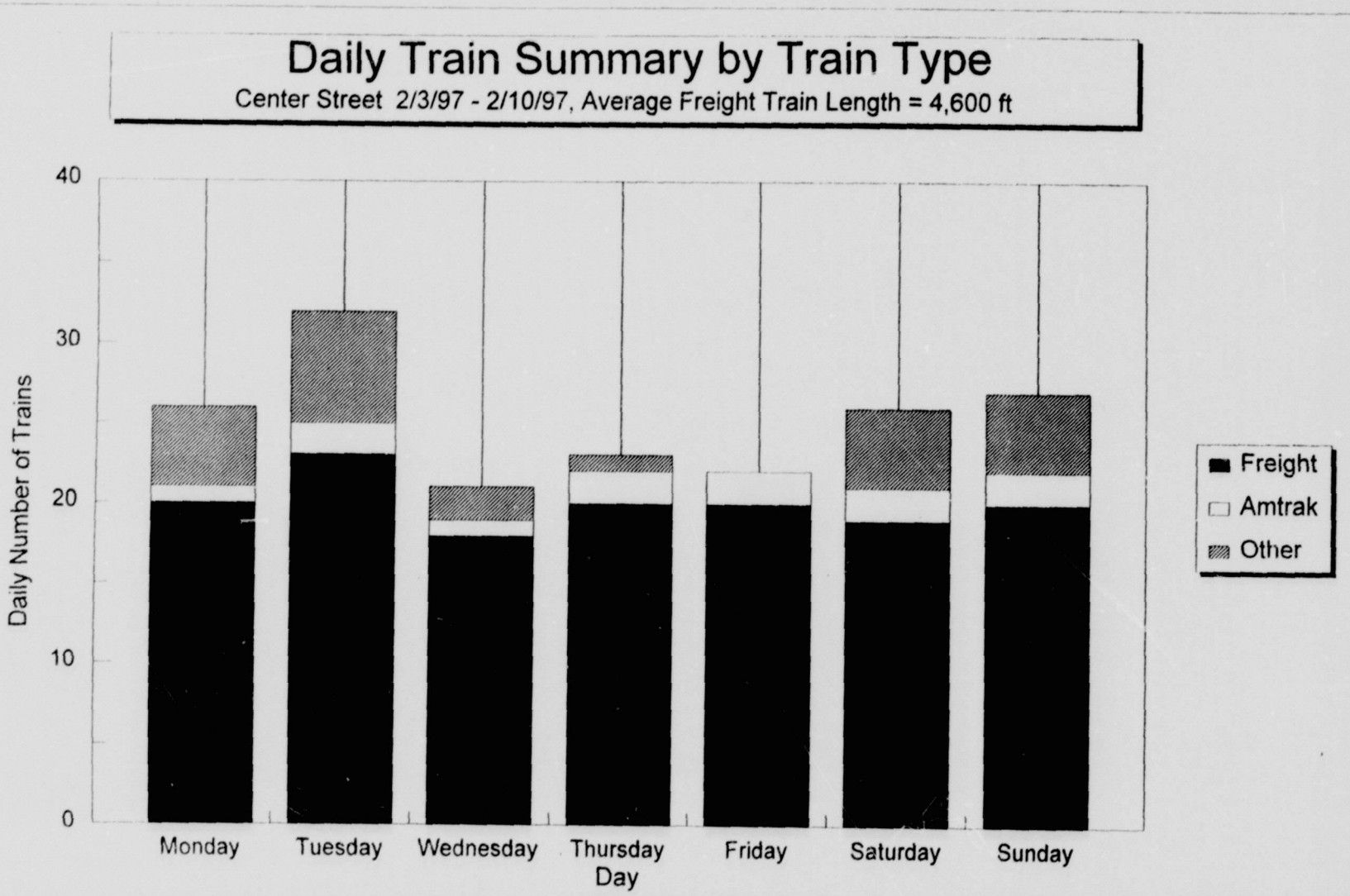

Daily Train Summary by Train Type
Center Street 2/3/97 - 2/10/97, Average Freight Train Length = 4,600 ft
Daily Number of Trains
40
30
20
10
0
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Day
Freight
Amtrak
Other

Figure 5.3.2-2 illustrates the calibrated average daily (vehicular) traffic (ADT) measured during the survey period on each of the five streets. ADT by street ranged from a high of 19,900 vehicles per day for Keystone Street to a low of 4,400 vehicles per day for Center Street. Center Street traffic was probably lower than normal given that the Center Street bridge over the Truckee River was closed for repairs. ADT volumes on the other three streets ranged from 6,900 to 10,500, indicating that Keystone is a primary north-south route that crosses the tracks at-grade. Figure 5.3.2-3 depicts, by street, the numbers of vehicles delayed crossing the tracks during the survey period. The number of vehicles delayed generally follows the traffic pattern by street.

Keystone Avenue had the highest traffic levels and the highest number of vehicles delayed, with an average of 1,300 vehicles delayed per day. Center Street had the lowest traffic levels and the lowest number of vehicles delayed, with an average of 190 vehicles delayed per day. The total number of vehicles delayed for all five streets was approximately 3,100 per day.

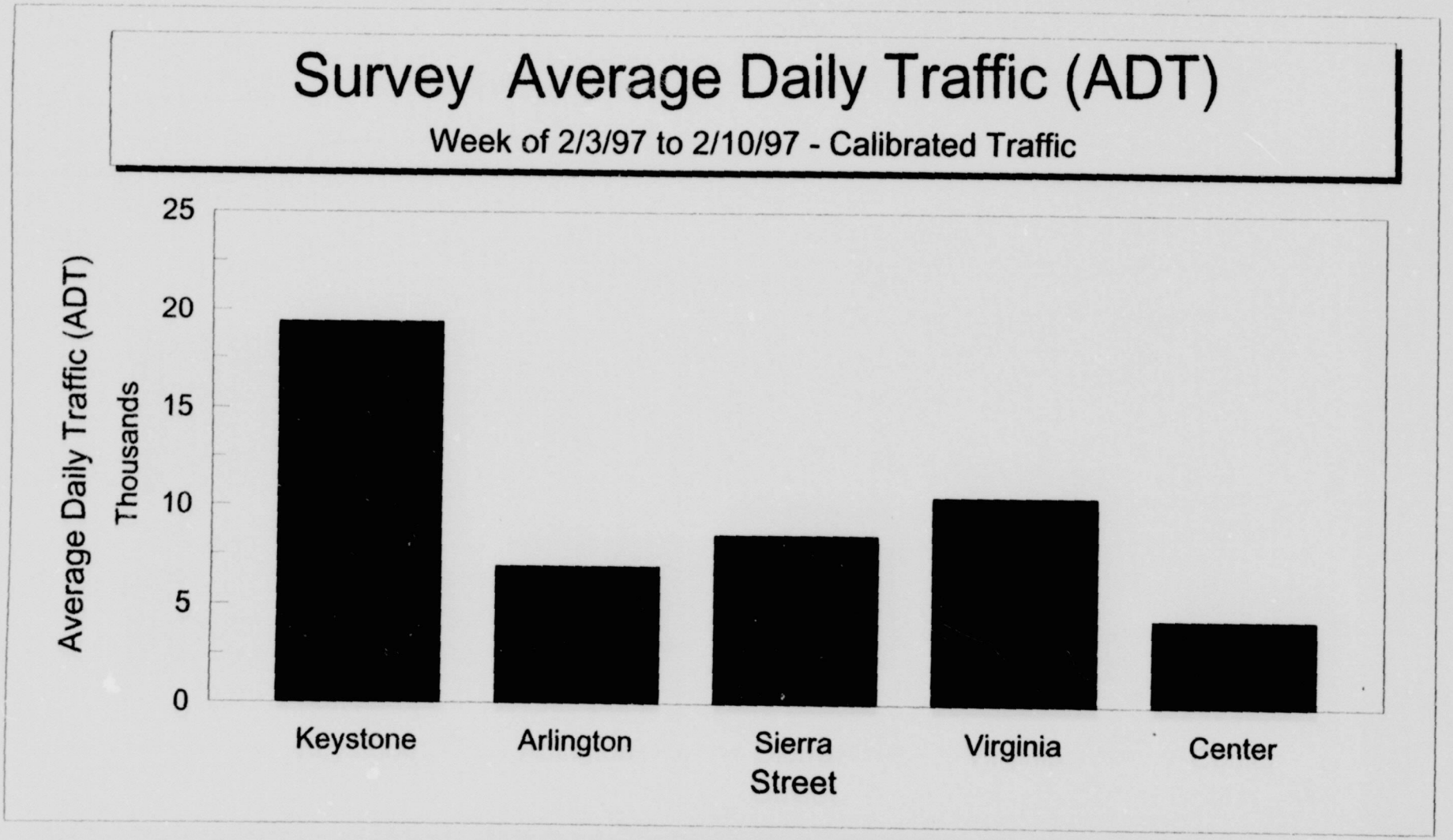
Train Noise Results

The SEA study team collected noise measurements at three locations A, B, and C along each of eight radial lines to quantify how train noise drops off with distance, shielding, and ground effects. Locations and findings regarding these noise measurements are presented in Section 6.2.9.

Train Speed Measurements

The survey team used a radar gun to determine speeds of 17 trains at the short-term noise measurement locations. Table 5.3.2-1 lists the recorded train speeds at the short-term locations.

The data identified above are used in the following sections to aid in the analysis of potential environmental impacts and possible mitigation measures for increased train traffic levels associated with the UP/SP merger.


Survey Average Daily Traffic (ADT)
Week of 2/3/97 to 2/10/97 - Calibrated Traffic
Average Daily Traffic (ADT)
Thousands
25
20
15
10
5
0
Keystone
Arlington
Sierra Street
Virginia
Center

Vehicles Delayed Crossing Tracks

Week of 2/3/97 to 2/10/97 - From Freight Trains Only

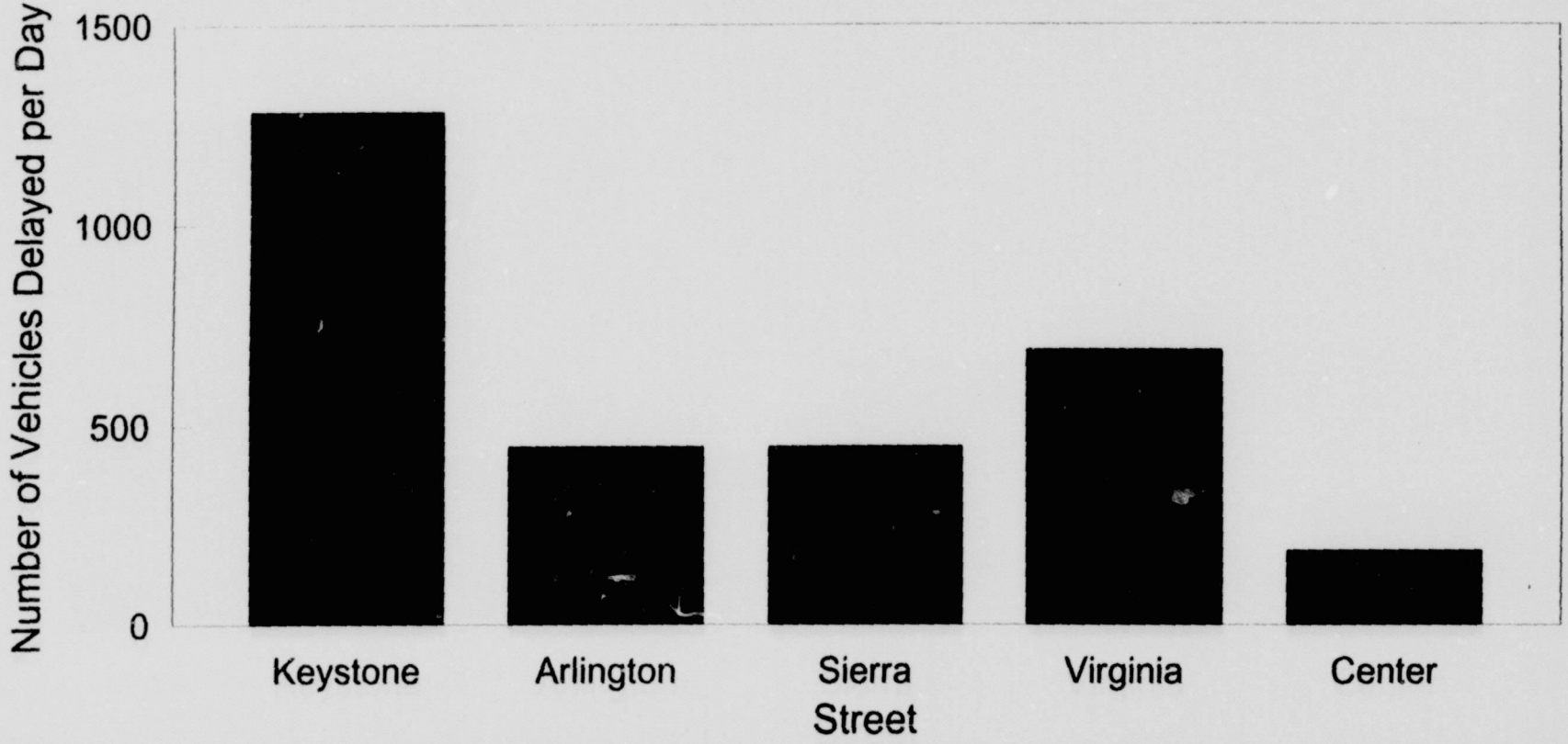


Table 5.3.2-1 Train Speed Measurements			
Location	**Date**	**Time**	**Speed (mph)**
Virginia	2/3/97	10:46	17
Virginia	2/4/97	10:45	20
Woodland	2/6/97	10:19	45
Woodland	2/6/97	10:40	39
Woodland	2/6/97	10:51	17
Woodland	2/6/97	11:04	44
Washington	2/4/97	14:07	18
Washington	2/4/97	15:03	22
Oxbow Park	2/6/97	14:16	21
Oxbow Park	2/6/97	14:37	12
Oxbow Park	2/6/97	14:48	20
Oxbow Park	2/4/97	16:18	24
Oxbow Park	2/4/97	16:53	30
Del Curto	2/5/97	10:32	24
Del Curto	2/5/97	11:41	31
Del Curto	2/5/97	12:07	27
Stag Lane	2/5/97	13:23	18

Section 6
EVALUATION OF POTENTIAL ENVIRONMENTAL IMPACTS

6.1 Introduction

This section describes the evaluation of potential environmental impacts resulting from the merger-related increase in freight train traffic of approximately 11.3 trains per day on UP's existing right-of-way through Reno and Washoe County.

This section is supplemental to the environmental analysis provided in the Environmental Assessment (EA) and the Post EA prepared by the Surface Transportation Board's (Board's) Section of Environmental Analysis (SEA) during the merger review proceedings. Consistent with the Board's direction in Decision No. 44, this section provides a more focused analysis of the potential environmental impacts of the increased train traffic in Reno and Washoe County. This section also provides a brief discussion of the range of possible additional mitigation options that have been considered, and Section 7 provides a detailed discussion of these mitigation options.

The SEA study team developed evaluation criteria as outlined below to assess the potential changes on Reno resulting from increased rail traffic related to the merger. Section 6.2 describes the evaluation methodology and evaluation results and lists possible options to mitigate potential environmental impacts associated with the merger.

The Board's environmental regulations, 49 CFR 1105(1996), developed to comply with the National Environmental Policy Act (NEPA) served as the SEA study team's guide for developing evaluation criteria. The study team established criteria for evaluation of 11 potential environmental impact areas for the merger-related increase in train traffic in Reno and Washoe County. These subject areas reflect Board directives and the issues and concerns identified by local interests through the Reno Mitigation Task Force, the public meetings, and other public comments received during the Reno Mitigation Study.

The following 11 sections provide criteria and analysis of potential environmental impacts of the merger-related increase in freight train traffic:

- Traffic Delay (Section 6.2.1)
- Pedestrian Safety (Section 6.2.2)
- Emergency Vehicle Access (Section 6.2.3)
- Train-Vehicle Accidents (Section 6.2.4)
- Derailments/Hazardous Materials Spills/Water Quality (Section 6.2.5)
- Train Operations (Section 6.2.6)
- Native American Issues (Section 6.2.7)
- Biological Resources (Section 6.2.8)
- Noise Levels (Section 6.2.9)
- Vibration (Section 6.2.10)
- Air Quality (Section 6.2.11)

6.2 Potential Environmental Impact Analysis and Possible Mitigation Measures

This section offers a detailed analysis of the 11 subject areas. Each of the analyses includes discussion of the following four topics:

- Criteria for evaluation, including the issue, objective, and measure.
- Methodology for evaluation.
- Discussion of the potential environmental impacts in Reno and Washoe County associated with the merger-related increased freight train traffic.
- Potential mitigation measures.

6.2.1 Traffic Delay

Evaluation Criteria

Issue: Vehicle delay at grade crossings.
Objective: Mitigate increases in vehicular traffic delays resulting from the merger and related increased train traffic.
Measure: Total average daily vehicle delay at all public mainline railroad crossings in the City of Reno.

Methodology

Overview: The SEA study team developed a methodology to calculate total vehicle delay at non-grade-separated railroad crossings resulting from the projected merger-related increase in freight train traffic in Reno and Washoe County. Because the data collected during the week of February 3, 1997 (see Section 5.3) contained typical variations in vehicular traffic and train frequency and length, the SEA study team's approach was to focus on the five streets surveyed that week (i.e., Keystone, Arlington, Sierra, Virginia, and Center) and develop a calibrated delay model based on crossings at those five streets. Analysis for the other 11 crossings was modeled after the observed streets, with adjustments for traffic and other local conditions.

Delay Calculation: The measure of traffic delay is total vehicle hours per day (i.e., the number of motor vehicles delayed multiplied by the amount of time each is delayed). This measure reflects the fact that either a larger amount of traffic, or a longer waiting time can result in more total vehicular delay.

The calculation includes vehicular traffic delay created in two ways. One is the delay caused by the blockage of grade crossings by trains. The other is the added delay caused by the queue of motor vehicles that must dissipate once the crossing is no longer blocked. Vehicles at the back of a queue of waiting traffic must wait not only for a train to pass, but also for the vehicles ahead of them to clear before they can cross the tracks. For a short queue, this additional wait (called queue dissipation) is typically minimal. For longer queues, this additional wait is longer in time. Because a longer queue adds to total delay, the more traffic there is on a road, the more motor vehicles will be stopped by a given train and the greater the total delay. High-traffic roadways have more vehicle

hours of delay, because more vehicles are affected and because those vehicles create a longer queue that takes more time to clear.

Sources of Data: The data used for the delay model and equations were from the February 1997 survey, observations made by the SEA study team of videotapes made by the City of Reno during the train survey week, and actual field observations made by the SEA study team in late April and May 1997. The February data consisted of mechanical 24-hour vehicular traffic counts on the five streets, the corresponding train time and length, and observations of actual queuing. The April and May checks focused primarily on gate down times, rates of queue dissipation, and verification of the approaching vehicular traffic (See Table 6.2.1-1). Appendix I gives further explanation regarding queue dissipation rates and adjustments for the pre- and post-merger number of trains.

Table 6.2.1-1
Data from Video and Field Samples

Street	Queue Dissipation Rate (vehicles/hr)	Maximum Flow Rate (veh/hr of green per lane)	Gate Time Constant (seconds)
Arlington	1,923	1,115	43 (32)
Center	2,723	1,040	31
Keystone	2,216	1,350	31
Sierra	2,723	1,150	31
Virginia	760	1,172	37

*Arlington Street measured 43 seconds average 2/3-10/97; UP reset the mechanism following the survey, with the resulting average estimated to be 32 seconds.

Model Calibration: Using a data set of approximately 40 videotaped train observations each for Keystone and Virginia streets and approximately 20 videotaped train observations each for Arlington, Center, and Sierra streets, the SEA study team calibrated the computer mathematical model used to analyze traffic delay. Keystone and Virginia streets were sampled much more heavily than the other streets, because those two streets experienced greater delay during the survey week. Appendix I provides the details of the calibration procedures.

For each crossing, the team collected data on the amount of time during which the gate was closed immediately before and after trains passed, i.e., the amount of time the crossing gate is down when the train is not in the crossing. This amount of time is constant for each individual crossing. The SEA study team found that the average gate down time during which the train was not in the crossing was 32.4 seconds, and this value was used when better information was not available for a given street. (During the survey week, the timing on the Arlington gate was set too high, with values averaging approximately 43 seconds. According to Union Pacific (UP), this gate was reset during the week following the survey.)

Adjustments for Future Traffic: Given that traffic volumes are a critical factor in the evaluation of potential traffic delay, train-vehicle accidents (see Section 6.2.4), and air quality (see Section 6.2.11), the SEA study team paid close attention to the assumptions used for traffic volumes. To evaluate reasonably foreseeable conditions, the SEA study team used future vehicular traffic

volumes projected for the Year 2000. Calculations of both pre- and post-merger conditions used these projected Year 2000 traffic levels to assure that the difference between pre- and post-merger potential environmental impacts could be attributed solely to changes in train traffic. The UP/SP merger will not produce increases in vehicular traffic in Reno and Washoe County, so the SEA study team did not include changes in vehicular traffic between 1995 and 2000 in its analysis. Rather, vehicular traffic conditions in the Year 2000, with the pre- and post-merger train levels, were analyzed.[27]

The traffic delay analysis uses the model developed from the data for the five surveyed streets, including the calibrated survey week average daily traffic (ADT), as well as projected future street traffic levels for the analysis Year 2000. The SEA study team used Nevada Department of Transportation (NDOT) 1995 traffic counts[28] together with street-by-street traffic growth rates from the Regional Transportation Commission's (Barton-Aschman) regional traffic model[29] to determine future Year 2000 vehicular traffic. The Barton-Aschman regional traffic model includes a base year of 1996 and a future year of 2015. For each street, the SEA study team calculated a compound traffic growth rate to calculate a ratio of Year 2000 vehicular traffic to 1995 traffic levels. Barton-Aschman projected future declines in traffic on two streets, Virginia Street and Vine Street.

When the model was extended to the remaining 11 streets crossing the tracks in Reno, there were some minor streets for which neither NDOT traffic counts nor Barton-Aschman traffic projections were available. For these streets, traffic counts from the 1997 Federal Railroad Administration (FRA) railroad crossing database were used. These streets included Woodland, Stagg, Del Curto, West, Morrill, and Sage, all with relatively low traffic volumes. The overall average traffic growth rate of 1.5 percent per year was used for Woodland, Stagg, and Del Curto on the west end of town, while the growth rate for Wells of 0.6 percent per year was applied to Morrill, Sutro, and Sage. With an ADT of about 12,000, Sutro is the only major street of these several on which traffic flow has been declining slightly over the last several years of NDOT counts. Table 6.2.1-2 summarizes the vehicular traffic values used in the model.

Overlapping Train Events: A train event is the passage of a train through a crossing. Overlapping train events occur when a passing train event begins at a crossing while the crossing gate is already down for another train event in progress. There was an average of 1.5 overlapping trains per day out of an average of 20 freight trains per day during the February 1997 survey week.

The SEA study team's analysis reflects the probability of overlapping train events occurring for the pre-merger 12.7 freight trains per day and the post-merger 24 freight trains per day. The analysis takes into account that overlapping trains have more potential to produce vehicular delay

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[27] For purposes of comparison, the SEA study team has provided an evaluation of potential traffic delay impacts using 1995 vehicular traffic with pre-merger train levels and Year 2000 vehicular traffic with post-merger train levels. This analysis is contained in Appendix J.

[28] Nevada Department of Transportation, *1995 Annual Traffic*.

[29] Barton-Aschman Associates, *Revised Project Report - Railroad Merger Mitigation Alternatives, Appendix F*, July 10, 1996. Prepared for the City of Reno by Nolte and Associates, Inc.

than ones that do not overlap, i.e., overlapping trains create the possibility of longer vehicular queues forming than would form if only one train passed at a time.

Table 6.2.1-2
Annual Average Daily Traffic Assumptions

Street	1995 Traffic from NDOT [1] or FRA Database [2]	Projected Year 2000 Annual Average Daily Traffic [3]
Woodland	1,500 [2]	1,616
Stagg	30 [4]	32
Del Curto	130 [2]	140
Keystone	22,100	28,017
Vine	4,185	3,946 [5]
Washington	1,875	1,891
Ralston	3,785	3,654
Arlington	8,415	9,254
West	4,700 [2]	4,783
Sierra	19,700	20,982
Virginia	14,000	13,551 [5]
Center	12,000	14,351
Lake	7,575	8,069
Morrill	500[2]	515
Sutro	11,700	12,051
Sage	1,500 [2]	1,545

[1] Nevada Department of Transportation, *1995 Annual Traffic*.
[2] FRA 1997 database for railroad grade crossings, which includes crossing traffic, assumed to be 1995 traffic.
[3] Traffic growth rates by street are from the Regional Transportation Commission's regional traffic model, Barton-Aschman Associates, *Revised Project Report - Railroad Merger Mitigation Alternatives, Appendix F*, July 10, 1996. Prepared for the City of Reno by Nolte and Associates, Inc.
[4] Estimated from ITE trip generation rates.
[5] Traffic on both Vine and Virginia streets was projected to decline slightly in the regional traffic model.

Transit: The hub of the local transit system is the CitiCenter transit center, located on Center Street between 3rd and 4th streets. Because of its location on a street close to the railroad tracks, many of the nineteen bus routes that transfer at the transit center have to cross the tracks, usually twice, in their circulation patterns to and from the center.[30] As with automobiles, buses are subject to delay from freight trains at the crossings. The Center Street crossing has additional delay from Amtrak trains that usually block Center Street when stopping at the adjacent Amtrak station.[31]

[30] RTC/Citifare, *Citifare Bus System Map, A Guide to all Citifare Bus Routes*. Effective August 25, 1996.

[31] Amtrak operations are not under the jurisdiction of the Board.

Potential Impacts on Vehicular Delay

Public, at-grade rail crossings are located at 16 streets including: Woodland, Stagg, Del Curto, Keystone, Vine, Washington, Ralston, Arlington, West, Sierra, Virginia, Center, Lake, Morrill, Sutro, and Sage. Figure 6.2.1-1 illustrates the estimated vehicular delay for each of these streets for pre-merger conditions of 12.7 daily freight trains in the Year 2000. Figure 6.2.1-2 illustrates projected post-merger delay for 24.0 trains per day in the Year 2000. A shown, the total daily pre-merger vehicle delay is estimated at 189 hours[32] for these 16 crossings, while the total post-merger vehicle delay is projected to be 373 hours -- an increase of 184 hours.

The total number of vehicles delayed by pre-merger trains is estimated at 5,740, and these vehicles are delayed an average of 1.98 minutes each. For post-merger trains, 11,130 vehicles per day are projected to be delayed an average of 2.01 minutes each.

Total daily traffic crossing the 16 grade crossings, including those stopped by trains and those not stopped by trains, is projected to be 124,400 vehicles in the Year 2000. The 11,130 vehicles projected to be delayed by post-merger freight trains represents about nine percent of this total traffic, which is an increase over the estimated six percent stopped for pre-merger conditions.

For the total 124,400 vehicles crossing the rail line, the estimated pre-merger average delay per vehicle is 5.5 seconds, while the post-merger average delay is 10.8 seconds.

The same average delay statistics would apply for transit vehicles crossing the tracks. The chance that a transit vehicle would be delayed while crossing the tracks would increase from 4.6 percent to 8.9 percent of the crossings. If delayed, the average delay per transit vehicle would be about two minutes.

Potential Mitigation Measures

There are two types of potential mitigation measures to decrease the amount of time that trains delay motorists waiting at grade crossings -- those that eliminate at-grade crossings entirely and those that reduce the amount of time the trains block the crossings.

Mitigation measures with the potential for entirely eliminating traffic delay involve separating the road from the railroad. Highway/rail grade separations can be made by creating an elevated or depressed train way, or by building underpasses or overpasses for vehicles and pedestrians. Any of these options would mean that vehicular traffic would not have to wait at the highway/rail grade-separated crossings while trains passed through the City of Reno.

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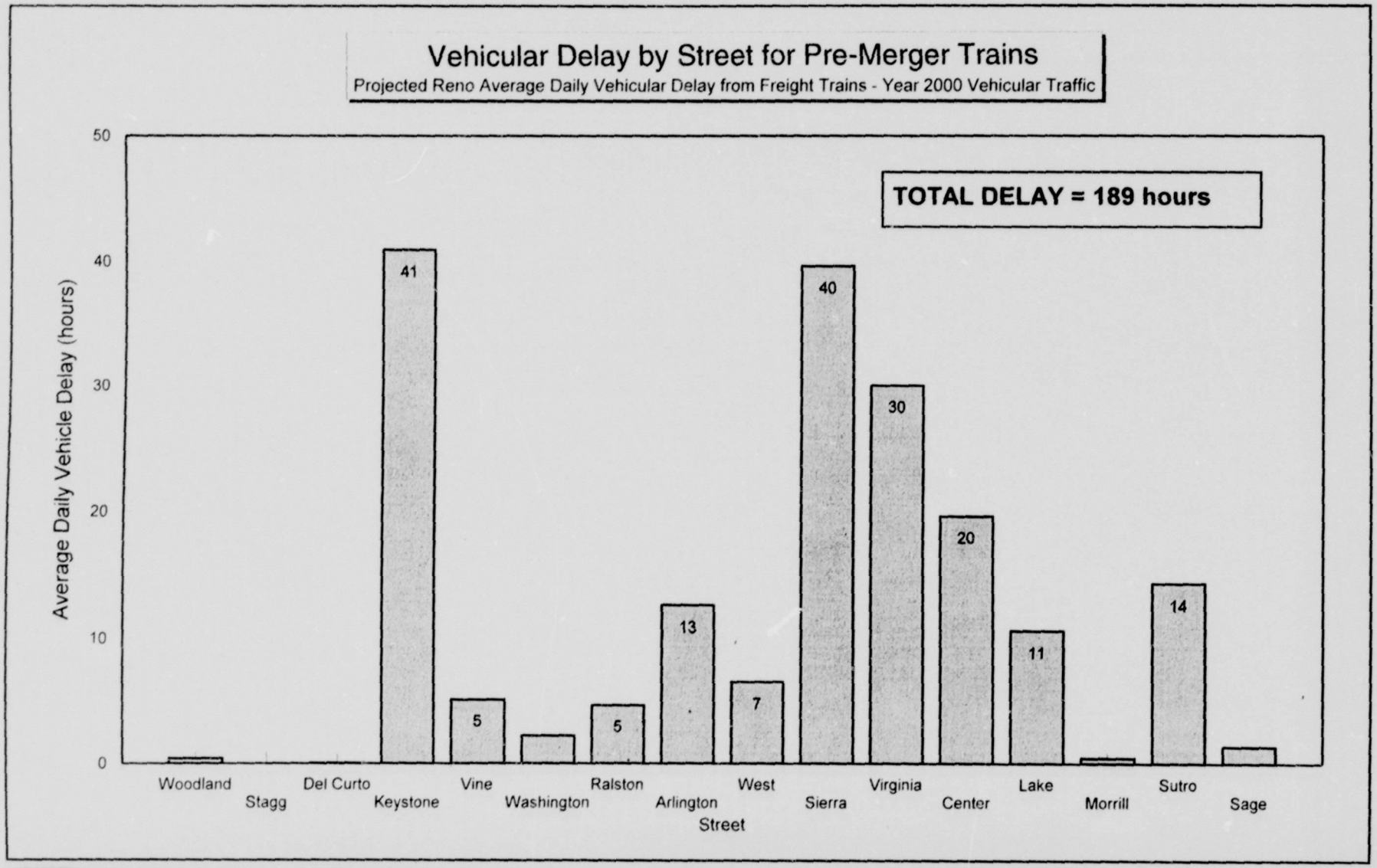
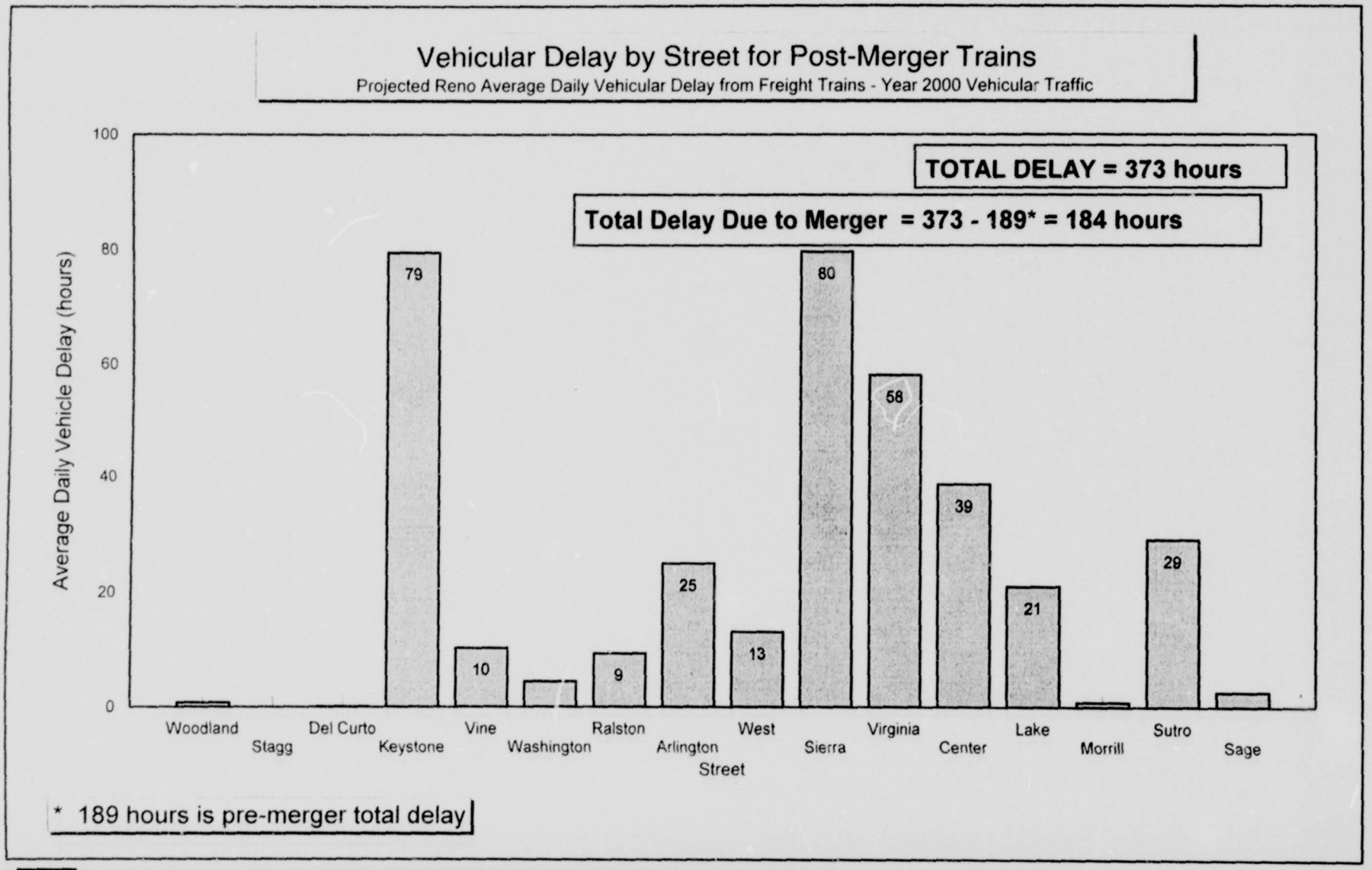
[32] One hour of delay, for example, means 30 vehicles stopped for two minutes each or 60 vehicles stopped for one minute each due to a blocked rail crossing.


Vehicular Delay by Street for Pre-Merger Trains
Projected Reno Average Daily Vehicular Delay from Freight Trains - Year 2000 Vehicular Traffic
TOTAL DELAY = 189 hours
Average Daily Vehicle Delay (hours)
0
10
20
30
40
50
41
5
5
13
7
40
30
20
11
14
Woodland
Stagg
Del Curto
Keystone
Vine
Washington
Ralston
Arlington
West
Sierra
Virginia
Center
Lake
Morrill
Sutro
Sage
Street


Vehicular Delay by Street for Post-Merger Trains
Projected Reno Average Daily Vehicular Delay from Freight Trains - Year 2000 Vehicular Traffic
TOTAL DELAY = 373 hours
Total Delay Due to Merger = 373 - 189* = 184 hours
Average Daily Vehicle Delay (hours)
100
80
60
40
20
0
79
10
9
25
13
80
58
39
21
29
Woodland
Stagg
Del Curto
Keystone
Vine
Washington
Ralston
Arlington
West
Street
Sierra
Virginia
Center
Lake
Morrill
Sutro
Sage
* 189 hours is pre-merger total delay

Another way to eliminate traffic delay would be for the trains to bypass Reno, either on other existing rail routes (e.g., Feather River route or via southern California), or on a track that would need to be constructed around the City, and such a construction would require a separate application to the Board. Increasing train speeds would allow trains to pass through Reno faster and would therefore reduce the amount of time that motorists must wait at crossings while trains block at-grade crossings.

6.2.2 Pedestrian Safety

Evaluation Criteria

Issue: Risk of injury to pedestrians.
Objective: Mitigate the increase in risk to pedestrians resulting from the merger-related increased train traffic.
Measure: Total number of train movements through grade crossings in downtown Reno, weighted by pedestrian activity.

Methodology

A number of pedestrian behavior patterns may result in accidents between pedestrians and trains. Patterns include failure to heed crossing signals, substance abuse, suicide, or other types of random behavior. Pedestrian behavior patterns are clearly complicated and site-specific. The SEA study team reviewed available literature and regulations (e.g., from FRA), but did not find methods for quantitatively measuring pedestrian behavior at rail crossings in statistically valid ways.

Because there is no formal methodology for predicting pedestrian-train accidents, the SEA study team's approach consisted of comparing train-pedestrian exposure in pre- and post-merger conditions, and then examining ways to reduce exposure. As the number of trains increases, so does the exposure of pedestrians to trains. Pedestrian exposure to trains also varies based on the concentration of pedestrians at each crossing. Table 6.2.2-1 lists the numbers of pedestrians crossing the tracks immediately after freight trains pass on the five primary downtown streets surveyed during the week of February 3, 1997.

Table 6.2.2-1
Pedestrians Waiting at Tracks while Trains Pass
During Survey Week, 2/3/97-2/10/97

Street	Northbound	Southbound	Total	Percent of Total
Keystone	91	85	176	2%
Arlington	333	236	569	6%
Sierra	1,013	1,017	2,030	21%
Virginia	2,918	3,589	6,507	68%
Center	163	141	304	3%
TOTAL	**4,518**	**5,068**	**9,586**	**100%**

Potential Impacts on Pedestrians

The City has summarized that, between 1970 and 1995,[33] pedestrian-train accidents resulted in three fatalities (one each at Ralston, Virginia, and Lake) and two injuries (one each at Center and Sutro). Special events held in the downtown central business district create additional concerns regarding pedestrians and train safety. These events attract large numbers of people, and according to the Reno Police Department, intoxication is sometimes a problem. There are special events almost every weekend throughout the summer. Up to 100,000 attendees have attended "Hot August Nights" in the past, and it places a major burden on local public safety officials. Local officials are concerned with trains operating with these crowds present. Pedestrian accidents may also result from pedestrian failure to heed warning lights, barriers, and warning sounds.

Potential Mitigation Measures

There are two types of potential mitigation options to decrease pedestrian risk -- those that improve at-grade safety features and those that entirely eliminate the need for pedestrians to cross tracks at grade. The pedestrian crossings of the tracks in downtown Reno are equipped with pedestrian gates, which is standard warning for pedestrians at railroad grade crossings. Safety mechanism improvements could include installation of, or improvement to, existing pedestrian gates, such as crossing gate skirts, electric signs, flashers, and warning signals.

As described in Section 6.2.1, the only way to entirely eliminate the danger of crossing tracks would be to limit pedestrian access to the tracks. This could be accomplished by building a bypass, constructing pedestrian or street overpasses or underpasses, or elevating or depressing the railway.

6.2.3 Emergency Vehicle Access

Evaluation Criteria

Issue:	Emergency vehicle delay at major grade crossings.
Objective:	Mitigate the increase in delays resulting from the merger-related increased train traffic.
Measure:	Average daily gate down time per crossing on major crossings.

Methodology

Given the possible effects on life, health, and safety, the potential blockage of emergency vehicles is of critical concern to SEA. The SEA study team used quantitative and qualitative methods for determining the effects of merger-related increases in the number of trains on emergency response vehicles.

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[33] City of Reno, *Railroad Merger Study, Fact Finding Report*, March 1996, p. 10 and Appendix E.

The quantitative approach involved projecting the average daily crossing gate closed time with and without increased freight trains. Daily crossing blockage time is a general indicator of the risk of delay, i.e., a surrogate measure of the probability that a crossing would be blocked at the time an emergency vehicle would need to cross the tracks. Another quantitative way to assess the potential effects on emergency vehicle access, is to evaluate the crossing blockage time per train. This could affect the amount of time that an individual emergency vehicle would be delayed if it encountered a train on an emergency run.

The SEA study team determined that the gate down time analysis does not completely or accurately reflect actual emergency vehicle delays in Reno for several reasons. First, emergency facilities exist on both sides of the UP tracks, so some emergency runs do not cross the tracks. Second, emergency runs occur at random times, and every rail crossing blockage does not necessarily delay emergency vehicles that must cross the tracks. Third, emergency vehicle drivers are likely to be aggressive in seeking unblocked rail crossings, avoiding or passing traffic congestion (e.g., using oncoming traffic lanes), and not being hampered by traffic restrictions such as one-way streets and traffic signals. Given the possible effects on health and safety related to even one blockage of an emergency vehicle, however, SEA is concerned with potential impairment of emergency vehicle access resulting from merger-related train traffic increases.

The calculation of crossing blockage time uses the same techniques and information as was used to calculate traffic delay (see Section 6.2.1). Mitigation measures that are implemented that result in reduced gate down times would reduce the likelihood of emergency vehicle blockages.

The following sections describe the SEA study team's observations regarding emergency response conditions in Reno.

Background: Concerns have been raised by the City regarding potential environmental impacts that increased train traffic through the City would have on general public safety and delays to emergency response by fire, police, and emergency medical service vehicles specifically.

As noted in Section 3, the City has developed around the rail line over the years and is bisected by the east-west tracks. There are several at-grade crossings, with only two highway/rail grade-separated crossings near downtown Reno -- an underpass on the west side of the downtown area at 2nd Street and Dickerson Road, and an underpass and a new overpass on the east side of downtown at Wells Avenue. These highway/rail grade separations are two miles apart.

The downtown area includes a concentration of hotels and casinos, many of which were developed over the past 20-25 years (See Table 3-1, Section 3). Automobile and pedestrian traffic is heavy year-round, and during the high summer tourist season, the crowds are reported to increase considerably. As mentioned in Section 6.2.2, the City also hosts a number of special events in the downtown area, with crowd numbers estimated as high as 100,000 people.

The SEA study team also reviewed emergency vehicle access issues west of downtown at Woodland and Del Curto avenues. At the initiation of the mitigation study, there was only one access road to areas off of Woodland and Del Curto avenues, and these roads crossed the rail line

at-grade. Potential blockage of emergency vehicle access to these areas therefore has been identified as a community concern. In addition, a prior UP/SP practice in the Woodland area was the addition of "helper" locomotives to trains, which provide additional power to travel over Donner Pass. This practice at times blocked the Woodland Avenue crossing as the train was stopped, creating additional vehicular traffic delay and emergency access concerns. A road that runs parallel to and south of the tracks connects Woodland Avenue with Mayberry Drive, which passes under the railroad. This road between Woodland and Mayberry has recently been widened and paved, and the gate that formerly prohibited its use has been opened. This recent improvement serves to help mitigate emergency access impacts for the Woodland area.

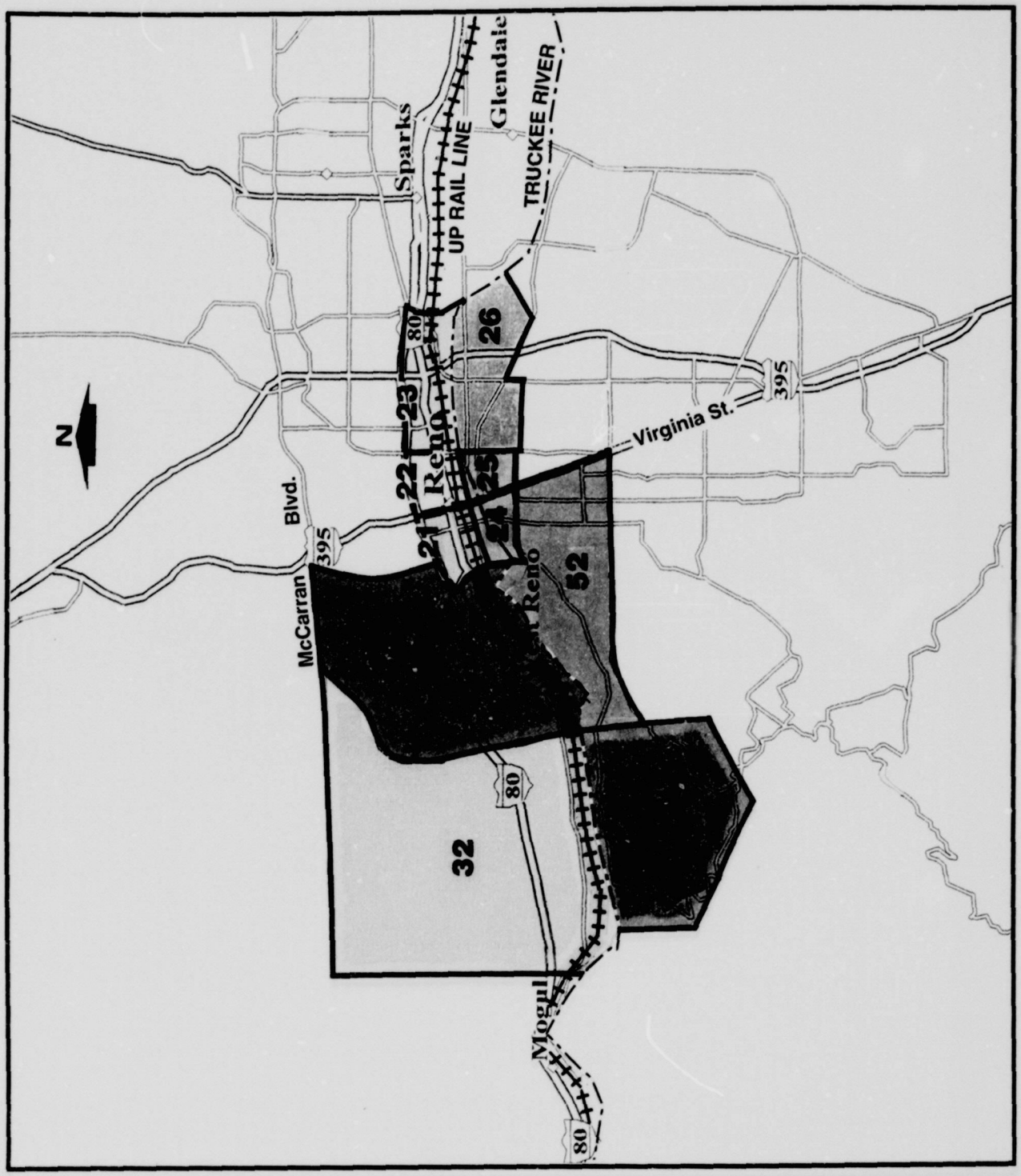
General: Emergency response differs among police, fire, and emergency medical services. Fire trucks usually respond from a known location (i.e., a fire station), while police and emergency medical units are field-based, and not stationed at one location.

Emergency Dispatch Center: The City's emergency communications center is responsible for receiving 911 emergency calls and for dispatching police and fire units. Although the units have computer-aided dispatching (CAD), the CAD has no mapping feature. CAD only determines which units are closest to an emergency and recommends to the dispatcher the order of priority for dispatch. The order of response has previously been determined by physically measuring response routes, meeting a five-minute response criterion, and entering the data into the computer. It is up to field personnel to notify the dispatch center when they are not available for response, or when their route is blocked. The dispatcher must enter this information into the computer so that the response order can be revised.

Fire Department: The distribution of fire stations around the City appears to provide good coverage. Stations are located on both sides of the tracks. The fire department estimates that they have approximately 3,700 emergency response situations annually that require emergency vehicles to cross the tracks. The City's goal is to have a response time of four minutes. Actual response time is more in the range of five minutes.

Police Department: The City is divided into three police areas: north, south, and central with each area containing several districts. Figure 6.2.3-1 highlights the districts that surround the railroad corridor. The Truckee River is the boundary between districts 32 and 56, 34 and 52, and 23 and 26. Second Street is the boundary between districts 21 and 24, and 22 and 25. The central or downtown police area (districts 21, 22, 24, and 25) is most affected by train traffic because it is bisected by the tracks. A CAD system prioritizes calls for police service. During peak-call periods, the wait on low priority calls is longer.

Emergency Medical Services: The Regional Emergency Medical Services Authority (REMSA), a private service provider operating under a franchise agreement with the City, provides emergency medical services in Reno. Somewhat like police units, REMSA units are roving and not based in stations. By contract, REMSA units must achieve a response time of eight minutes or less for 90 percent of its calls, or the contract can be terminated. Concerns have been raised that increased train traffic levels would jeopardize the REMSA units' ability to meet response time criteria.



SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

PRELIMINARY MITIGATION PLAN

FIGURE 6.2.3-1

City of Reno Police Districts Surrounding R.R. Corridor

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Hospital location is also a concern to REMSA units. There are two hospitals, one north and one south of the tracks. REMSA policy is to transport a patient to the nearest hospital, which may require crossing the tracks. Currently, there is no way for a REMSA unit to know in advance if its route is blocked by a train.

REMSA estimates that units respond to approximately 5,000 to 6,000 calls annually for service in the downtown area alone. REMSA units are not dispatched by City dispatchers, although 911 calls for assistance are received by the City communications center and then are transferred to the REMSA dispatch center.

Potential Impacts on Emergency Vehicle Access

Because gate closed time is primarily determined by train frequency, speed, and length, the downtown crossings between Keystone and Sage (where the train speed limit is 20 mph) generally experience similar amounts of gate closed time per day. With the pre-merger 12.7 freight trains, the average total daily gate closed time per crossing between Keystone and Sage is estimated at 42.9 minutes per day. With post-merger train levels of 24 freight trains, the average total daily gate closed time per crossing is projected to be 82.7 minutes, an increase of 39.8 minutes per crossing per day. This represents an average gate down time of 3.4 minutes per train for both pre- and post-merger conditions for the crossings between Keystone and Sage.

Daily gate closed times are lower for the Woodland, Stagg, and Del Curto crossings at the west end of town, where the train speed limit is 40 mph. For pre-merger train levels (12.7 per day), the average total daily gate closed time per crossing is estimated at 22.4 minutes. Post-merger with 24 trains per day, the average total daily gate closed time is projected to be 42.5 minutes per crossing, an increase of 20.1 minutes per crossing per day. This represents an average gate down time of 1.8 minutes per train for both pre- and post-merger conditions for the Woodland, Stagg, and Del Curto crossings.

Potential impacts from the merger-related increase in train traffic on emergency vehicle response can be summarized as follows:

- Emergency vehicle access is affected by the fact that the railroad tracks bisect a central business district that has developed over the years around the rail line and is often populated with large numbers of tourists who may be unfamiliar with the area.
- City public safety service providers, fire, REMSA, and police have been operating under these conditions for years and have developed mechanisms, although not formally, to manage issues raised by train traffic.
- Emergency vehicle drivers are likely to be aggressive in seeking unblocked rail crossings, avoiding or passing traffic congestion (e.g., using oncoming traffic lanes), and not being hampered by traffic restrictions such as one-way streets and traffic signals.
- Emergency facilities exist on both sides of the UP tracks, so some emergency runs do not need to cross the tracks.
- Emergency runs occur at random times, and every rail crossing blockage does not necessarily delay emergency vehicles that must cross the tracks.

- The merger-related increase in train traffic will increase the average total daily gate down time for each crossing.

Potential Mitigation Measures

Given the possible effects on health and safety related to even one blockage of an emergency vehicle, SEA is concerned with the possible blockage of emergency vehicle access resulting from merger-related train traffic increases, and SEA has evaluated potential mitigation measures to reduce this potential impact. The two types of measures that would reduce potential traffic delay would also mitigate potential impacts for emergency vehicle access, i.e., (1) mitigation measures that would decrease the amount of time that trains block access, and (2) mitigation measures that would separate the tracks and the street to eliminate blockages entirely.

In addition to measures outlined in Section 6.2.1 for general traffic delay, emergency vehicle delays could be reduced by establishing a communication system for informing dispatchers of the location and approach of each train, allowing them to dispatch emergency vehicles already located on the appropriate side of the tracks. Dispatchers could also inform the emergency vehicle drivers of the location or approach of trains so that the drivers could better avoid the blockage. An improvement to current conditions would be a display in the dispatch center showing train locations, and video camera(s) viewing the tracks.

6.2.4 Train-Vehicle Accidents

Evaluation Criteria

Issue: Risk of accidents between trains and vehicles.
Objective: Mitigate increased risk of accidents resulting from merger-related increased train traffic.
Measure: Accident rate of grade crossings.

Methodology

The method generally used to calculate the risk of train-vehicle accidents is a standard accident-rate prediction method developed by the FRA (see Appendix K). Described in *Summary of the DOT Rail-Highway Crossing Resource Allocation Procedure–Revised*, the methodology uses a set of three equations that produce an estimate of accidents for an individual grade crossing based upon the specific characteristics of that crossing. These characteristics include the following:

- Number of trains per day.
- Number of through trains operating during daylight hours.
- Number of mainline tracks.
- Average annual daily vehicle traffic.
- Number of highway lanes.
- Type of warning devices in place.
- Actual accident experience at that crossing in the last five years.

Two additional factors are considered only if the crossing does not have "active" warning devices such as flashers or flashers and gates. These factors are train speed and whether the highway is paved or not. All analyzed crossings in Reno have active gates and flashers except for Stagg, which is a low-traffic volume private crossing.

Train-vehicle accidents at the 16 railroad grade crossings were estimated using the FRA grade crossing accident estimation methodology documented in Appendix K (and Year 2000 vehicular traffic as discussed in Section 6.2.1). In accordance with FRA procedures, train-vehicle accident predictions were calculated using the accident history for the previous five years, as summarized in Table 6.2.4-1. Accidents occurred during this five-year period on Arlington, Center, Lake, and Sierra Streets. Arlington had two accidents and the other streets had one each.

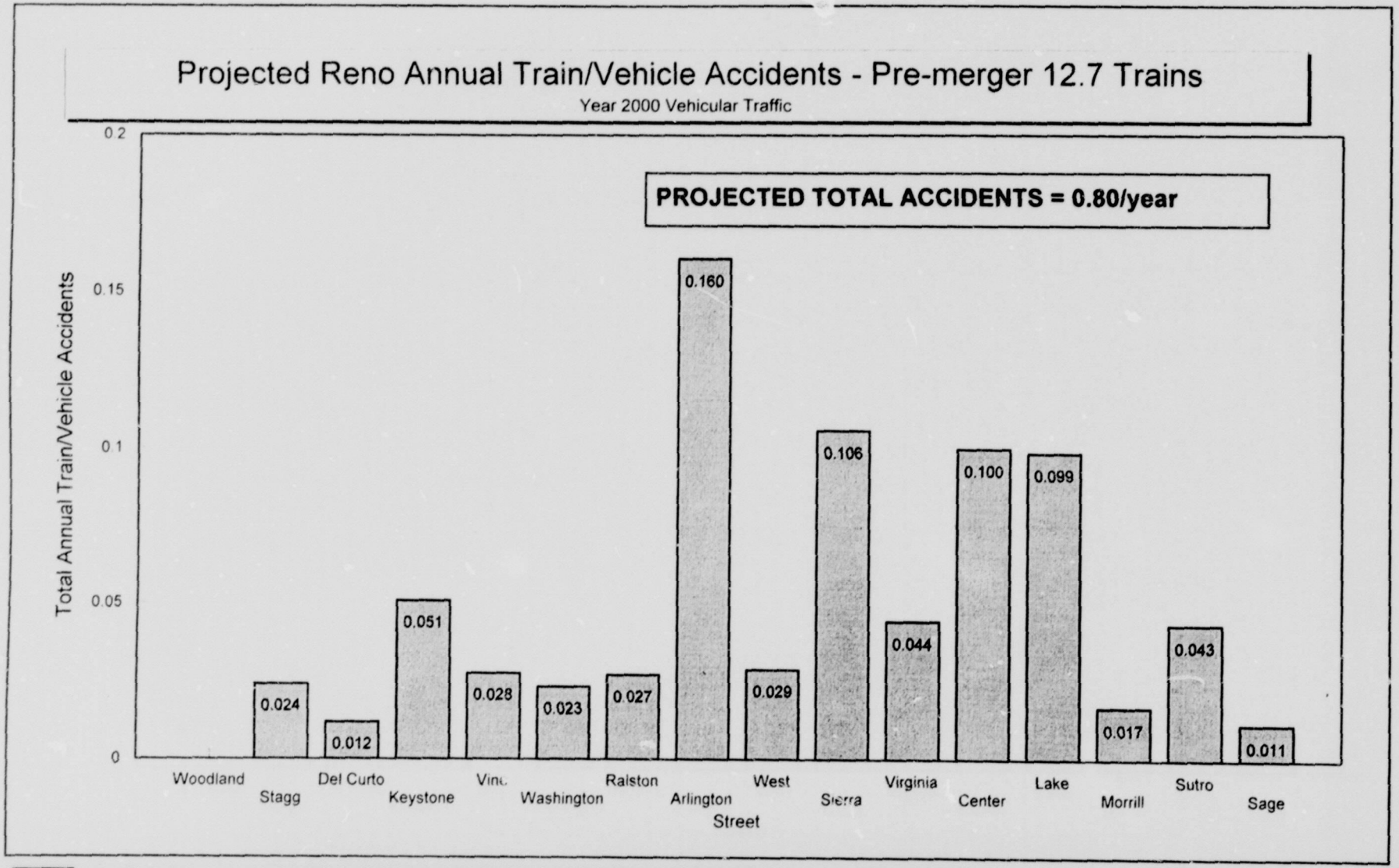
Table 6.2.4-1
FRA Five-Year Accident History for Reno Railroad Grade Crossings

Street	Accident History by Year					Total Accidents by Street
	1992	1993	1994	1995	1996	
Woodland Ave.	0	0	0	0	0	0
Stagg Rd. *	-	-	-	-	-	-
Del Curto Dr.	0	0	0	0	0	0
Keystone St.	0	0	0	0	0	0
Vine St.	0	0	0	0	0	0
Washington St.	0	0	0	0	0	0
Ralston St.	0	0	0	0	0	0
Arlington St.	0	0	2	0	0	2
West St.	0	0	0	0	0	0
Sierra St.	0	1	0	0	0	1
Virginia St.	0	0	0	0	0	0
Center St.	0	0	1	0	0	1
Lake St.	0	0	1	0	0	1
Morrill Ave.	0	0	0	0	0	0
Sutro St.	0	0	0	0	0	0
Sage St.	0	0	0	0	0	0
Total Accidents	**0**	**1**	**4**	**0**	**0**	**5**

* Stagg Rd. is a private crossing and is therefore not included in the FRA accident history database for public crossings.

Potential Train-Vehicle Accident Impacts

Pre-Merger Conditions: Figure 6.2.4-1 illustrates the estimated accidents for pre-merger conditions of 12.7 daily freight trains in the Year 2000. Because the FRA accident estimation methodology gives a high weight to accident history, the streets with accidents in the past five years stand out from the others, with Arlington having the highest expected rate at 0.160 accidents per year, or one accident expected every 6.2 years.


Projected Reno Annual Train/Vehicle Accidents - Pre-merger 12.7 Trains
Year 2000 Vehicular Traffic
PROJECTED TOTAL ACCIDENTS = 0.80/year
Total Annual Train/Vehicle Accidents
0.2
0.15
0.1
0.05
0
0.024
0.012
0.051
0.028
0.023
0.027
0.160
0.029
0.106
0.044
0.100
0.099
0.017
0.043
0.011
Woodland
Stagg
Del Curto
Keystone
Washington
Ralston
Arlington
West
Sierra
Virginia
Center
Lake
Morrill
Sutro
Sage
Street

The lowest expected rate is at Sage, with 0.011 accidents per year, or one accident expected about every 91 years. The total annual number of train-vehicle accidents expected at the 16 crossings for pre-merger conditions is 0.795, or one accident every 1.3 years on the average for all 16 crossings.

Post-Merger Conditions: Figure 6.2.4-2 also illustrates the projected accidents for the projected post-merger 24.0 daily freight trains in the Year 2000. Streets that experienced accidents in the past five years again stand out from the others. Arlington is projected to have the highest expected rate at 0.184 accidents per year, or one accident expected every 5.4 years. The lowest expected rate is at Del Curto, with 0.015 accidents per year, or one accident expected about every 67 years. The total annual number of accidents expected at the 16 crossings for the post-merger 24 freight trains is 0.952, or one accident every 1.05 years on the average for all 16 crossings. This represents a projected increase of 0.156 accidents per year, or an increase of one accident every 6.4 years, that would be attributable to the merger-related increased train traffic.

Potential Mitigation Measures

As with pedestrian safety issues, there are two types of mitigation options appropriate for decreasing the risk of train-vehicle accidents -- those that improve at-grade safety features and those that entirely eliminate the grade crossing. These options are outlined in detail in Section 7. In addition to these options, local street modifications such as street closures or changing current two-way streets into one-way streets would also serve to reduce train-vehicle accidents. As with pedestrian safety issues, an ongoing public education campaign and increased enforcement measures would mitigate the risk of train-vehicle accidents.

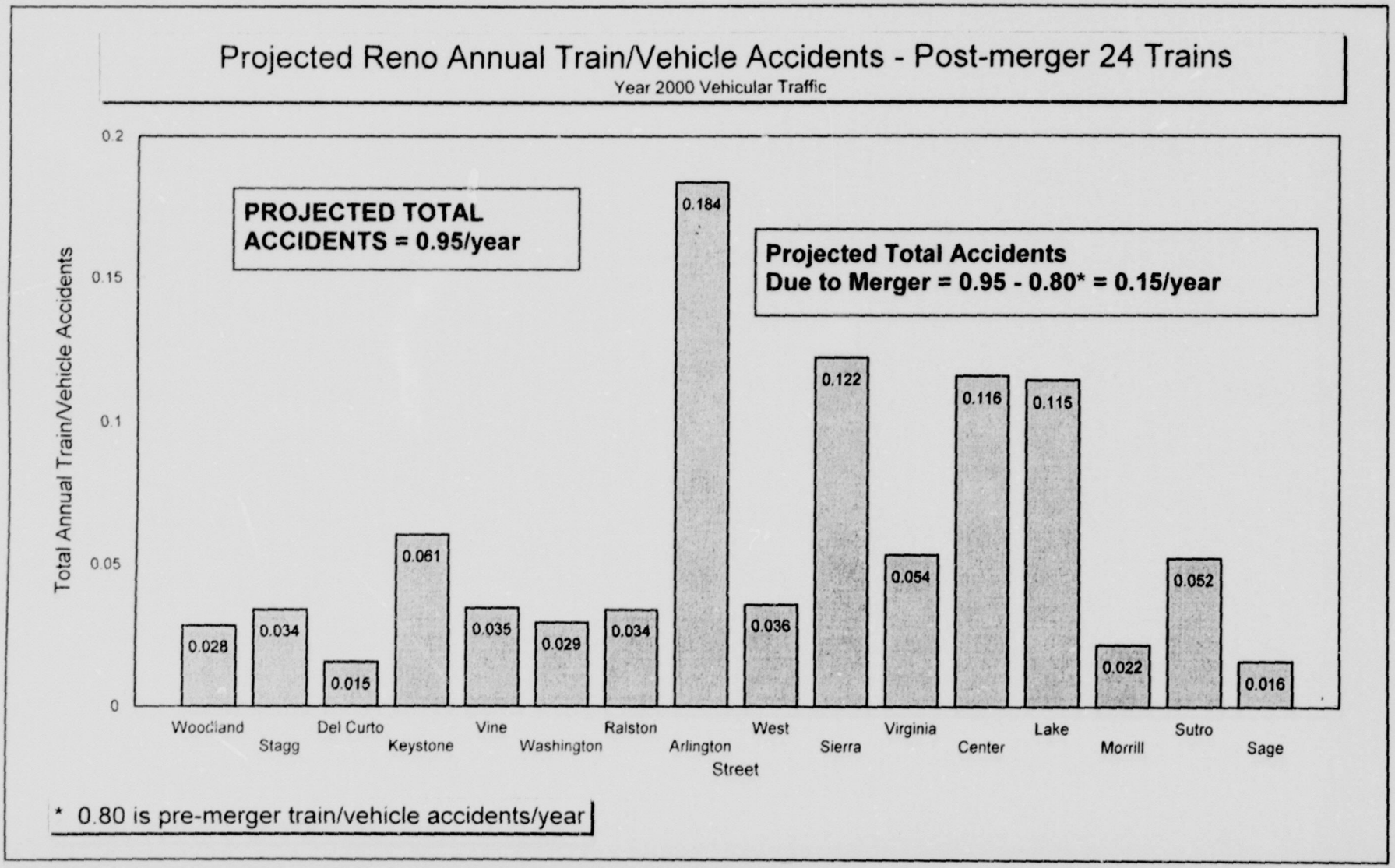
6.2.5 Derailments/Hazardous Materials Spills/Water Quality

Evaluation Criteria

Issue:	Risk of derailments or hazardous materials spills and related impacts on water quality.
Objective:	Mitigate the increase in risk of derailments resulting from the merger-related increased train traffic.
Measure:	Number of derailments.

Methodology

Federal Regulation of Railroad Safety and Hazardous Materials Transportation: The Federal agency primarily responsible for railroad safety is the FRA, which has issued substantive safety regulations in more than 20 subject areas. Most of these rules specifically address one of three major elements of the railroad system: the rolling equipment, the track and signal system over which it operates, and the rules for conducting rail operations. These regulations have evolved and been updated over the last 100 years so as to implement the latest technology and improved safety practices known.


Projected Reno Annual Train/Vehicle Accidents - Post-merger 24 Trains
Year 2000 Vehicular Traffic
PROJECTED TOTAL ACCIDENTS = 0.95/year
Projected Total Accidents Due to Merger = 0.95 - 0.80* = 0.15/year
Total Annual Train/Vehicle Accidents
0.2
0.15
0.1
0.05
0
0.028
0.034
0.015
0.061
0.035
0.029
0.034
0.184
0.036
0.122
0.054
0.116
0.115
0.022
0.052
0.016
Woodland
Stagg
Del Curto
Keystone
Vine
Washington
Ralston
Arlington
West
Sierra
Virginia
Center
Lake
Morrill
Sutro
Sage
Street
* 0.80 is pre-merger train/vehicle accidents/year

It is through the FRA's enforcement of these regulations that safety is assured for railroad employees and the public. FRA currently is conducting an in-depth safety review of the UP/SP, including the rail line through Reno and Washoe County, to assess any merger-related safety issues.

DOT prescribes the standards for the safe transportation of hazardous materials. These materials are defined as "a substance or material which the Secretary of Transportation has determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce." There are 11 principal classes of hazardous materials. Classes are based on chemical and/or physical properties, i.e., gasses, flammable liquids, oxidizers and organic peroxides, corrosive materials, etc.

UP has developed its own specific instructions regarding hazardous materials, which are contained in UP's booklet, *Instructions for Handling Hazardous Materials*. UP employees must have a copy of, be familiar with, and comply with the instructions when working on UP property. This booklet contains eight sections: (1) general, (2) required documentation, (3) placards and markings, (4) car inspections, (5) switching, (6) placement in the train, (7) train operations, and (8) emergency response. A review of these sections illustrates that the movement of hazardous materials is highly regulated. Briefly, these instructions require that each car (or block of cars) containing hazardous materials has the proper documentation, including identification of the material and an emergency response telephone number. Hazardous materials cars display placards (a special sign) and/or other markings. These placards use words, numbers, symbols, and colors to indicate the type of material by DOT hazard class. Hazardous materials cars must be inspected for mechanical condition and leakage before they are accepted from a shipper, and once accepted, the rail cars must be moved promptly, usually within 48 hours. The location in a train of hazardous materials cars is also regulated, and cars containing incompatible commodities are not to be located next to each other.

Under current UP procedures, trains carrying specified numbers of loaded rail cars, trailers, and containers of hazardous materials are designated by UP as a "key train" and are subject to special operating practices. Key trains contain five or more tank cars having environmentally sensitive chemicals, inhalation hazardous materials, or a combination of both; or 20 or more loaded hazardous materials shipments. These trains are limited to a length of 6,000 feet or 100 cars, a maximum speed of 50 mph and, when practical, do not use siding tracks.

Surface and Groundwater Resources: The Truckee River is within the Truckee Meadows region, draining mountains and valleys around Reno and Sparks, Nevada. The Truckee River flows from the Sierra Nevada, north of Lake Tahoe (southwest of Reno) eastward through the Truckee Meadows area and the Virginia Mountain Range. It eventually discharges into Pyramid Lake, northeast of Reno. Steamboat Creek, flowing from Washoe Valley, is a primary tributary to the river.

Groundwater occurs in the unconsolidated alluvium deposits of the valley fill. Groundwater moves generally from west to east, parallel to the Truckee River. The Sierra Pacific Power Company has 24 production wells in Central Truckee Meadows, which it uses to augment the

Truckee River-based drinking water supply. Groundwater supplies about 20 to 25 percent of Metropolitan Reno's water supply, while surface water accounts for approximately 75 to 80 percent.

The Final Central Truckee Meadows Remediation District Work Plan (February 1996) reported that there are organic solvents, particularly tetrachloroethene (PCE) in the groundwater. Other constituents in the groundwater include fuel-related contaminants such as benzene, ethylbenzene, toluene, and xylenes. The Truckee Meadows Remediation District is undertaking a series of studies to determine the concentrations and extent of contamination in the Truckee Meadows groundwater supply.

Hazardous Materials Releases on the UP/SP Mainline in Reno, Washoe County, Nevada and California: Because of the potential for requiring area evacuation or causing numerous casualties, the risks associated with transport of hazardous materials deserve careful consideration. The SEA study team discussed rail spills on the UP (formerly SP) mainline through Reno, Washoe County, and the states of Nevada can California of hazardous materials with Pete Tuttle, Fish and Wildlife Biologist with the U.S. Fish and Wildlife Service (USFWS) Contamination Response, and with Bob Sack, Environmental Supervisor with the Washoe County Environmental Health Department.

Mr. Tuttle, from the Washoe County Health Department, stated that there have not been any rail spills in the last ten years that have required USFWS action.[34] He also noted that there was a truck spill in the Washoe County area last year. Mr. Sack confirmed that there have been no catastrophic rail spills affecting the Truckee River over the past ten years. He added that there have been rail spills, not related to derailments, that required clean-up action by the Washoe County Environmental Health Department. However, these spills did not result in contamination of the river, nor require notification of USFWS.

For a broader look, the SEA study team requested information regarding railroad-related spills in the State of Nevada and along the UP/SP mainline in California from the U.S. Department of Transportation (DOT), Research and Special Programs Administration (RSPA), which has collected information on unintentional releases of regulated hazardous materials being transported for commerce since 1971. The data show that, since 1971 when that agency began maintaining records of hazardous materials spills, 26 events have occurred along the UP (formerly SP) rail lines in the area of the Truckee River in California and Nevada. These events are predominantly very minor releases which did not meet the FRA's reporting thresholds for incidents or accidents. Of the 26 events, the RSPA report indicates that: (1) most were minor instances involving loose fittings or valves, (2) four required response by Disposal Control Services (a private disposal company in Sparks, NV.), and (3) the largest event involved a 40-gallon spill of hazardous materials. None of these spills resulted in hazardous materials entering the Truckee River. Relevant sections of this report are contained in Appendix L.

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[34] In the event of a rail spill, the Nevada Emergency Management staff responds and evaluates the situation. If they determine that the spill has the potential to affect a surface water, they notify the USFWS, which reviews the spill information to determine if USFWS involvement is warranted. USFWS involvement is based on a case-by-case review of the nature and quantity of the spilled substance.

UP Hazardous Materials for the UP System (1995 and 1996): For that pre-merger UP rail system, which does not embrace the rail line though Reno, four hazardous materials events occurred in 1995 (involving five rail cars) and four hazardous materials events in 1996 (involving four rail cars).[35] These system-wide FRA-reportable releases of hazardous materials included incidents on mainlines, yards, sidings, and industrial tracks.

Railroad Accident Prevention Equipment: In addition to reviewing current Federal hazardous materials controls and regulations and current UP practices, the SEA study team reviewed UP's specialized equipment along the rail line in the Reno and Washoe County area for detection of potential train-related defects. Railroads use a number of devices to enhance operational safety, including track-side detectors that are designed to identify various types of potential trouble. The detectors are automated, and when unsafe conditions are sensed, the detector equipment alerts either the train engineer or the dispatcher, and the engineer stops the train. Common types of detectors include:

- Hot box detectors -- These detect hot locomotive and car wheel bearings. An overheated wheel bearing can melt the wheel-bearing assembly causing a derailment.
- Dragging equipment detectors -- These detect equipment or other objects hanging from the bottom of a locomotive or car. Equipment that is dragging is dangerous. It can damage rail, ties, switches, and become lodged between a wheel and the rail causing a derailment. The most common type of dragging equipment are long rods and other fixtures used for the train brake system that are suspended beneath a freight car.
- High, wide, shifted load detectors -- these detect loads or other items that protrude from the top and side of a train. This situation is dangerous because protruding loads can strike trains on adjacent tracks, tunnel walls, bridges, bridge supports, etc.

Based on a review of UP's track diagrams, the UP/SP mainline tracks through Washoe County have multiple detectors. For both the eastbound and westbound tracks west of Reno, dragging equipment detectors exist at Mile Posts (MP) 206 (Truckee, CA.), 212.5, 220, 224 (about 19 miles west of Reno), 235 and 240 (about three miles west of Reno). For the single track east of Reno, dragging equipment detectors exist at MP 251.6 and 270.5. Intervals between dragging equipment detectors on either side of the Sparks Yard therefore range from five to ten miles.

Hot box detectors exist at MP 270.5 and 251.6 for the single-track rail line east of the Sparks Yard. For the double-track rail line west of Reno, hot box detectors exist on the eastbound track at MP 206 (Truckee, CA.), MP 224 (about 19 miles west of Reno), and MP 240 (about three miles west of Reno). For the westbound track, hot box detectors exist at MP 206 (Truckee), and MP 223.9. Thus, hot box detectors exist for eastbound trains at intervals of less than 20 miles. Except for the 27.7-mile interval between MP 251.6 and 223.9, hot box intervals for westbound trains are also less than 20 miles.

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[35] U.S. Department of Transportation, Federal Railroad Administration *Accident Incident Bulletin* for calender years 1995 and 1996.

High, wide, shifted load detectors exist on both tracks at MP 231.8 and on the single track at MP 260.5 Given that all trains stop at the Sparks Yard to change crews, the proximity of the stopped trains to yard personnel, supervision, and mechanical forces increases the probability of discovering train defects.

Potential Impacts from Derailments or Hazardous Materials Spills [36]

Based on hazardous materials rail car traffic flow projections developed by UP for the merger, approximately 40 total car loads of hazardous materials per day (25.8 non-intermodal and 14.2 intermodal) are anticipated post-merger on the UP mainline through Reno and Washoe County. This represents about 3.3 percent of the total of about 1,212 average daily loaded rail cars (588 non-intermodal and 624 intermodal) passing through Reno post-merger.

For 1994, an estimated 25 car loads per day of hazardous materials out of a total of 744 rail cars (630 non-intermodal and 114 intermodal) passed through Reno. These hazardous materials rail cars represent about 3.4 percent of the 1994 pre-merger total rail traffic. An average daily increase of 15 hazardous materials rail cars (13.8 intermodal and 1.2 non-intermodal) is projected for post-merger train levels, but the percentage of hazardous materials rail cars per train is anticipated to remain generally the same as the pre-merger level, i.e., at 3.3 percent.[37]

Under FRA criteria, an accident/incident is reportable when, (1) the cost of any resulting damage to on-track equipment, signals, track, track structures, or roadbed is greater than $6,300; (2) one or more persons are killed; (3) medical treatment is required as a result of injury to one or more persons; or (4) an employee's work status is restricted or otherwise changed as a result of the accident.

The SEA study team independently estimated the likelihood of a hazardous materials release (pre- and post-merger) associated with a derailment on the portion of the UP rail line (formerly SP line) from Truckee, California east through Reno to Fernley, Nevada. SEA chose to analyze this segment given that a portion of the rail line in this segment is near the Truckee River. The length of the Truckee River from Lake Tahoe to Pyramid Lake, is approximately 115 miles. The UP mainline is generally within 200 feet of the river for approximately 25 miles of the river's length, or about 22 percent. Figure 6.2.5-1 shows the Truckee river and its relationship to the UP mainline.

The SEA study team used the UP projections for hazardous material rail cars (pre- and post-merger) as provided above, the national average annual derailments rates (by train miles and rail-car miles), and national data for derailments resulting in a hazardous materials releases to estimate the likelihood of a hazardous spill on the rail line segment described above. (Appendix N describes the methodology used to develop these statistics.) As part of this analysis, the SEA study team reviewed other reports prepared on this subject, including:

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[36] Potential environmental impact analysis is from the EA and Post EA.

[37] Memo from Clyde Anderson, Union Pacific Railroad, August 17, 1997, pg. 2 (see Appendix M).

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PRELIMINARY MITIGATION PLAN

UP/SP MERGER MITIGATION STUDY RENO

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FIGURE 6.2.5-1

Relationship of Truckee River to UP Mainline

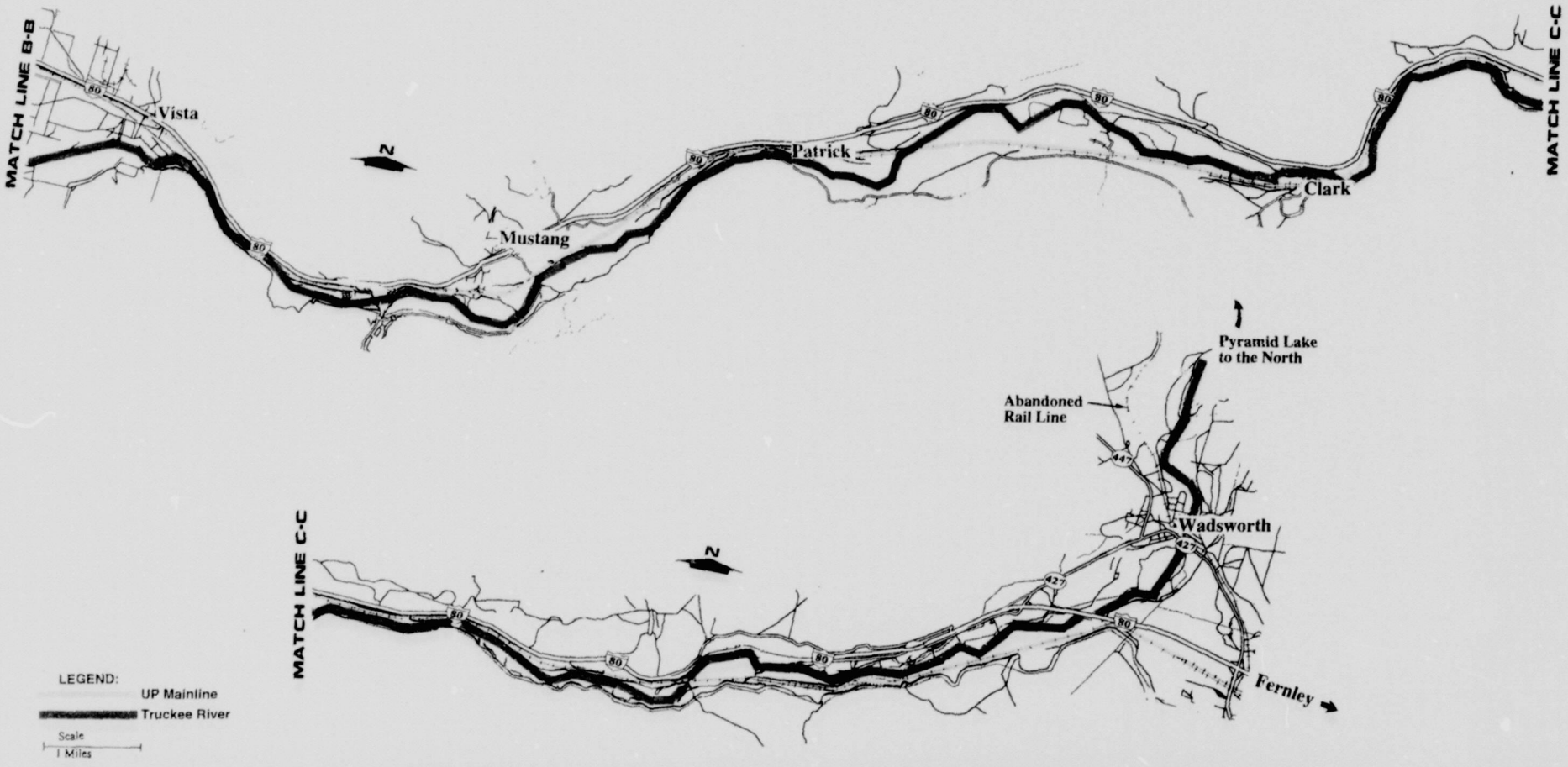

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FIGURE 6.2.5-1

Relationship of Truckee River to UP Mainline

- Arthur D. Little, Inc., "Assessment of Risks and Risk Control Options Associated with Liquefied Natural Gas Trucking Operations from Distrigas Terminal, Everett, MA.," June 1979.
- Arthur D. Little, Inc. For U.S. DOT, *Safety of High Speed Guided Ground Transportation Systems*, Volume 1, Appendix A "U.S. Serious Railroad Accident Data," March 1993.
- Carr, James R., "Development of an Integrated Computer Platform for the Evaluation of Contamination Mitigation Scenarios along the Truckee River-Risk of Transporting Hazardous Substances Adjacent to the Truckee River," November 22, 1996.
- *FRA Guide For Preparing Accidents/Incidents Reports*, DOT/FRA/FFS-22, January 22, 1993.
- Geffen, C.A., and Franklin, A.L., "An Assessment of the Risk of Transporting Propane by Truck and Train," Department of Energy Environmental Control Symposium, Reston, VA., March 1980.

Table 6.2.5-1 shows the estimated likelihood of a hazardous materials release for the UP rail line between Truckee California and Fernley Nevada.

Table 6.2.5-1
Hazardous Materials Release Estimates
(Segments of UP's Central Corridor)

	California (Truckee to California Border)	Nevada (Between California Border and Fernley)	Combined (Between Truckee CA. and Fernley NV.)
Pre-Merger			
Expected releases per year	0.00681	0.01834	0.02514
Expected years between release	146.9	54.5	39.8
Post-Merger			
Expected releases per year	0.01015	0.02635	0.03650
Expected years between release	98.5	38.0	27.4
Difference Between Pre- and Post-merger			
Expected releases per year	0.00334	0.00801	0.01136
Expected years between release	48.4	16.5	12.4

As shown in the table, the likelihood of a hazardous materials release between Truckee, California and Fernley, Nevada is once every 39.8 years for pre-merger conditions. The estimated number of years between hazardous materials spill events for post-merger trains (with the increased number of hazardous materials cars) is once every 27.4 years, a reduction of 12.4 years. The table also provides these estimates for the California and Nevada portions of this rail line segment.

The SEA study team also estimated the likelihood of hazardous materials spills into the Truckee River resulting from incidents on the mainline. Factors used to make these calculations included the hazardous materials release estimates in Table 6.5-1, the distance between the rail line and the Truckee River over this rail segment, the amount of the rail line that passes over the river on a bridge, assumptions regarding the distance that a derailed train car could travel, the types of hazardous materials being transported, the associated likelihood that these materials would flow into the river, and the probable severity of the release. Appendix N describes the methodology used to develop the likelihood of River contamination from hazardous materials on a UP freight train.

Table 6.2.5-2 shows the expected probability of contamination of the Truckee River for the rail line segment. As shown, contamination is expected to occur every 112.2 years for pre-merger conditions, and every 77.3 years for post-merger trains and hazardous materials levels.

Thus, while the likelihood of a spill or river contamination is increased for post-merger conditions, the probabilities are still remote. Notwithstanding the low probabilities, SEA has reviewed possible mitigation measures for hazardous materials spills.

Table 6.2.5-2
Hazardous Materials Release Estimates
(Segments of UP's Central Corridor)

	California (Truckee to California Border)	Nevada (Between California Border and Fernley)	Combined (Between Truckee CA. and Fernley NV.)
Pre-Merger			
Expected releases per year	0.00681	0.01834	0.02514
Fraction of releases estimated to contaminate the Truckee River	0.4615	0.3145	0.3543
Expected years between contamination	318.2	173.4	112.2
Post-Merger			
Expected releases per year	0.01015	0.02635	0.03650
Fraction of releases estimated to contaminate the Truckee River	0.4615	0.3145	0.3543
Expected years between contamination	213.5	120.7	77.3
Difference Between Pre- and Post-merger			
Expected releases per year	0.00334	0.00801	0.01136
Expected years between contamination	104.7	52.7	34.9

Potential Mitigation Measures

System-wide mitigation measures to provide critical protection in the areas of derailments/ hazardous materials spills/water quality have already been imposed on UP in the Board's Decision No. 44 and include:

- **Condition 1:** UP/SP shall adopt UP's existing formula-based standards for track inspection for all rail lines of the merged system, which will increase the frequency of inspections on SP rail lines.
- **Condition 2:** UP/SP shall adopt UP's existing tank car inspection programs for all appropriate facilities on the merged system.
- **Condition 3:** For all highway grade crossing signals, UP/SP shall provide visible instructions designating [a toll-free] number to be called if signal crossing devices malfunction.
- **Condition 4:** UP/SP shall provide [toll-free] numbers to all emergency response forces in all communities. These numbers shall provide access to UP/SP supervisors who shall provide train movement information and work cooperatively with communities in emergency situations. These numbers are not to be disclosed to the general public.
- **Condition 5:** UP/SP shall participate on a system-wide basis in the TRANSCARE program to develop hazardous materials and emergency response plans in cooperation with communities.
- **Condition 6:** UP/SP shall redistribute personnel to respond to hazardous materials emergencies in unprotected areas on the SP rail lines, such as in Arizona, New Mexico, and West Texas.
- **Condition 7:** UP/SP shall adopt UP's training program for community and emergency response personnel for locations on the SP rail lines, and include personnel from SP served locations in UP's school at Pueblo, Colorado for additional emergency response training.
- **Condition 12:** UP/SP shall adopt UP's existing policy of using head-hardened rail on curves in mountainous territory for SP rail lines to promote safer operations.

The safety effectiveness of the operations over this rail line is represented by County and State records that show no hazardous materials have spilled into the Truckee River since record keeping began in 1971. The UP/SP merger mitigation measures identified above, which are already in place, will strengthen these effective operating methods. Condition 1 will bring a disciplined and methodical approach to track inspection programs. As tonnage over the line increases, so will the frequency of track inspections. Conditions 3 and 4 will improve coordination between the public, emergency forces, and the railroad.

As a result of Condition 6, UP's Western Regional Manager for Emergency Response has been relocated to the Reno-Sparks area. This provides the opportunity for a continuing close relationship between the railroad and emergency response organizations/personnel to develop training programs and emergency response strategy. Under Condition 7, UP is conducting ongoing training for communities in the northern Nevada region. Personnel from the Reno-Sparks area are invited to attend. Condition 12 will reduce rail wear and the probability of rail defects developing. This is especially meaningful on the Donner Pass route segments adjacent to the Truckee River.

Based on its extensive analysis, SEA believes that the system-wide mitigation measures imposed in Decision No. 44 provide a high level of protection from hazardous materials events in the Reno and surrounding area. Moreover, UP has sophisticated detection equipment (hot box, dragging equipment, and high, wide, shifted load detectors) throughout the Reno area.

However, the addition of a hot box detector on the current westbound track (Track 1) at MP 240 (about three miles west of Reno) would further reduce the likelihood of hazardous materials spills or other train accident events. This is particularly the case should UP change its method of train traffic control to a centralized system, which would enable the use of either track in either direction. (Possible changes to UP train control are discussed in Sections 7.2.1 and 8.) Additional detection and protection would be offered by the installation of high, wide, shifted load detectors at MP 240. In addition, improved, ongoing communications could be promoted with the establishment of a Community Advisory Panel, consisting of representatives of the community, including Native Americans, who are willing to work with UP management on a regular basis to review safety, environment, and health issues associated with rail operations, particularly as they relate to the transport of hazardous materials.

6.2.6 Location Specific Train Operations (at Woodland Avenue)

Issue:	Railroad crossing blockage time at Woodland Avenue due to "helper" locomotive switching for westbound trains.
Objective:	Reduce railroad blockage time.
Measure:	Switching movements at Woodland Avenue.

Methodology

The SEA study team discussed with UP the current practice of adding "helper" locomotives at or near Woodland Avenue in Reno. Previously, the locomotives were added to provide additional power for trains to travel over Donner Pass. The locomotives were added near Woodland due to the availability of an additional track in this area.

Potential Impacts at Woodland Avenue

The practice of adding "helper" locomotives at or near Woodland Avenue has led to extended blockages of vehicular traffic at the Woodland at-grade rail crossing.

Potential Mitigation Measures

At the time of this report, UP has relocated the addition of "helper" locomotives away from the Woodland area, so this is currently not an issue.

6.2.7 Native American Issues

Evaluation Criteria

Issue:	Native American groups have identified a series of issues related to the impacts of the increased freight train traffic associated with the merger.
Objective:	Assure appropriate consultation with Native American interests in and near Reno. To the extent possible, respond to Native American issues in the mitigation plan.
Measure:	Adequacy of consultation and responsiveness to Native American issues.

Methodology

Since the filing of the merger application in December 1995, SEA has recognized the importance of extending outreach to the Reno and Washoe County Native American community. A Federal Register Notice of Intent to Prepare an EA was published in December 1995. In January 1996, SEA distributed agency consultation letters to more than 500 Federal, State, and local agencies, including 11 area representatives of the Bureau of Indian Affairs. The Phoenix Bureau of Indian Affairs, whose jurisdiction includes Nevada, was among the notified parties.

On April 12, 1996, SEA distributed the EA to 1,600 interested parties, including 300 county libraries, including the Washoe County and Sparks branches. In June 24, 1996, SEA issued the Post EA to 1,200 parties including 13 area and regional representatives of the Bureau of Indian Affairs and to Arlan Melendez, Chair of the Reno-Sparks Indian Colony. Mr. Melendez also received a copy of Decision No. 44.

During preparation of this PMP, SEA conducted site visits in the Reno area, including meeting with Paula Berkley, representing the Reno-Sparks Indian Colony in October 1996. In December 1996, SEA established the advisory Reno Mitigation task force, which included Paula Berkley as a representative of Native Americans. Ms. Berkley attended most task force meetings. Arlan D. Melendez, Chair of the Reno-Sparks Colony was Ms. Berkley's alternate on the task force. Both Mr. Melendez and Ms. Berkley, received all materials distributed to task force members.

In May 1997, SEA sent letters to the chairs of the Native American councils (Reno-Sparks Indian Colony, Pyramid Lake Paiute, and Washo Tribal) in the Reno area offering an opportunity to consult regarding Native American issues (see Appendix O). In addition, SEA added to its study team a subcontractor, Mary Rusco, from the Reno area to address Native American issues.

General Background [38]

Both Northern Paiute and Washo peoples have occupied the Great Basin for many centuries. During the times immediately preceding the arrival of non-Washo or Numic speaking people into the Great Basin, it is likely that the Washo utilized the area through which the railroad right-of-way passes from Donner Summit to Sparks. From Sparks to Wadsworth, it was probably the Northern Paiute who utilized this area. Much of the territory claimed for Washo may have served as a joint use area for them and their Northern Paiute neighbors.

Northern Paiute people occupied a large area where resources on which they depended were unevenly distributed. The various subgroups hunted and gathered native food, medicinal sources, and other resources available locally or in their neighbor's districts, trading any surplus commodities for those only available elsewhere. Until their lives were changed forever by the arrival of European-Americans, they lived in small kin-based, highly mobile groups, forming inter-group kinship networks that greatly increased the size of the area with which they were familiar and were

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[38] From summary prepared by Mary Rusco, Ph.D., 1997.

granted access. Nuclear families were the basic socioeconomic unit, but their camps were often extended to include other relatives or friends.

The Washo nuclear territory extended from Sonora Pass on the south along the Sierra crest to Yuba Pass and on the eastern slope of the Sierra and foothills north to Honey Lake. Their homeland extended east to the Pinenut Range, northward just west of Dayton and Virginia City, through Sparks. Lake Tahoe was both an economic and spiritual center of their world.

The use of the resources in their territory required a seasonal pattern of hunting and plant gathering. They usually wintered along lowland stream terraces or wetlands, beginning to move upland in the early spring, often arriving at Lake Tahoe by summer. They harvested acorns as well as pinenuts that were processed and stored as winter staples.

History of the Reno-Sparks Indian Colony[38]

The Cities of Reno and Sparks were within the nuclear territory of the Washo Indians at the time it was originally settled by non-Indians. At that time there were small settlements of Washo throughout what was to become the two neighboring cities. Northern Paiute Indians were settled downstream along the Truckee River and both to the north and south of Reno and Sparks. Although their right to land was not recognized by the new Territory government, the area's indigenous residents continued to live much the way they had before the immigration of European-Americans. As the non-Native American population grew, many Washo and Northern Paiute people found employment on farms or ranches and gradually shifted from a hunter-gatherer to a wage-labor economy.

After the construction of the Central Pacific Railroad, many Native Americans moved to towns along the railroad seeking employment. When the roundhouse in Wadsworth was moved to Sparks in 1904, Native American laborers and their families followed their jobs and settled along a ditch beside the tracks. By 1916, landowners in Reno and Carson City joined Bureau of Indian Affairs (BIA) agents to petition Congress for land for these Native Americans, who were then regarded as landless. With the support of Senator Key Pittman of Nevada, legislation was passed providing funds to purchase 20 acres between Reno and Sparks to house what was to become the Reno-Sparks Indian Colony. In 1926 an additional 8.38 acres was purchased, totaling the number of urban holdings to nearly 29 acres. Additional land was acquired by the Colony approximately 20 miles north-northeast in Hungry Valley.

The urban colony originally consisted of BIA administrative facilities, small farms, and houses. Today it is residential except for tribal and Inter-Tribal administrative complexes and tribal commercial buildings. At the present time, the Tribal Enrollment is 819 Washo, Northern Paiute, and Shoshone members. The population of the two Colony tracts and immediate vicinity is 799. The Colony is organized under the Indian Reorganization Act of 1934. Its Constitution and Bylaws were adopted by a large majority (92.4 percent) in 1935 and approved by the Department of the Interior in 1936. A six-member Council governs the Colony. Council members serve two-year terms. The chair, elected separately every two years, serves as a seventh member.

Potential Native American Impacts

Figure 6.2.7-1 shows the location of Native American Tribes in the Reno area in relation to the UP rail lines. As shown, the Reno-Sparks Indian Colony is in the eastern portion of the City of Reno, abutting the rail line.

A mitigation measure that would involve construction along the railroad right-of-way through Washoe County (e.g., highway/rail grade separation(s) or a depressed railway) can be expected to have potential adverse impacts on significant cultural properties. As noted above, both Washo and Northern Paiute people made use of the Truckee River. They lived on terraces above the river, where they trapped, hunted, and fished and made use of edible and medicinal plants.

Both of these early inhabitants of the area traversed by the rail line recognize a religious obligation to act as stewards for the land and water, which is intrinsically sacred to them. Descendants of these earliest occupants live in the area today and recognize a concern for the environment that is both pragmatic and religious.

Consultation

During consultations, Native American representatives raised a number of environmental and other issues. On July 10, 1997, Arlan D. Melendez (Chairman, Reno-Sparks Indian Colony Tribal Council) Paula Berkeley (Consultant to local Native American interests), Pat Smith (Attorney representing local Native American interests), and Merri Belaustegui-Traficanti (Deputy City Attorney for the City of Reno) met with Dave Mansen and Mary Rusco of the SEA study team.

Mr. Melendez noted that the Colony is part of the Nevada Indian Environmental Coalition, whose president is Brian Wallace (Chair, Washo Tribe). He stated that he had discussed related issues with Mervin Wright, Jr., Tribal Chair of the Pyramid Lake Paiute Tribal Council.

Potential Environmental Issues: Mr. Melendez and his representatives expressed the following potential environmental Native American issues. (Each issue is followed by the section in the PMP in which the issue is addressed.)

- Increased noise levels (especially at night) at Colony residences (Section 6.2.10).
- Increased traffic delays in Reno and near the Colony (Section 6.2.1).
- Potential for pollution of the Truckee River from spills of hazardous materials (Section 6.2.5).
- With an increase in hazardous materials transported by rail, the Pyramid Tribe is concerned about the possibility of spills of hazardous waste into the Truckee River that would endanger public health and the Pyramid Lake fishery (Section 6.2.5).
- Increased danger to the Colony from the transportation of hazardous materials (Section 6.2.5).
- Potential air quality impacts to the nonattainment status of Reno (Section 6.2.11).

UP RAIL LINES

Source: Nevada Department Of Transportation, Planning Division, 1994

- Any construction/earth moving (e.g., from construction of highway/rail grade separations or a depressed railway) might affect archaeological sites of importance to Washo and Northern Paiute tribe members (Sections 7.2.2 and 7.2.3).
- U.S. Department of Energy can require the railroad to transport nuclear material (Not within the purview of the Surface Transportation Board).

Other Observations and Concerns: Mr. Melendez and his representatives expressed the following additional observations and concerns:

- The Native American community and the Colony feel that they were "left out" of the procedure to evaluate effects of the merger and were not specifically notified to respond to the draft EA when it was being reviewed (See "methodology" discussion above).
- Tribes were not on the EA distribution list for notices of public hearings, and requests were not made for input. (No hearing was held on the EA. See also "methodology" discussion above).
- An environmental impact statement (EIS) should have been prepared for the merger, as is being done in the case of the proposed Conrail acquisition (see Section 2.3).
- The mitigation study schedule should be extended to allow for more input into the process. The 30-day review time of the mitigation plan is inadequate (see Section 2.7.2).
- The Colony plans to file an Amicus brief for the City of Reno's lawsuit (Comment noted).

Potential Mitigation

A section of the PMP is identified above for each of the concerns identified by the Chair of the Reno-Sparks Colony. These PMP sections provide responses to the Native American concerns and/or analyses of the issue identified. Mitigation measures for potential environmental impacts are reviewed not only in the Section 6 sections identified above, but also in Sections 7 and 8 of this PMP.

6.2.8 Biological Resources

Evaluation Criteria

Issue:	Train derailments releasing hazardous substances into the environment.
Objective:	Minimize the increase in risk to soil resources and plant and animal species from train derailments resulting from the increased train traffic associated with the merger.
Measure:	Risk of derailments/spills.

Methodology

The City of Reno, Washoe County, and Native American interests have expressed concerns that increased rail traffic along the Truckee River could affect species of concern because of the increased potential of hazardous material spills. The USFWS has identified two species of concern in the study area: (1) the Federally listed endangered fish, the cui-ui (*Chasmistes cujus*) and (2) the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi,* also known as *Salmo clarki henshawi*), which inhabit Pyramid Lake, a tributary of the Truckee River.

In response to this concern, SEA prepared a technical memorandum documenting the status and locations of Lahontan cutthroat trout and cui-ui. The memorandum, attached as Appendix P, also discusses the potential impacts, including hazardous materials spills, on these special status species. Section 6.2.5 also reviews the likelihood of hazardous materials spills.

Based on its extensive analysis, SEA believes that the system-wide mitigation measures imposed in Decision No. 44 provide a high level of protection from hazardous materials events in the Reno and surrounding area. Moreover, UP has sophisticated detection equipment (hot box, dragging equipment, and high, wide, shifted load detectors) throughout the Reno area.

Consultation: The SEA study team submitted formal requests on January 29, 1996, to the USFWS and the Nevada Department of Conservation and Natural Resources for input regarding endangered species. Comments were not submitted by these agencies during the environmental review period for the overall merger. The SEA study team also transmitted an information package to the nine area offices of the BIA. SEA has also consulted with Native American representatives on this issue (see Section 6.2.7). SEA has conducted additional consultation with the USFWS during preparation of the PMP, and SEA will continue ongoing consultation with USFWS during the review of this PMP and the preliminary mitigation measures.

Species of Concern Status -- Cui-ui: Cui-ui is the common name for *Chasmistes cujus*, a lakesucker currently only found in Pyramid Lake, Nevada. Pyramid Lake is located in the western portion of the State of Nevada, approximately 25 miles northeast of the City of Reno. This lake is located entirely within the boundaries of the Pyramid Lake Paiute Indian Reservation (Reservation). Much of the economy on the Reservation centers on fishing and recreational activities at Pyramid Lake. The only permanent tributary to Pyramid Lake is the Truckee River, which originates at Lake Tahoe, located approximately 25 miles southwest of the City of Reno. The river's primary water sources are runoffs from the Sierra Nevada and the Carson mountain ranges. Dams now largely control the flow of the Truckee River. Lake Tahoe, which once overflowed directly into the Truckee River, is now regulated by a dam, as are Donner and Independence Lakes.

Historically, the cui-ui occurred in the sister lakes: Pyramid and Winnemucca. The cui-ui no longer occurs in Winnemucca Lake. The lower Truckee River, which encompasses the historical spawning area of the cui-ui, is a low-gradient stream. Its reaches include the Marble Bluff Dam, the Fish Processing Building, and Pyramid Lake Fishway and its four ladders. At the Fish Processing Building, fishery staff trap and release migrating adult cui-ui upstream from the dam. With program support from governmental agencies, members of the Pyramid Lake Paiute Tribe have received training in netting, fish transport, and artificial culture techniques in order to assume a more direct role in fish culture facility operation.

The USFWS listed the cui-ui as a Federally endangered species on March 11, 1967. The Endangered Species Act (ESA) stipulates that endangered species are protected under Sections 7 and 9.

The USFWS Pacific Region (Region I) is responsible for the State of Nevada. The lead State agency for Section 7 consultation is the Nevada Department of Conservation and Natural Resources (NDCNR), which has a Division of Wildlife for coordination on threatened and endangered wildlife.

The USFWS originally approved a Recovery Plan for this species in January 1978, and has twice updated this plan. The Recovery Plan developed for the cui-ui ranks the species as Priority 2C (a species with a high degree of threat and a high recovery potential) under the USFWS' Species Priority System. The goal of this Recovery Plan is to reestablish the cui-ui in portions of its historic range. Although no critical habitat has been designated and no "special rules" apply, the endangered status of this species applies to the entire population. The recovery plan is discussed in Appendix P.

Species of Concern Status -- Lahontan Cutthroat Trout: Lahontan cutthroat trout is the common name for *Oncorhynchus clarki henshawi*, the only trout native to the Lahontan subbasin of the American Great Basin (west-central Nevada). The general geographic setting described above for the cui-ui also applies to the Lahontan cutthroat trout. Historically, the trout was native to the Truckee, Carson, Walker, and Quinn Rivers as well as Lake Tahoe and the Pyramid, Walker, Donner, Independence, and Summit Lakes. Native Lahontan cutthroat trout are now extinct in Lake Tahoe, Pyramid, Walker, and Donner Lakes, but still occur in Independence and Summit Lakes. The trout presently exists in approximately 10 percent of its historic stream habitat and one percent of its historic lake habitat.

Native Americans of the Great Basin, including the Northern Paiute, Shoshone, and Washo relied heavily on the trout as a major food source. At the turn of the century, the trout was also an important commercial resource in Lake Tahoe and Pyramid Lake. It is still considered a significant gamefish today.

In the early 1930s, the original Pyramid Lake population of Lahontan cutthroat trout slowly began to decrease. Authorities determined that several water diversion projects contributed to this decline. The ability of trout to reproduce successfully diminished, because low water levels severed a once-viable spawning habitat. This reduction in spawning habitats, coupled with increased predation and species competition from the indiscriminate introduction of nonnative trout species such as rainbow and brook trout, led to the extinction of the Lahontan cutthroat trout in Pyramid Lake and the Truckee River by the early 1940s. The trout also became extinct in Lake Tahoe around the same time that most of the suitable spawning tributaries became dewatered or dammed. In Walker Lake, located well south of Reno, the trout was extinct by 1948.

The Lahontan cutthroat trout fishery exists today because of an excellent hatchery program that is rearing large numbers of fish for transplant. These fish are transplanted into all rivers, tributaries, and lakes within their historic range. However, in order for the Lahontan cutthroat trout to fully recover, habitat restoration measures are needed in conjunction with transplanting efforts to enhance the probability for natural reproduction. Once this is achieved, the trout can naturally sustain its existence.

The USFWS Federally listed the Lahontan cutthroat trout as an endangered species in 1970, but later reclassified and listed it as a threatened species in 1975 to facilitate management and restoration efforts. A threatened species is defined as one that is considered likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Sections 7 and 9 of the ESA protect threatened and endangered species.

In January 1995, the USFWS approved a species recovery plan, which outlines the management actions necessary to lead to the eventual de-listing of the Lahontan cutthroat trout as a threatened species. Additional information concerning this recovery plan is provided in Appendix P.

History of Hazardous Materials Rail Spills: The dialogue concerning potential effects on endangered species has focused on concerns regarding the potential for increased spills of hazardous materials due to the increase of rail traffic along the Truckee River. Arguments have been made that an unexpected spill could result in chemicals and hazardous substances washing into the river and entering Pyramid Lake where the cui-ui and Lahontan cutthroat trout occur.

Potential Impacts on Biological Resources

Based on the history of spill events along the Truckee River (see Section 6.2.5) and the infrequency of derailments, SEA has concluded that it is unlikely that the above-referenced endangered and threatened species will be affected by the merger-related increase in train traffic given the low likelihood that an accidental upstream spill from a UP freight train will occur (see Section 6.2.5). In addition, UP plans to improve tracks[39] and rail beds, improvements which should further reduce the risk of rail spills along the Truckee River. UP has also developed an emergency response plan to respond to spill events, in cooperation with local emergency service agencies.

While SEA is sensitive to these issues and the relationship of derailments and spills as they affect endangered or threatened species, the independent risk assessment performed for this study (Section 6.2.5) demonstrates that the likelihood of a rail-produced spill that would affect the Truckee River or any downstream body of water is remote. The safety mitigation measures previously ordered by the Board in Decision No. 44 are expected to offset increases in risk attributable merger-related increases in freight train traffic. In addition, SEA has reviewed additional mitigation measures pertaining to hazardous materials that would further reduce the likelihood of hazardous materials spills, e.g., additional safety detection equipment (see Section 6.2.5 and Section 8).

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[39] As part of Condition #12 of the Post EA, UP is improving tracks and rail beds in areas of mountainous terrain and curves, including the segment along the Truckee River. These track improvements will further reduce the potential for a spill event. (These planned improvements activities will not occur in proximity to either species' habitats and would not affect the fish or their habitats.)

In conclusion, it appears that the merger-related train traffic increases through Reno and Washoe County would have a negligible impact on the cui-ui and Lahontan cutthroat trout for the following reasons:

- Appropriate mitigation measures imposed in Decision No. 44.
- Pyramid Lake, the major habitat for cui-ui, is 15 miles from the UP (formerly SP) tracks.
- There is no history of major derailment spills along the Truckee River, which feeds into Pyramid Lake.
- UP has an emergency response program in place, and in the event that a spill occurs, UP can respond quickly with appropriate remediation measures.
- The Washoe County Environmental Health Department and other local agencies have emergency response plans and staff to respond to emergencies.
- UP is improving the tracks along the Truckee River, which will further reduce the potential for a spill event. (These planned improvements will not occur in proximity to either species' habitats and would not affect the fish or their habitats.)

On June 17, 1997, SEA transmitted letters discussing these initial conclusions to USFWS staff in the Sacramento Field office, the Nevada State office, and the Region I office. SEA's proposed additional mitigation measures for the protection of the Truckee River and the endangered and threatened species are provided in Section 8. With the issuance of the PMP and its preliminary recommendations, SEA will continue consultation with the USFWS on both the initial conclusions and the PMP with its proposed additional mitigation measures.

6.2.9 Noise Level

Evaluation Criteria

Issue:	Train noise.
Objective:	Mitigate the increase in train noise resulting from the increased train traffic of the merger.
Measure:	Total number of sensitive receptors within the 65 dBA noise contour or with a 3 dBA increase in noise.

Methodology

Board's Noise Criteria: Under the Board's rules, environmental analyses are required for areas where the Board's noise analysis threshold of eight trains per day is exceeded, 49 CFR 1105.7 (e)(6)(1996). If this threshold is exceeded, an analysis is required of the following noise conditions, 49 CFR 1105.7(e)(6)(I)(ii)(1996):

- An incremental increase in noise levels of three decibels (L_{dn}) or more, or
- An increase to a noise level of 65 decibels L_{dn} or greater.

Board regulations require identification of sensitive receptors within areas that would experience increases in noise under these criteria. The following examples of sensitive receptors are provided in the Board's regulations: "schools, libraries, hospitals, residences, retirement communities, and nursing homes" (49 CFR 1105.7(e)(6)(ii)(1996)).

The Board's noise criteria include the day-night average sound level (L_{dn}) as the noise descriptor. The L_{dn} is the time-average of the A-weighted noise levels obtained over a 24-hour period, with a 10 dBA penalty added to the nighttime levels (10:00 p.m. to 7:00 a.m.). This adjustment is intended to account for increased sensitivity to nighttime noise events.

Representatives of the City of Reno have stated that the nighttime penalty included in the L_{dn} calculation may not be applicable to Reno, with its 24-hour resort/gaming activities. However, removal of the 10 dBA penalty would reduce the number of sensitive receptors potentially affected. SEA, therefore, has continued to use the L_{dn} as a conservative noise descriptor for this study.

Noise Measurements: SEA's study team conducted noise measurements in Reno during the week of February 3, 1997 (see Section 5.3). Flooding in January 1997 caused UP to reroute train traffic from the Feather River rail line through Reno, enabling measurement and assessment of potential noise impacts at train levels approaching anticipated post-merger numbers. The on-site measurements took into account such site-specific sound issues as actual train and horn equipment, shielding due to buildings, ground absorption, and the variability of train horn sounding sequences. The purpose of the survey was to measure every train noise event during the week to provide actual measurements of the 24-hour L_{dn}.

Long-term measurements were performed for several 24-hour periods at two locations. Short-term measurements were performed at three distances along a line extending perpendicularly from the tracks at seven locations to characterize the site-specific sound issues. The seven locations were chosen to be representative of urban (with building shielding) and rural (little building shielding) areas, and grade-crossing (horn noise) and non-grade crossing (no horn noise) areas. Noise measurements for these conditions were deemed sufficient to characterize the noise environment for the entire study area. Short-term measurement locations are identified in Table 6.2.9-1.

Table 6.2.9-1
Noise Measurement Locations

Location	Type	Positions A, B, C: Nominal distance from Tracks (feet)
1. Virginia North	Urban grade crossing -- with shielding	300, 600, 1200
2. Virginia South		150, 300, 600
3. Washington		150, 300, 600
4. Oxbow Park	No horns	50, 100, 200
5. Del Curto	Rural grade crossing -- little shielding	150, 300, 600
6. Stage Lane	Rural grade crossing	50, 100, 200
7. Woodland		150, 300, 600

Single-event Sound Exposure Level (SEL) data for each train noise event were used to determine how train noise decreases (i.e., the drop-off rate) with distance for each location identified in Table 6.2.9-1. SEL is a noise descriptor that normalizes all of the sound energy of a noise event to a one-second duration and provides a meaningful way to compare noise levels of two different noise events of different durations. SEL is useful for calculating the drop-off rate, because it accounts for propagation of sound from the train to the measurement position for the entire train noise event, not just for the loudest portion of the noise event. In addition, SEL, in conjunction with the number of daytime and nighttime train noise events, can be used to calculate directly the L_{dn}.

The rates of noise decrease with distance were calculated for the locations identified in Table 6.2.9-1 for every measured train noise event and were used to determine the distance from the tracks to the 65 dBA L_{dn} contour. These distances were calculated to determine the average distance to the 65 dBA contour for an urban grade crossing, rural grade crossing, and no-horn condition. The results of this analysis are shown in Table 6.2.9-2.

Table 6.9.2-2
Distance to the Post-Merger 65 dBA L_{dn} Contour

Type	Distance from Track Centerline (feet)
Urban grade crossing-with shielding	345
Rural grade crossing-little shielding	404
No horn	112

Freight Train Noise Model: A freight train noise model was used in conjunction with the on-site noise measurements to characterize train horn, engine, and wheel/rail noise and sound propagation effects, including the rate at which noise levels decrease with distance away from the tracks. This model was used to calculate the train noise levels at various locations along the rail line in Reno. The SEA study team overlaid the projected noise levels and contours onto a Geographic Information System (GIS) to provide information regarding affected sensitive receptors within the Board's noise criteria.

Environmental Noise Issues: Environmental noise issues analyzed in this study include the effects of train horns, wheel/rail interface, and diesel locomotive engines. As described below, the overwhelming majority of noise generated by rail operations is that which emanates from warning horns located on the locomotives. This source of noise poses an unusual and complex issue for consideration. Unlike other potentially adverse environmental impacts, rail horn noise is a deliberately created annoyance that takes place to ensure safety.

The Board addressed the public safety implications of the train horn in its Decision No. 44. Specifically, the Board noted that "[a]ny attempt significantly to reduce noise levels at grade crossings would jeopardize safety, which we consider to be of paramount importance."

The conflict between safety and potential noise impacts was recognized in the recently passed Federal legislation entitled the Swift Act (49 U.S.C. §20153). This act directs the Secretary of DOT to promulgate regulations relating to noise and rail safety measures. Although the regulations have yet to be promulgated, it is anticipated that they will include underlying requirements for establishment of a "quiet zone" within which train horns would not need to be sounded.

FRA is the Federal agency within DOT responsible for train horn requirements. The FRA has noted that it is unlikely to have "quiet zone" regulations in place before 1999. Until the new regulations related to quiet zones and other alternatives to train horns are promulgated and adopted, train horns must be sounded to ensure public safety.

Current Practices Regarding Horn Blowing: Proposed Federal regulations do not specifically mention how the horn is to be sounded; however, current railroad industry practice is a pattern of two long, one short, and one long sound. Railroads differ in their specific rules, some require the sound pattern to begin 1/4 mile before the highway while others simply say "on approach" to a highway. The UP requires the pattern to begin 1/4 mile before the crossing and that the last long sound be continued until the locomotive reaches the crossing.

Potential Noise Impacts

The freight train noise model was used to develop noise projections for projected pre- and post-merger train levels.

Three dBA Increase Criterion: Based on an increase in the number of trains from pre- to post-merger levels, the potential increase in train noise is projected to be 2.7 dBA L_{dn}.

Consequently, no exceedence of the Board's criterion of a three dBA or greater noise increase is projected for Reno and Washoe County.

65 dBA L_{dn} Criterion: In the vicinity of grade crossings, potential train horn noise impacts from increases in freight train levels associated with the merger can extend as far as 400 feet from the track into the adjacent community. Potential wheel/rail noise impacts can extend up to 110 feet from the track. Noise contours for pre- and post-merger conditions without mitigation were overlain on a parcel-based GIS provided by Washoe County. GIS data included actual property boundaries and land use information.

Table 6.2.9-3 shows the number of existing sensitive receptor properties (parcels) that potentially fall between or are intersected by the pre- and post-merger 65 dBA L_{dn} noise contours. As shown in the table, the increase in the number of sensitive receptors from pre- to post-merger train levels is 40, which includes 27 hotels/casinos and 13 other properties. The parcel locations are shown on maps in Appendix Q.

Table 6.2.9-3
Number of Noise-Sensitive Receptors (parcels) Potentially Within or Intersected by Pre- and Post-merger 65 dBA L_{dn} Noise Contours

Condition	Number of Affected Noise-Sensitive Receptors (Parcels)	Number of Affected Casinos and Hotels (Parcels)	Total
Post-merger (unmitigated)	44	61	105
Pre-merger	31	34	65
Difference (due to the merger-related increase in freight trains)	**13**	**27**	**40**

Using actual noise measurements and noise models, the SEA study team has taken a "harder look" at the potential noise impacts in Reno. The Board has the authority to determine the significance or insignificance of these potential environmental impacts, and SEA recommends that the Board find these potential noise impacts to be insignificant, which is consistent with the EA, Post EA, and Decision No. 44. As noted in the Board's Decision No. 44, the intensity of the train horns is not expected to increase, only the frequency. Moreover, this is not a new type of noise that will be experienced, and the effects are on properties that developed over the years next to the rail line. Most importantly, safety, which is of paramount importance, requires the blowing of the train horns as noted in the Board's Decision No. 44, and as recognized in the recently passed Federal Swift Act.

Potential Mitigation Measures

Decision No. 44 notes that "safety dictates that railroads sound their horns at grade crossings. Any attempt significantly to reduce noise levels at grade crossings would jeopardize safety, which we consider to be of paramount importance."

The Board, in its Decision 44, requires UP to "consult with affected counties to develop focused noise abatement plans." To comply with the Board's Decision, UP is monitoring train frequencies to identify counties that experience increases of three or more average daily trains. UP has informed the SEA study team that it intends to send notifications to these counties and provide a toll-free number for citizens to call to register noise complaints. UP has also stated its intent to work with local communities regarding noise issues and complaints. SEA will continue to monitor UP's compliance with the provisions of Decision No. 44.

There are two types of mitigation measures appropriate for lessening the potential noise impacts of merger-related increased train traffic in Reno and Washoe County: (1) options to reduce the noise produced by the trains, and (2) options that would provide a noise buffer separating the train and the sensitive receptors. Constructing highway/rail grade separations or a depressed railway or closing streets would remove grade crossings and the need to sound train horns. Other possible measures include restricted nighttime train operations, source noise control, noise barriers, and building sound insulation. Only after the FRA promulgates regulations under the Swift Act will the additional types of noise mitigation that could be applied be known, and such regulations are to be developed recognizing the necessary balance between the public safety and the adverse noise impacts associated with the horns being blown. Under the anticipated new regulations, possible methods for decreasing noise produced by the train horns include: four-quadrant gates (or median barriers) and "quiet zones," or local grade crossing warning devices (directional horns). Each of these potential mitigation measures is reviewed in more detail in Section 7.

6.2.10 Vibration

Evaluation Criteria

Issue: Vibration created by trains.
Objective: Mitigate the increase in vibration created by trains resulting from merger-related increased train traffic.
Measure: Building damage vibration criteria.

Methodology

Ground-borne vibration can be a concern for nearby neighbors of a railroad line, although vibration is not as common an environmental problem as noise. The effects of ground-borne vibration include "feelable" movement of building floors, rattling of windows, and shaking of items on shelves or hanging from walls. In some extreme cases, vibration can cause cosmetic or structural damage to buildings.

Train wheels rolling on the rails create vibration energy that is transmitted through the track support system into the ground. The amount of energy that is transmitted is strongly dependent upon how smooth the wheels and rails are, the vehicle suspension system, and the track support system. The vibration of the track support shakes the adjacent ground, resulting in vibrations that propagate through the soil and rock to the foundations of nearby buildings. Ground-borne vibration is typically less annoying to people who are outdoors than to people in buildings.

Vibration Descriptors

A common measure of vibration is peak particle velocity (PPV), defined as the maximum instantaneous vibratory motion in any direction. PPV is often used in monitoring blasting vibration, since it is related to potential damage to building components. Another descriptor, typically presented in decibels (dB), is the root-mean-square (RMS) amplitude, which is the average of the squared amplitude and is often used as the basic descriptor for evaluating human response to ground-borne vibration.

Regulatory Setting

Although there has been limited research of human response to building vibration, there are several guidelines for judging the acceptability of vibration related to railroad projects.

Federal Transit Administration (FTA) +6X"Human Response" Guidelines: FTA transit vibration guidelines delineate human response impact thresholds based on land use and event frequency stated in terms of RMS ground-borne vibration velocity level (VdB). Although the impact thresholds are based on experience with rail transit (passenger) systems, they can be applied to freight train vibrations. Table 6.2.10-1 provides FTA ground-borne vibration "human response" impact criteria. FTA guidelines suggest use of the "infrequent" criterion for locomotives and the "frequent" criterion for rail cars, taking account of the facts that typical freight locomotives tend to have vibration levels 5 to 10 dB higher than rail cars and that locomotive vibration only lasts for a few seconds (infrequent), while rail car vibration can last for several minutes (frequent).

Table 6.2.10-1
FTA Ground-Borne Vibration Human Response Impact Criteria
(VdB re 1 micro inch/sec)(RMS)

Land Use Category		Frequent Events*	Infrequent Events**
Category 1:	Buildings where low ambient vibration is essential for interior operations	65 VdB	65 VdB
Category 2:	Residences and buildings where people normally sleep.	72 VdB	80 VdB
Category 3:	Institutional land uses with primarily daytime use.	75 VdB	83 VdB

* "Frequent Events" is defined as more than 70 events per day.

** "Infrequent Events" is defined as fewer than 70 events per day.

Bureau of Mines "Major Damage" Guidelines: Researchers at the U.S. Bureau of Mines have identified a ground vibration peak particle velocity (PPV) of 2.0 in./sec (126 VdB re 1 micro in./sec) as a safe blasting limit to avoid major damage to residential structures, but lower levels are recommended to minimize complaints. The Bureau has also identified a ground vibration PPV of 0.5 in./sec (114 VdB re 1 micro in./sec) as the approximate threshold for minor cosmetic damage to buildings.

Potential Vibration Impacts

Ground-borne vibration is a complex phenomenon that is difficult to model analytically and predict accurately. Factors that influence vibration caused by railroad activity include vehicle speed and suspension, wheel and track type and condition, track support system, soil type, soil rock layering, depth to water table, and building construction type.

Existing vibration impact criteria assess the potential impact of maximum vibration levels at a sensitive receptor for a single event only, so an increase in the number of freight trains does not affect vibration levels per event nor the likelihood of exceedance of the single-event criterion. Stated differently, there are no impact guidelines that assess potential vibration impacts on the basis of increases or decreases in number of train operations.

Vibration velocity levels, as a function of distance from the track for different types of rail systems, have been assembled and can be used for general assessment. Based on generalized railroad surface vibration levels, generalized propagation characteristics, and a train speed of 30 mph, a potential impact distance of 120 feet from the track was estimated for freight operations using FTA's "human response" guidelines for residential buildings (i.e., 80 VdB limit for locomotives and 72 VdB limit for rail cars). That is, residential buildings within 120 feet of the railroad track may be subject to vibration that exceed the FTA "human response" vibration impact criterion. To apply this criterion, the freight rail cars are categorized as frequent and the freight locomotives are classified as infrequent.

Ground-borne vibration levels expected from individual freight train passbys are expected to be substantially below cosmetic damage criteria, which are lower than structural damage criteria. It is very unlikely that vibration levels would exceed any building damage criterion and thus unlikely that freight train activity at any level would cause damage to buildings in Reno. Vibration levels from existing and future single event train passbys along the corridor could exceed the FTA "human response" guidelines, meaning that low-level vibrations may be felt by people near the rail line, but the single-event vibration levels are not expected to change on a per train basis.

Potential Mitigation Measures

Because the SEA study team concluded that potential merger-related vibration impacts would be substantially below damage levels adjacent to the existing freight rail line, potential mitigation measures were not identified.

6.2.11 Air Quality

Evaluation Criteria

Issue:	Locomotive and motor vehicle exhaust emissions.
Objective:	Mitigate the increase in emissions.
Measure:	Total emissions of particulate matter, oxides of nitrogen, hydrocarbons, and carbon monoxide.

Methodology

Criteria Pollutants and National Standards: For this study, the pollutants of interest are volatile organic compounds (VOCs), oxides of nitrogen (NO_x), ozone (O_3), particulate matter (PM), and carbon monoxide (CO). The national regulations addressing these criteria pollutants are the National Ambient Air Quality Standards (NAAQS). These health-based limits define maximum allowable ambient air concentrations for each pollutant, which have been determined by scientific studies estimating human exposure level and potential health impacts. Table 6.2.11-1 shows the current NAAQS, as well as the recently proposed stricter NAAQS. [40]

The Clean Air Act of 1970 and its subsequent amendments call upon local and state governments to develop implementation plans for each area in which ambient concentrations exceed the NAAQS (so-called nonattainment areas). The implementation plans are series of regulations or programs that reduce emissions from sources in the local region. The governments have significant discretion in developing plans that are tailored to the situation in their region, but each plan must obtain approval from the EPA.[41] Under the current NAAQS, Reno is designated as being in moderate nonattainment for CO and PM, and Washoe County is designated as being in marginal nonattainment for O_3.

Air Quality in Reno and Washoe County: Reno, Nevada, is located at an altitude of 4,400 feet in the Washoe County plateau, near the Nevada/California border. It lies in the lee of the Sierra Nevada Mountain Range to the west, which rises to elevations of up to 11,000 feet. Smaller hills to the east reach to about 7,000 feet. This terrain creates a basin that can trap air pollutants. This basin is known as Truckee Meadows and has boundaries identical to the Truckee Meadows hydrographic basin as defined by the Nevada Division of Water Resources.[42]

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[40] The new EPA-proposed NAAQS for ozone and $PM_{2.5}$ were approved by President Clinton on June 25, 1997, and are undergoing interagency review at the time of this writing. Many areas of the nation that are now in attainment status are expected to become nonattainment areas if this proposal is implemented. It is possible that Congressional action will modify or eliminate the NAAQS revisions.

[41] Laws, E. P., "The Regulation of Stationary Sources," paper in *Clean Air Law and Regulation,* The Bureau of National Affairs, Inc., Washington, D.C., 1992, pg. 155.

[42] *Washoe County, Nevada, 1995 Emission Inventory for Particulate Matter,* Washoe County District Health Department, Air Quality Management Division, December 1996.

Table 6.2.11-1 National Ambient Air Quality Standards		
Pollutant	**Current**	**Proposed**
O_3	0.12 ppm, 1-hr average	0.08 ppm, 8-hr average
CO	9 ppm, 8-hr average 35 ppm, 1-hr average	Unchanged
NO_2	0.053 ppm, annual arithmetic mean	Unchanged
PM_{10}	50 $\mu g/m^3$, annual arithmetic mean 150 $\mu g/m^3$, 24-hr average	Unchanged
$PM_{2.5}$	—	15 $\mu g/m^3$, annual arithmetic mean 65 $\mu g/m^3$, 24-hr average
SO_2	0.030 ppm, annual arithmetic mean 0.14 ppm, 24-hr average	Unchanged
Lead	1.5 $\mu g/m^3$, calendar quarter	

Sources: Current NAAQS are from 40 CFR 50 (1996). Proposed NAAQS are from EPA website, URL address: http://ttnwww.rtpnc.epa.gov/naaqsfin/o3pm.htm, July 1, 1997.

Truckee Meadows and Washoe County are designated as nonattainment areas for different pollutants. The Truckee Meadows nonattainment area is currently in moderate nonattainment for CO and PM_{10}. All of Washoe County is designated as a marginal nonattainment area for O_3. Because of these designations, the Air Quality Management Division of the Washoe County District Health Department has developed a network of air quality monitoring stations within the Truckee Meadows nonattainment area (See Figure 6.2.11-1).

Washoe County published a document describing air quality trends in the Truckee Meadows Basin from 1989 to 1995.[43] Figure 6.2.11-2 shows the trend of exceedances from 1989 to 1995. The downward trend reflects a combination of control measures and favorable meteorology.[44]

The last NAAQS exceedance day for CO was recorded on December 13, 1991. As a result, Washoe County may request to be redesignated to maintenance status for CO.[45] A similar request for redesignation to attainment status for O_3 was submitted to the EPA in 1994 and again in 1996, since monitoring data have shown that there have been no violations of the O_3 standard since 1990.[46]

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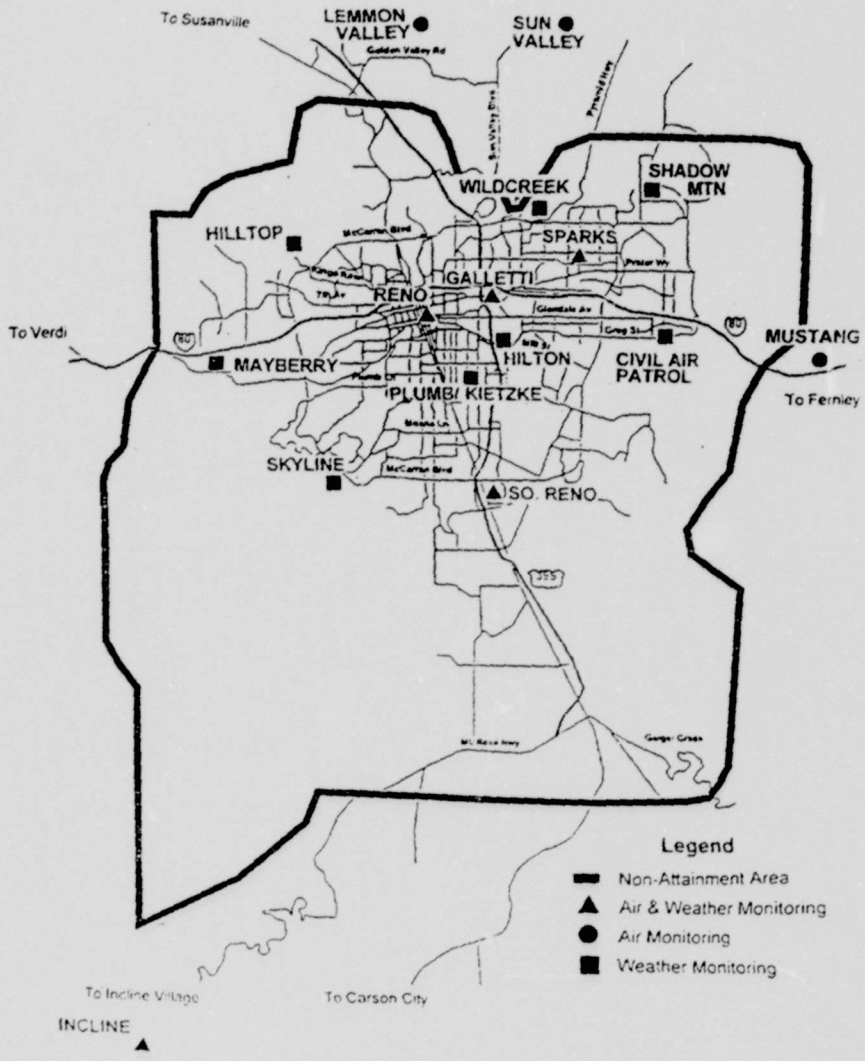
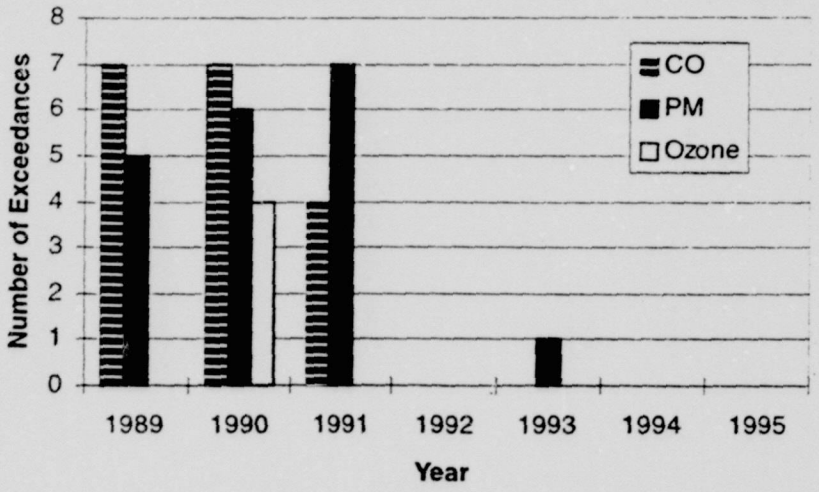
[43] *Washoe County, Nevada, Air Quality Trends, 1989-1995,* Washoe County District Health Department, Air Quality Management Division, 1995.

[44] Jennison, B., Washoe County District Health Department, Air Quality Management Division, personal communication with D. Luscher, Acurex, December 1996.

[45] Jennison, B., Washoe County District Health Department, Air Quality Management Division, personal communication with D. Luscher, Acurex, December 1996.

[46] *Washoe County, Nevada, Redesignation Request and Maintenance Plan for the National Ozone Standard,* Washoe County District Health Department, Air Quality Management Division, November 1996, pg. 4.


To Susanville
LEMMON VALLEY
SUN VALLEY
WILDCREEK
SHADOW MTN
HILLTOP
SPARKS
GALLETTI
RENO
To Verdi
MUSTANG
MAYBERRY
HILTON
CIVIL AIR PATROL
To Fernley
PLUMB/ KIETZKE
SKYLINE
SO. RENO
395
Legend
Non-Attainment Area
Air & Weather Monitoring
Air Monitoring
Weather Monitoring
To Incline Village
To Carson City
INCLINE


Number of Exceedances
8
7
6
5
4
3
2
1
0
CO
PM
Ozone
1989
1990
1991
1992
1993
1994
1995
Year

The EPA has not yet approved this request. For PM, the EPA was scheduled to redesignate the Truckee Meadows PM nonattainment area from moderate to serious. However, in light of monitoring data taken in 1994 that revealed reduced ambient concentrations, the EPA has delayed this action. The last 24-hour exceedance for PM occurred in 1993. Table 6.2.11-2 shows recent peak air quality monitor readings for Washoe County.

Table 6.2.11-2
Recent Peak Air Quality Monitor Readings for Washoe County

Pollutant	Peak Readings	Year of Data Reviewed
0_3	0.0092 ppm, 1-hr average	1994-1995
CO	High: 9.21 ppm, 8-hr average Second high: 9.05 ppm, 8-hr average	1994-1995
PM_{10}	High: 113 $\mu g/m^3$, 24-hr average Second high: 110 $\mu g/m^3$, 24-hr average	1994-1995

Source: *Washoe County, Nevada, Air Quality Trends, 1989-1995,* Washoe County District Health Department, Air Quality Management Division, 1995.

In general, air quality in Reno appears to be improving, and overall emissions are being reduced. However, unfavorable weather conditions could contribute to future exceedances of the air quality standards. Air quality officials have projected that the plans being implemented under the State Implementation Plan (SIP) will further contribute to Reno's declining emissions inventory.

Proposed New Air Quality Regulations: The impacts of the new proposed NAAQS for ozone and $PM_{2.5}$ are uncertain. Based on SEA study team and Washoe County District Health Department analyses of recent monitoring data,[47] it appears likely that Washoe County would be able to meet the proposed O_3 standard. The potential impact of the proposed $PM_{2.5}$ standard is less clear. The Washoe County District Health Department recently installed a $PM_{2.5}$ monitor. Initial data from this monitor indicate that about half of the PM_{10} consists of $PM_{2.5}$.[48] Based on the SEA study team's analysis of recent trends in ambient PM_{10} in Truckee Meadows, the area might meet the proposed $PM_{2.5}$ standard. Current data are insufficient to allow a clear determination. However, as under the current standard, meteorological conditions will play a large role in determining whether Truckee Meadows experiences any future exceedances of the proposed $PM_{2.5}$ standard.

Contribution of Locomotives to the Emission Inventory in Washoe County: As part of the emissions inventory preparation and updating process, the Washoe County District Health Department has estimated emissions resulting from current railroad operations within the County. These values help place into context the relative impact of the increased train levels associated with the merger on locomotive emissions. Inventory numbers are shown in Table 6.2.11-3. They do not include emissions from idling on-road vehicles, but do include emissions from locomotives

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[47] Jennison, B., Washoe County District Health Department, Air Quality Management Division, personal communication with D. Luscher, Acurex, December 1996.

[48] Jennison, B., Washoe County District Health Department, Air Quality Management Division, personal communication with D. Luscher, Acurex, December 1996.

operating on the Pyramid Lake/Feather River route north of Reno. They also include switching operations as well as line-haul operations, which are not associated with the merger. For three pollutants, the contribution to the total inventory is insignificant. The percentage of railroad NO_x, as compared to the County inventory, is small but not negligible.

Table 6.2.11-3
Estimated Emissions Resulting from Current Railroad Operations Within the County

Pollutant	Railroad Inventory (tons/year)	Washoe County Inventory (tons/year)	Railroad Inventory as Percent of County (%)
VOC	41	16,596	0.25
NO_x	929	27,261	3.53
PM	35	14,362	0.24
CO	119	97,766	0.12

Source: *Washoe County, Nevada, 1995 Emission Inventory for Particulate Matter,* Washoe County District Health Department, Air Quality Management Division, December 1996. *Washoe County, Nevada, Ozone Non-Attainment Area: 1993 Emission Inventory of Ozone Precursors,* Washoe County District Health Department, Air Quality Management Division, November 1995.

Selection of Emissions Analysis Study Areas and CO Dispersion Modeling Locations: To analyze the potential air quality impacts in Reno of merger-related increased train levels, the SEA study team performed two types of analysis.

First, to evaluate pollutants that are primarily regional in nature, the SEA study team calculated potential overall emissions impacts for two different study areas. The first was Washoe County, which is the jurisdiction of the Washoe County District Health Department's Air Quality Management Division. The second (smaller) area is the Truckee Meadows CO/PM nonattainment area. VOCs, NO_x, PM, and CO were analyzed for both study areas.

Second, the SEA study team selected three railroad crossings within Reno to perform localized CO dispersion modeling. Two grade crossings -- Keystone and Sierra -- were selected as representative of potentially high ambient CO concentrations associated with vehicular traffic levels and train delays. The SEA study team selected Galletti Street as the third grade crossing for analysis due to its proximity to a local CO monitoring station.

Calculation Methodology: The methodology used for the air quality analysis differs from the EA and Post EA analyses in the following ways:

- It focuses specifically on Reno and Washoe County.
- It includes emissions from queuing automobiles, local seasonal conditions and topography, and an analysis of potential CO hot spots near rail grade crossings.

The analysis focuses exclusively on potential air quality impacts associated with expected increases in UP freight trains. It excludes emissions related to switching operations and passenger

trains, which are unrelated to the merger. Emissions related to on-road vehicle idling caused by switching and passenger train activity are therefore excluded.

In addition, the analysis excludes freight trains on other rail lines in Washoe County, specifically the Pyramid Lake/Feather River UP/SP line north of Reno. This line is within Washoe County and activity on this line is expected to decrease as a result of the UP/SP merger. However, emissions related to this line do not have an appreciable effect on peak levels of ozone and other pollutants in Washoe County, due to its distance from Reno.

Emissions Sources: The emissions model used for this study calculates emissions for both locomotives and idling on-road vehicles at the grade crossings. Emission estimates for locomotives were based on fuel consumption estimates provided by UP for various train types.

Emissions from on-road vehicles are from vehicles waiting at railroad crossings for freight trains while the gates are down. The basis for estimating these emissions was vehicular delay projections in conjunction with emission factors developed from the EPA's mobile source inventory model, MOBILE5a.

Emissions Analysis: The SEA study team's emissions calculation model combines the sum of locomotive and on-road vehicle emissions. To accurately represent the sources and quantity of emissions, numerous input parameters are used in the model. Table 6.2.11-4 lists these parameters, their values, and the sources of these data.

Locomotive Emissions: Locomotive emissions were calculated by multiplying the amount of fuel burned by a train within the SEA study area by locomotive emission factors in pounds of pollutant per gallon of fuel. UP provided the study team with fuel consumption estimates. Emission factors in terms of lb/gal are those recommended by the EPA[49] for use in air quality state implementation plan (SIP) calculations.[50]

Queuing Vehicle Emissions: Vehicle air emissions were calculated for queuing vehicles at the grade crossings reviewed in Section 6.2.1 for traffic delay. At each crossing, the average daily total hours of delay for vehicles was multiplied by an emission factor in grams of pollutant per hour. These scenario-specific emission factors were generated by using the EPA's mobile source emissions models, MOBILE5a and PART5.

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[49] *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources,* Emission Planning and Strategies Division, Office of Mobile Sources, U.S. EPA, 1992, pg. 211.

[50] These emission factors are similar to, but not identical to, those used in the EA and Post EA calculations discussed in Section 1.2.

Table 6.2.11-4 Modeling Input Parameters		
Parameter	**Values**	**Source**
Pre-merger number of trains/day	12.7 [a]	UP/SP Operating Plan
Post-merger number of trains/day	24.0 [a]	UP/SP Operating Plan
Locomotive emission factors (lb/gal)	VOC: 0.0211 CO: 0.0626 NO_X: 0.4931 PM: 0.0116	EPA, *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, 1992*
Locomotive fuel factors (gal/through train)	Varies by train speed	UP/SP
On-road vehicle emission factors (g/mi)	VOC: 10.275 CO: 105.425 NO_X: 3.675 PM: 0.058	MOBILE5a runs for Reno, Year 2000 for 2.5 mph
Total hours of vehicle delay	Varies by scenario	Study team derivation

[a] Train traffic projections do not include Amtrak passenger trains. The pre-merger projection consists entirely of 12.7 UP/SP trains. The post-merger projection includes 20.0 UP/SP trains/day and 4.0 BN/SF trains/day.

The specific values used were averages of January and July runs for the Year 2000, to represent average emissions for the entire year. Given the location, year, average vehicle speeds, and other input parameters, MOBILE5a and PART5 provided fleet-average emission factors for all vehicles in grams per mile. For all runs, an average speed of 2.5 miles per hour was used, simulating idling emissions.[51] With this value, the SEA study team converted the g/mi output of MOBILE5a to g/hr. This value was then multiplied by the total hours of delay from the traffic analysis to produce a grams-per-day, or tons-per-year, figure.

CO Dispersion Modeling -- CAL3QHC Model: The air quality dispersion model selected by the SEA study team for the Reno Mitigation Study is the CAL3QHC, Version 2.0, line source ambient air dispersion model. The model combines traffic algorithms for estimating vehicular queue lengths at signalized intersections with the CALINE-3 line source dispersion model.

CO Modeling Parameters: For each scenario, the SEA study team chose meteorological inputs, traffic flow data, and vehicle emission factors to project conservatively high concentrations of CO. This conservative approach is maintained by use of such assumptions as having the total daily train volume pass through the intersection during the 8-hour modeling period. Other assumptions for this worst-case analysis include: all trains were assumed to have the length of the longest observed train; the Year 2000 traffic volumes for 4 p.m. to midnight were used with CO peaks occurring in early morning; worst-case meteorology, representing stagnant air, and January temperatures were used; the second-highest 8-hour average CO reading in 1995, at a monitor located

[51] MOBILE5a does not allow users to model idling emissions at 0 mph. However, EPA recommends that to closely simulate such conditions, the user specify that the vehicles are traveling at an average speed of 2.5 mph.

near the Galletti grade crossing, was used as background CO level;[52] and the "double-counting" of localized vehicle contribution to background CO level was not corrected. Worst-case meteorological parameters were selected based on EPA guidelines.[53]

Potential Air Quality Impacts

Emissions Analysis: The results of the analysis of pre- and post-merger conditions without further mitigation are shown in Tables 6.2.11-5 and 6 for both Washoe County and the Truckee Meadows CO/PM nonattainment area. Shown are the emissions from locomotives and idling vehicles, and the sum of these two sources.

At the County level, the analysis shows that, under both pre- and post-merger conditions, locomotive emissions heavily outweigh vehicular emissions. However, total emissions generated by the increase in freight trains associated with the merger are quite small when compared with the total emissions inventory for the County. For NO_x, the increased train traffic generates an emissions increase equivalent to about 1.5 percent of the inventory. The County has requested that EPA redesignate the area to maintenance status, and any increase in emissions could increase the likelihood of an exceedance of the ambient standard. However, the SEA study team believes that the NO_x increase resulting from the increased levels of through train traffic due to the merger is unlikely, by itself, to result in a change from attainment to nonattainment under current air quality standards.

Within the Truckee Meadows nonattainment area, CO and PM increases are again small when compared to the overall emissions inventory. These emissions are not expected to have a detrimental impact on air quality within the air basin.

With regard to proposed NAAQS, it is difficult to assess the implications of the merger on Reno's attainment status. As discussed earlier, Washoe County is likely to meet the proposed O_3 standard. Truckee Meadows may or may not meet a new $PM_{2.5}$ standard, and a definitive answer will not be available until additional monitoring stations have been established and ambient data are collected. However, it is unlikely that increased emissions for merger-related NO_x and PM would result in a change in attainment/nonattainment status under proposed new O_3 and $PM_{2.5}$ standards.

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[52] We used the second-highest CO reading because one exceedance of the CO standard per year does not cause nonattainment; two exceedances do. Therefore, to analyze the implications of the UP/SP merger on Washoe County's CO attainment status, it is the second-highest value in a given year (otherwise known as the "design value") that is most relevant.

[53] *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting, Pollutant Concentrations Near Roadway Intersection,* EPA-454/R-92-006, U.S. EPA, OAQPS, Research Triangle Park, North Carolina.

Table 6.2.11-5
Total Emissions in Washoe County Related to UP/SP Through Trains on the Study Line -- Baseline Analysis (tons per year)

VOCs		
	Pre-merger	**Post-merger w/o further mitigation**
Locomotive emissions	19.0	35.9
Idling vehicle emissions	2.1	3.9
Total emissions	21.1	39.8
Washoe County emission inventory	16,596	16,596
Total as % of inventory	**0.13%**	**0.24%**

NO_x		
	Pre-merger	**Post-merger w/o further mitigation**
Locomotive emissions	443.4	838.0
Idling vehicle emissions	0.7	1.4
Total emissions	444.2	839.4
Washoe County emission inventory	27,271	27,271
Total as % of inventory	**1.63%**	**3.08%**

Source and notes:

1. Calculations considered only UP/SP through trains on the study line.
2. Number of trains per day (for calculating locomotive emissions): 12.7 pre-merger, 24.0 post-merger, based on UP/SP operating plan estimates.
3. Locomotive emission factors (lb/gal) are from *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*, 1992, EPA. The proposed EPA locomotive emissions standards will not significantly affect locomotive emission rates in the Year 2000. Hydrocarbon emission rates are converted to VOCs by multiplying by 1.005.
4. Locomotive fuel consumption (gal/train) is a weighted average based on the relative frequency of various train types, as specified in the UP/SP operating plan.
5. On-road vehicle emission rates are based on EPA MOBILE5a model runs for idling conditions (2.5 mph as specified by the EPA). Runs for January 2000 and July 2000 were averaged to estimate the average daily emissions for the entire year.
6. Estimates of total hours of delay for queuing automobiles were based on SEA study team data gathering.
7. Washoe County emission inventory figures are from *Washoe County, Nevada, Ozone Non-Attainment Area: 1993 Emission Inventory of Ozone Precursors*, Washoe County District Health Department, Air Quality Management Division, November 1995.
8. Numbers may not sum precisely due to rounding.

Table 6.2.11-6
Total Emissions in Truckee Meadows CO/PM Nonattainment Area Related to UP/SP Trains on the Study Line: Baseline Analysis (tons per year)

PM_{10}		
	Pre-merger	**Post-merger w/o further mitigation**
Locomotive emissions	3.0	5.6
Idling vehicle emissions	0.01	0.02
Total emissions	3.0	5.7
Truckee Meadows emission inventory	3,983	3,983
Total as % of inventory	**0.08%**	**0.14%**

CO		
	Pre-merger	**Post-merger w/o further mitigation**
Locomotive emissions	16.1	30.4
Idling vehicle emissions	21.4	40.5
Total emissions	37.7	71.2
Truckee Meadows emission inventory	58,871	58,871
Total as % of inventory	**0.06%**	**0.12%**

Source and notes:

1. Calculations considered only UP/SP through trains on the study line.
2. Number of trains per day (for calculating locomotive emissions): 12.7 pre-merger, 24.0 post-merger, based on UP/SP operating plan estimates.
3. Locomotive emission factors (lb/gal) are from *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*, 1992, EPA. The proposed EPA locomotive emissions standards will not significantly affect locomotive emission rates in the Year 2000.
4. Locomotive fuel consumption (gal/train) is a weighted average based on the relative frequency of various train types, as specified in the UP/SP operating plan.
5. On-road vehicle emission rates are based on EPA MOBILE5a model runs for idling conditions (2.5 mph as specified by the EPA). Runs for January 2000 and July 2000 were averaged to estimate the average daily emissions for the entire year.
6. Estimates of total hours of delay for queuing automobiles were based on SEA study team data gathering.
7. Truckee Meadows emission inventory figures are from *Washoe County, Nevada, 1995 Emission Inventory for Particulate Matter*, Washoe County District Health Department, Air Quality Management Division, December 1996, and *Washoe County, Nevada, Ozone Non-Attainment Area: 1993 Emission Inventory of Ozone Precursors*, Washoe County District Health Department, Air Quality Management Division, November 1995.
8. Numbers may not sum precisely due to rounding.

CO Dispersion Modeling: The results of the SEA study team's CO dispersion modeling for pre-merger scenarios are shown in Table 6.2.11-7, and indicate that an increase in through trains could elevate CO levels under worst-case conditions by approximately 0.2 to 0.6 ppm, to a peak level of 7.8 ppm at the Sierra Street and 4th Street intersection. All CO projections are within the EPA standard of 9 ppm. Note that the background CO level of 6.0 ppm represents most of the total CO levels in Table 6.2.11.7. Thus, it appears that an increase in freight trains resulting from the UP/SP merger would be very unlikely to affect Reno's CO attainment status.

Table 6.2.11-7 Estimated Worst-case CO Concentrations at Selected UP/SP Study Line Grade Crossings in Truckee Meadows: Baseline Analysis (ppm, 8-hr average)		
	Pre-merger	Unmitigated post-merger
Keystone	7.1	7.5
Sierra	7.2	7.8
Galletti	6.4	6.6

Sources and notes:

1. NAAQS for CO is 9 ppm (8-hour average).
2. Results are based on screening-level dispersion modeling using the CAL3QHC model.
3. Assumptions for worst-case analysis include:
   - All trains (12.7 pre-merger and 24.0 post-merger) pass grade crossing within an 8-hour period.
   - All trains have the length of the longest observed train (6,698 ft on February 6, 1997).
   - Year 2000 traffic volumes for 4 p.m. to midnight used.
   - Worst-case meteorology used: stagnant air, January temperatures.
   - Second highest 1995 8-hour average from CO monitor near Galletti crossing used as background CO level: 6.0 ppm, which occurred from 8 p.m. to 4 a.m. on November 7-8, 1995.
   - "Double-counting" of localized vehicle contribution to background CO level not corrected for.

General Conformity: SEA has concluded that the proposed merger is not subject to EPA's air quality regulations entitled "Determining Conformity of General Federal Actions to State of Federal Implementation Plans" (General Conformity). The proposed merger does not meet the definitions set forth in the General Conformity regulations at 40 CFR 51.852, because as a regulatory agency the Board does not maintain program control over railroad emissions as part of its continuing responsibilities.

Potential Mitigation Measures

Even though violations of NAAQS are not anticipated for on-road vehicle emissions due to delays from the incremental increase in train traffic associated with the merger, possible mitigation measures include highway/rail grade separations, increased train speed, or a depressed railway.

However, these options would not reduce increases in locomotive emissions from increased train levels associated with the merger. Although the locomotive emission increases are projected to be small compared to total emissions from all sources in Washoe County, it is worth investigating options specifically designed to reduce post-merger locomotive emissions. Options for mitigating increased locomotive emissions, with a focus on reducing NO_x and PM emissions, include the following:

- Adopting improved railroad operating practices.
- Implementing the proposed EPA locomotive emissions standards.
- Concentrating the operation of new EPA-certified low-emission locomotives in Reno.

- Introducing low-emission locomotives in advance of the EPA schedule.
- Offsetting the increase in locomotive emissions by decreasing emissions from other sources.

6.3 Economic Considerations

The potential environmental impacts (e.g., traffic delay, pedestrian safety, emergency vehicle access, noise/vibration, and air quality) that could indirectly affect economic conditions in the Reno and Washoe County area are reviewed in detail in the previous sections. Mitigation measures to further reduce these environmental impacts are discussed in Section 7, and preliminary recommendations for mitigation measures to be funded by UP to address these potential environmental impacts are provided in Section 8.

The Board, in its Decision No. 44, directed only a further focused review of the potential environmental impacts of the merger-related increased train traffic levels. SEA has determined, therefore, that additional economic analysis is not required.

Public comments during the study process include requests for SEA to use UP's profitability from the merger as a criterion for evaluation of potential mitigation measures. Railroad profitability is not germane to the environmental review process and is clearly beyond the Board's directives for this study.

Section 7
MITIGATION OPTIONS AND EVALUATION

7.1 Approach to Defining Mitigation Options

This section describes physical facilities, train operational changes, and other options that have been evaluated as potential mitigation measures for the increase in through freight train traffic in Reno and the surrounding area.

Mitigation options reviewed in this section include:

- Increased train speeds.
- Highway/rail grade separations at selected streets in and near the downtown area.
- Depressed railway through the downtown area.
- Elevated railway.
- I-80 bypass.
- Mitigation of potential environmental impacts at specific grade crossings outside the downtown area.
- Improved grade crossing safety measures.
- Improved pedestrian safety measures.
- Noise suppression.
- Hazardous materials safety measures.
- Enhanced landscaping and beautification.

The options evaluated represent mitigation approaches that appear to be reasonable and technically feasible. Options were identified from a review of prior studies, suggestions raised by the public and agencies, and concepts developed by the SEA study team.

Some of these options are alternatives to each other, while others can be implemented in conjunction with others. For example, a depressed railway would be an alternative to highway/rail grade separations in the same location. The depressed railway would also enable noise suppression, improved grade crossing safety measures, and improved pedestrian safety measures.

7.1.1 Previous Studies

Highway/rail grade separations at Keystone Avenue, Washington Street, Arlington Avenue, and Evans Avenue were studied for the Union Pacific (UP) Railroad and presented in a report by Daniel, Mann Johnson & Mendenhall (DMJM) entitled *Grade Separation Feasibility Study - City of Reno* dated April 4, 1996. A supplementary report prepared by DMJM for a highway/rail grade separation at Ralston Avenue instead of Arlington Avenue was presented on September 1, 1996.

Several mitigation options were studied for the City of Reno in a report by Nolte & Associates, Inc. entitled *Railroad Merger Mitigation Alternatives (Revised)*, dated July 10, 1996. The study identified the following options:

- Downtown depressed railway.
- Relocation of the railroad adjacent to the I-80 freeway.
- Highway/rail grade separations presented in the 1996 DMJM report.
- Highway/rail grade separations consisting of an overpass at Keystone Avenue and underpasses at all streets from Washington Street to Lake Street with Vine Street closed. An underpass at Sutro Street, east of the downtown area, and an overpass at Evans Avenue, combined with a bridge over the Truckee River connecting to Holcomb Avenue, were also included in this option.
- Mitigation measures at Woodland Avenue and Del Curto Avenue, where existing grade crossings provide the only access to local streets.

Technical issues related to the depressed railway alternative were further developed by Nolte & Associates and described in a report entitled *Re-Evaluation of Downtown Depressed Trainway - City of Reno*, dated January 13, 1997. Construction cost estimates were revised in this report based on the reevaluation.

The engineering studies performed as part of this Preliminary Mitigation Plan (PMP) take into account the analysis in previous studies. Prior studies or concepts have not been repeated. Supplementary work has been performed where modifications were deemed appropriate due primarily to differences in standards, or where more detailed analyses were needed.

7.1.2 Base Documents

To assess the potential physical mitigation options, base mapping, consisting of aerial photography, was obtained in digital format from the City of Reno Redevelopment Agency. This photography covers the downtown area between 2nd Street and 4th Street from 1,000 feet west of Keystone Avenue to just east of Quincy Street. This base mapping was supplemented at Sutro Street, Keystone Avenue, and along the corridor north of 4th Street and south of 2nd Street with scanned uncontrolled aerial photography from 1994, obtained from Great Basin Aerial Surveys. Street plans for major grade crossings were obtained from the City of Reno Department of Public Works. Assessor's Maps and parcel information were obtained from the Washoe County Assessor's Office. Utility plans were obtained from individual utility owners such as the City of Reno (storm drains and sanitary sewers), Sierra Pacific Power Company (water, gas, electric), and others. Subsurface data, consisting of soils boring logs and groundwater elevation logs, were obtained from the National Bowling Stadium and El Dorado Hotel. Site inspections were made by SEA study team to identify physical facilities such as specific buildings and businesses.

7.1.3 Standards and Regulations

Street and railroad construction is governed by numerous regulations and standards.

City of Reno

The City of Reno, Department of Public Works, Engineering Division, *Public Works Design Manual* contains standards for street design and construction. This manual states that the design of all streets and related improvements shall conform to the following publications:

- *Guidelines for Major Urban Street Design*, published by ITE.
- *A policy on Geometric Design of Highways and Streets*, published by AASHTO.

The more restrictive standard shall prevail for design.

Union Pacific

Each railroad has its own standards and criteria for railroad design and construction. Minimum standards for some aspects of railroad design also are established by regulatory agencies, such as Federal Railroad Administration (FRA) or the Nevada Public Service Commission (NPSC). Other railroad engineering standards are contained in the *Manual for Railway Engineering*, published by the American Railway Engineering Association (AREA). Railroad standards typically exceed regulatory minimums.

Nevada Public Service Commission

The NPSC establishes requirements for horizontal and vertical railroad clearances and for grade crossing warning devices.

Federal Railroad Administration

The FRA has established regulations regarding track inspection engineering standards and train control signals.

7.2 Mitigation Options and Evaluation

For each mitigation option under consideration, four elements are discussed in the following sections:

- Description of Possible Mitigation Measure.
- Costs of the Mitigation Measure.
- Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic.
- Potential Environmental Impacts Introduced by the Mitigation Measure.

7.2.1 Increased Train Speeds

Description of Possible Mitigation Measure

The current UP maximum authorized speed for trains in the downtown Reno area is 20 miles per hour (mph). It appears that this maximum speed could be increased under applicable FRA regulations. SEA requested information from UP regarding the feasibility and practicality of increasing train speeds through Reno, along with the associated costs. UP's response is contained in Appendix R.

According to UP, it is feasible to increase general train speeds to 30 mph between the east end of the Sparks Rail Yard (Mile Post (MP) 247.1) to just west of Keystone Street (MP 242) on the west side of downtown Reno, if various capital improvements and operating requirements were implemented. These include:

- Replacement, between Woodland Avenue and Vista (which is east of Sparks Yard) of the current automatic block signal (ABS) system with centralized traffic control (CTC).
- Replacement of various turnouts (switches) in the Sparks Yard from size No. 10 to a larger size (No. 14) that would be power operated.
- Addition of a universal power-operated No. 20 crossover west of Reno.
- Tie replacement and track surfacing, as needed.
- Installation of power-operated or electric lock switches for all main line tracks in the CTC territory.
-

According to UP, these changes would enable trains to achieve a timetable speed of 30 mph on a consistent basis through Reno.

Costs of the Mitigation Measure

UP estimated that costs for construction and materials for the necessary train control and track work to enable increased train speed through Reno would be $7.34 million (see Appendix R).

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic

Vehicular Traffic Delay: The vehicular traffic delay model described in Appendix I was expanded to allow for an analysis of the effects of increases or decreases in train speeds. An important relationship utilized is that between train speed and gate down time, as follows:

[Gate down time] = [Train length]/[Train speed] + [Gate time constant]

where:

[Gate time constant] = average time the crossing gate is down before and after the train is in the crossing.

Application of these equations allows for analysis of changes in vehicular traffic delay associated with changes in train speed. Appendix I includes a more detailed compilation of the basic delay equations.

For this analysis, train speed was calculated using observed gate down time and train length from the train survey (see Section 5.3). Variations in the gate time data resulted in a few trains with calculated speeds higher than the UP established limit of 20 mph, and these are considered to be anomalies in the survey data. Overall, the calculated average speeds appear to be consistent with the established UP limit, with a calculated average speed during the survey of 18.7 mph and a median speed of 19.0 mph.

To evaluate increased train speeds as a potential mitigation option, the SEA study team first calculated the speed of each freight train that passed through downtown Reno during the train survey in February 1997 (see Section 5.3). SEA used the observed crossing gate down times and actual length of each train (provided by UP) to calculate the speed of each train during the survey week. The calculated average train speed during the February survey week was 18.7 miles per hour (mph), which is near the current UP-established train speed limit of 20 mph.

SEA then evaluated the effects of increasing the speed of each train in downtown Reno by 10 mph. For example, a train that was calculated as traveling at eight mph was assumed to travel at 18 mph, a different train traveling at 20 mph was assumed to travel at 30 mph, and so on. Under this assumption, SEA then calculated total vehicular traffic delay with Year 2000 vehicular traffic for the pre- and post-merger number of freight trains. For these calculations, the speeds were varied only on the streets between Keystone and Sage streets. The outlying western crossings of Woodland, Stagg, and Del Curto were assumed to have all trains at 40 mph, which is the track speed limit in that area.

With the assumed 10 mph speed increase per train, the projected total post-merger vehicular traffic delay for the 16 grade crossing studied is 154 hours. This is a reduction of 219 hours from the projected post-merger 373 hours of delay without increased train speeds. Indeed, with a 10 mph per train increase in speed, the total post-merger vehicular delay is 35 hours less than the total pre-merger delay of 189 hours. Figure 7.2.1-1 illustrates the projected vehicular traffic delay by street.

Additionally, with increased train speeds, the number of vehicles delayed is projected to drop to 7,290 per day, as compared to 5,740 vehicles for pre-merger conditions and 11,130 vehicles for post-merger conditions without increased train speeds.

Increasing the speed of each train by 10 mph would result in the average delay per vehicle delayed dropping to 1.27 minutes, as compared with the pre-merger delay of 1.98 minutes and unmitigated post-merger delay of 2.01 minutes per vehicle delayed. The average delay per vehicle for all 124,400 vehicles crossing the tracks would likewise decrease to 4.5 seconds per vehicle with increased train speeds. This compares with 5.5 seconds per vehicle under pre-merger conditions and 10.8 seconds per vehicle under unmitigated post-merger conditions.

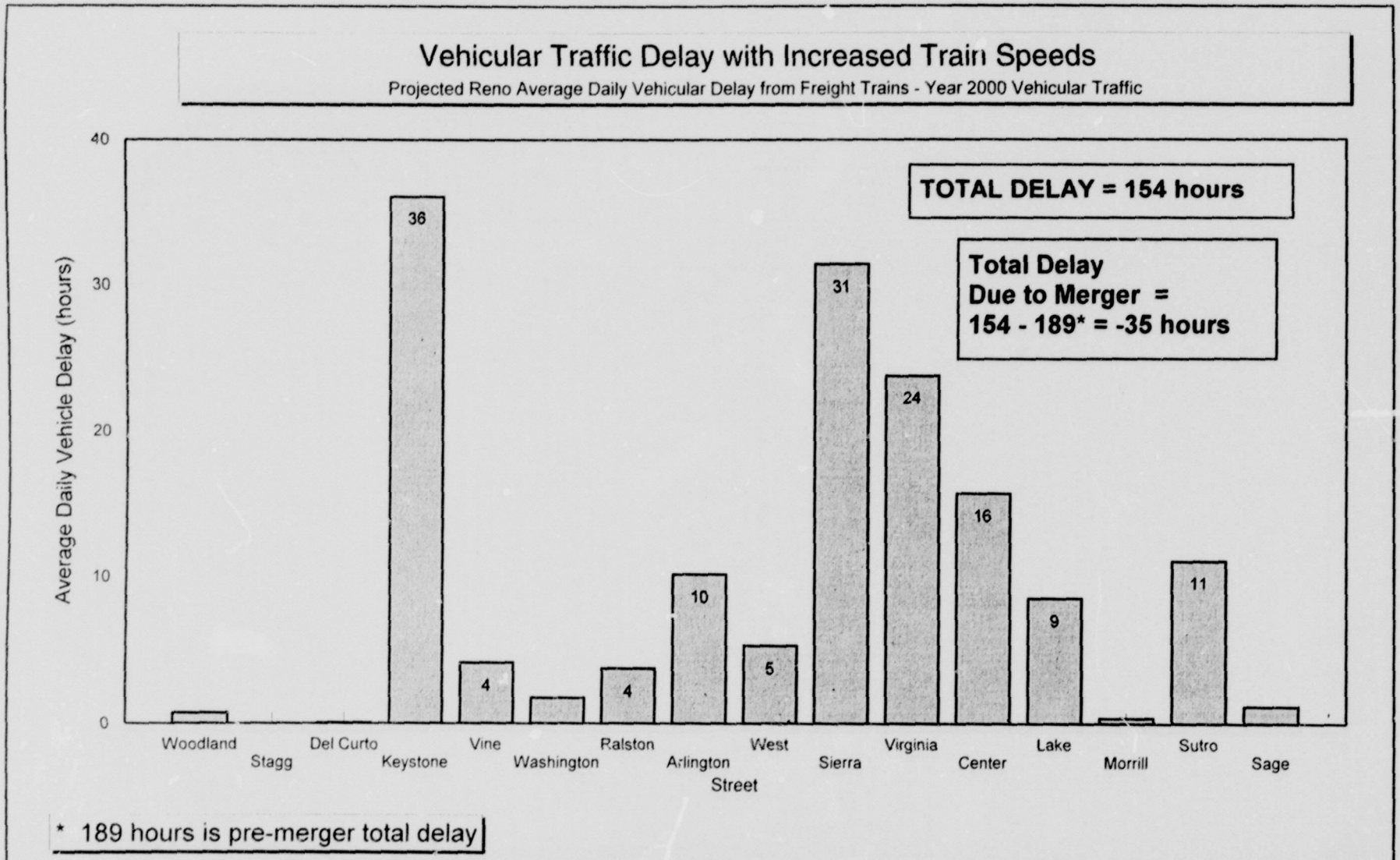

Vehicular Traffic Delay with Increased Train Speeds
Projected Reno Average Daily Vehicular Delay from Freight Trains - Year 2000 Vehicular Traffic
TOTAL DELAY = 154 hours
Total Delay
Due to Merger =
154 - 189* = -35 hours
Average Daily Vehicle Delay (hours)
40
30
20
10
0
36
4
4
10
5
31
24
16
9
11
Woodland
Stagg
Del Curto
Keystone
Vine
Washington
Ralston
Arlington
West
Sierra
Virginia
Center
Lake
Morrill
Sutro
Sage
Street
* 189 hours is pre-merger total delay

Table 7.2.1-1 summarizes these vehicular delay statistics.

Table 7.2.1-1
Delay Statistics for 16 Grade Crossings in Reno

	Pre-merger	Post-merger	Increased Train Speeds [1]
Total daily number of vehicles crossing tracks at-grade in the Year 2000	124,400		
Total daily number of vehicles delayed by trains	5,740	11,130	7,290
Percent of total vehicles crossing the tracks that are delayed by trains	4.6%	8.9%	5.9%
Total daily hours of delay	189	373	154
Average delay per vehicle delayed	1.98 minutes (or 118.8 sec.)	2.01 minutes (or 120.6 seconds)	1.27 minutes (or 76.2 seconds)
Average delay per vehicle for all 124,400 vehicles crossing the tracks	5.5 seconds	10.8 seconds	4.5 seconds

[1] Data are calculated assuming an increase of 10 mph for each train over the actual train speeds monitored by SEA during Phase 1 of the study. This included the period of time when additional trains were diverted through Reno as a result of flooding on the Feather River Route (see Section 5.3).

The amount of warning time for vehicles (and pedestrians) would not be reduced with an increase in train speeds. FRA regulations (49 CFR 234.225) state, "A highway-rail grade crossing warning system shall be maintained to activate in accordance with the design of the warning system, but in no event shall it provide less than 20 seconds warning time for the normal operation of through trains before the grade crossing is occupied by rail traffic." Thus, the warning time at 30 mph would be no less than the current 20 mph speed.

Air Quality: Tables 7.2.1-2, -3, and -4 show the effects on air quality of increased train speeds between Woodland and the Sparks Yard. Increasing train speeds in this area by 10 mph mostly mitigates the CO concentrations at the intersections evaluated for vehicular traffic delay. Because a train speed increase mitigates the increase in emissions of CO, it is logical that it also helps mitigate any increase in peak CO concentrations from vehicles waiting for freight trains near the grade crossings.

Emergency vehicle access: Emergency response events are essentially random, and the only way to partially predict the likelihood for an emergency vehicle response delay from a freight train is to determine the length of time, or percentage of the day, that grade crossings are blocked. If mitigation efforts result in gate down times at or near pre-merger levels, the potential post-merger impact on emergency response is no more than it was with pre-merger train levels. Gate closed time is primarily determined by the numbers of trains, train speed, and length. Each crossing gate for the downtown crossings between Keystone and Sage, where train speed is approximately 20 mph, has approximately the same gate closed time per day. With 12.7 freight trains per day, the total average gate closed time is projected to be 42.9 minutes per day. With 24 freight trains per day, the total average gate closed time is determined to be 82.7 minutes per day, an increase of 39.8 minutes.

Table 7.2.1-2
Total Emissions in Washoe County Related to Through Freight Trains in Reno -- Increased Train Speeds Mitigation Option (tons per year)

VOCs			
	Pre-merger	**Post-merger without further mitigation**	**Increase train speed to 30 mph**
Locomotive emissions	19.0	35.9	35.6
Idling vehicle emissions	2.1	3.9	1.8
Total emissions	21.1	39.8	37.4
Washoe County emission inventory	16,596	16,596	16,596
Total as % of inventory	**0.13%**	**0.24%**	**0.23%**

NO_x			
	Pre-merger	**Post-merger without further mitigation**	**Increase train speed to 30 mph**
Locomotive emissions	443.4	838.0	831.5
Idling vehicle emissions	0.7	1.4	0.6
Total emissions	444.2	839.4	832.2
Washoe County emission inventory	27,271	27,271	27,271
Total as % of inventory	**1.63%**	**3.08%**	**3.05%**

Source and notes:

1. Calculations considered only UP/SP and BN/SF through trains on the study line.
2. Number of trains per day (for calculating locomotive emissions): 12.7 pre-merger, 24.0 post-merger, based on UP/SP operating plan estimates (De Leuw, Cather fax dated March 24, 1997).
3. Locomotive emission factors (lb/gal) are from *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources,* 1992, EPA. The proposed EPA locomotive emissions standards will not significantly affect locomotive emission rates in 2000. Hydrocarbon emission rates are converted to VOCs by multiplying by 1.005.
4. Locomotive fuel consumption (gal/train) is based on information provided to Acurex Environmental by De Leuw, Cather (fax dated April 29, 1997), and is a weighted average based on the relative frequency of various train types, as specified in the UP/SP operating plan.
5. On-road vehicle emission rates are based on EPA MOBILE5a model runs for idling conditions (2.5 mph as specified by EPA). Runs for January 2000 and July 2000 were averaged to estimate the average daily emissions for the entire year.
6. Estimates of total hours of delay for queuing automobiles were provided by De Leuw, Cather (fax dated July 9, 1997).
7. Washoe County emission inventory figures are from: *(a) Washoe County, Nevada, 1995 Inventory for Particulate Matter*, Washoe County District Health Department, Air Quality Management Division, 1995, and (b) *Washoe County Nevada, Ozone Non-Attainment Area: Emission Inventory of Ozone Precursors,* Washoe County District Health Department, Air Quality Management Division, November 1995.
8. Numbers may not sum precisely due to rounding.

Table 7.2.1-3
Total Emissions in Truckee Meadows CO/PM Nonattainment Area Related to Through Freight Trains in Reno -- Increased Train Speeds Mitigation Option (tons per year)

PM			
	Pre-merger	**Post-merger without further mitigation**	**Increase train speed to 30 mph**
Locomotive emissions	3.0	5.6	5.6
Idling vehicle emissions	0.01	0.02	0.01
Total emissions	3.0	5.7	5.6
Truckee Meadows emission inventory	3,983	3,983	3,983
Total as % of inventory	**0.08%**	**0.14%**	**0.14%**

CO (Carbon Monoxide)			
	Pre-merger	**Post-merger without further mitigation**	**Increase train speed to 30 mph**
Locomotive emissions	16.1	30.4	30.2
Idling vehicle emissions	21.4	40.5	18.3
Total emissions	37.7	71.2	48.5
Truckee Meadows emission inventory	58,871	58,871	58,871
Total as % of inventory	**0.06%**	**0.12%**	**0.08%**

Source and notes:

1. Calculations considered only UP/SP and BN/SF through trains on the study line.
2. Number of trains per day (for calculating locomotive emissions): 12.7 pre-merger, 24.0 post-merger, based on UP/SP operating plan estimates (De Leuw, Cather fax dated March 24, 1997).
3. Locomotive emission factors (lb/gal) are from *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources,* 1992, EPA. The proposed EPA locomotive emissions standards will not significantly affect locomotive emission rates in 2000. Hydrocarbon emission rates are converted to VOCs by multiplying by 1.005.
4. Locomotive fuel consumption (gal/train) is based on information provided to Acurex Environmental by De Leuw, Cather (fax dated April 29, 1997), and is a weighted average based on the relative frequency of various train types, as specified in the UP/SP operating plan.
5. On-road vehicle emission rates are based on EPA MOBILE5a model runs for idling conditions (2.5 mph as specified by EPA). Runs for January 2000 and July 2000 were averaged to estimate the average daily emissions for the entire year.
6. Estimates of total hours of delay for queuing automobiles were provided by De Leuw, Cather (fax dated July 9, 1997).
7. Washoe County emission inventory figures are from: *(a) Washoe County, Nevada, 1995 Inventory for Particulate Matter*, Washoe County District Health Department, Air Quality Management Division, 1995, and (b) *Washoe County Nevada, Ozone Non-Attainment Area: Emission Inventory of Ozone Precursors,* Washoe County District Health Department, Air Quality Management Division, November 1995.
8. Numbers may not sum precisely due to rounding.

Table 7.2.1-4 Estimated Worst-case CO concentrations at Selected Intersections-Near Grade Crossings in Truckee Meadows — Increased Train Speeds Mitigation Options (ppm, 8-hr average)			
	Pre-merger	**Post-merger without further mitigation**	**Increase train speed to 30 mph**
Keystone	7.1	7.5	7.2
Sierra	7.2	7.8	7.4
Galletti	6.4	6.6	6.5

Sources and notes:

1. NAAQS for CO is 9 ppm (8-hour average).
2. Results are based on screening-level dispersion modeling using the CAL3QHC model.
3. Assumptions for worst-case analysis include:
   - All trains (12.7 pre-merger and 24.0 post-merger) pass grade crossing within an 8-hour period.
   - All trains have the length of the longest observed through train (6,698 ft on February 6, 1997).
   - Year 2000 traffic volumes for 4 p.m. to midnight used.
   - Worst-case meteorology used: stagnant air, January temperatures.
   - Second highest 1995 8-hour average from CO monitor near Galletti crossing used as background CO level: 6.0 ppm, which occurred from 8 p.m. to 4 a.m. on November 7-8, 1995.
   - "Double-counting" of localized vehicle contribution to background CO level not corrected for.

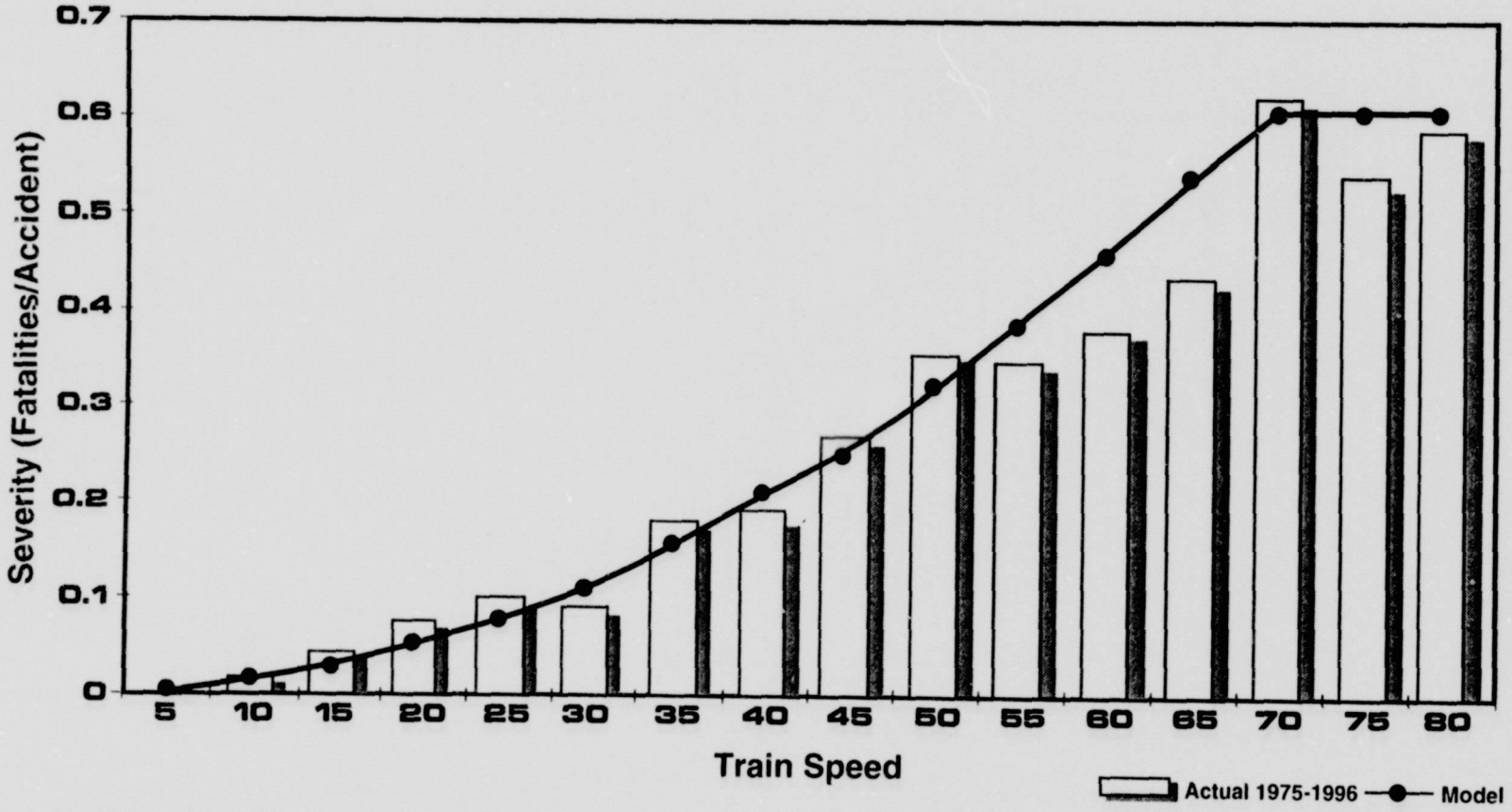
If each train travels at an increased speed of 10 mph faster than that observed during the survey week, the average gate down time for 24 freight trains decreases from 82.7 minutes per day to 54.8 minutes. This is an average increase for each crossing of 11.9 minutes per day from the pre-merger 12.7 trains to the Year 2000 with 24 through freight trains per day.

With no increased train speeds at Woodland, Stagg, and Del Curto, the average daily crossing gate down time would increase from 22.4 minutes per day for the pre-merger 12.7 trains to 42.5 minutes for the Year 2000 with 24 through freight trains, an increase of 20.1 minutes per day.

Potential Environmental Impacts Introduced by the Mitigation Measure

Vehicular Accidents: For grade crossings with active warning devices (i.e., signals or crossing gates), train speed is not a factor in the FRA formula for calculating the likelihood of a train/vehicle accident (see Appendix K). However, FRA data provided to the SEA study team show that accidents are likely to be more severe with increased train speeds. Specifically, Figure 7.2.1-2 shows that anticipated fatality rates (number of fatalities per accident) increase as train speeds increase.[54]

[54] Unpublished graph depicting Actual 1975-1995 Train Speed vs Severity of Highway/Rail Grade Crossing Accidents, entitled "Figure 3.2 Fatalities on Autos struck by Train," presented by Federal Railroad Administration, Deputy Associate Administrator for Safety, Grady Cothen at a meeting held July 16, 1997 with SEA staff and study team.



Source: Unpublished graph depicting Actual 1975-1995 Train Speed vs Severity of Highway/Rail Grade Crossing Accidents, entitled "Figure 3.2 Fatalities on Autos struck by Train," presented by Federal Railroad Administration, Deputy Associate Administrator for Safety, Grady Cothen at a meeting held July 16, 1997 with SEA staff and study team.

Pedestrian safety: Both the current maximum train speed of 20 mph and the 30 mph speed discussed here are relatively slow operating speeds. These train speeds are similar to street and highway speeds in downtown Reno, so the speed-distance relationships for pedestrians are similar.

In a strict sense, an increase in train speed reduces pedestrian reaction time to get out of the way of an approaching train. The conditions in Reno mitigate this situation somewhat, however, because the tracks are straight, and trains can be seen for long distances. As noted earlier, under FRA regulation 49 CFR 234.225, the amount of warning time for and pedestrians would not be reduced with an increase in train speeds. Pedestrian flashers/crossing gates must, under the FRA regulations, provide a minimum of 20 seconds' warning time, and this 20-second minimum applies for any train speed. Thus, the warning time at 30 mph would be no less than the current 20 mph speed.

As discussed in the previous section, severity of train/**vehicular** accidents can be expected to slightly increase with train speed. However, for train/**pedestrian** accidents, the same tragedy occurs independent of the speed. Proposed mitigation measures for the potential environmental impacts associated with the increased train speed to reduce this risk are described in Section 7.2.6.

Derailments/spills: Given the same conditions, the frequency and severity of derailments and spills will increase with an increase in train speed. However, proposals to increase train speeds may cross regulatory safety thresholds that trigger commensurate higher track safety standards and stricter operating practices.

In the case of Reno, the existing track has been maintained to standards exceeding that required for 20 mph operations, i.e., the tracks are a Class 3 under FRA regulations. Under FRA regulations, if UP increases train speed up to 30 mph, it must continue to meet Class 3 safety standards. FRA Class 3 track permits freight train speeds up to 40 mph, so at 30 mph, the track would be well within its maximum safe limit under FRA regulations. As operating speeds would be relatively low, incident severity in the 30 mph area would be less than that expected for the 40-60 mph mainline operation. The incremental increase in the incident rate that would result from 20 to 30 mph is statistically very low.

To increase train speeds, the UP stated that it would replace the existing ABS system through Reno with a CTC System, implement power operation of certain mainline and yard turnouts, put electric locks on all non-powered turnouts in the CTC area, and improve track layouts to facilitate the flow of trains. These operational and safety improvements would help to mitigate the already-low predicted incremental increase in incident rates caused by increased train speeds.

Moreover, as discussed in Section 6.2.5, the Board, in Decision No. 44, has already directed extensive safety mitigation designed to reduce the likelihood of a derailment and the adverse consequences should a derailment occur. Given that the track in question is safe for the speed increases projected (and higher speeds), the greatest incremental increase in risk for derailment would result from a train vehicle collision at a crossing. Proposed mitigation measures for the potential environmental impacts associated with the increased train speed are described in Section 7.2.6.

Noise: Wheel/rail noise from trains is related to train speed. Increases in train speeds in locations where train horns are not the predominant source of train noise are predicted to result in increases in wheel/rail noise (calculated as varying approximately as 30 X Log10[speed]). For those areas where horns are the major source of train noise, an increase in train speeds from 20 to 30 miles per hour for post-merger train levels is not predicted to increase L_{dn} noise levels. The portion of the rail line proposed for possible increased train speeds is between Keystone Avenue and the Sparks Yard, and the major source of freight train noise in this area is from train horns. An increase from 20 to 30 mph in freight train speeds in this area is not expected to add to post-merger L_{dn} noise levels.

Vibration: The Board environmental regulations do not contain ground-borne vibration level criteria. An increase in train speed will increase vibration levels. Train wheels rolling on the rails create vibration energy that is transmitted through the ground. As the train speed increases, the wheel to rail energy increases and vibration levels at receptors increase.

A speed increase from 20 to 30 mph could change the vibration velocity levels by 3 dB (with respect to 1 micro in./sec.). Based on human response to residential building vibration, an increase vibration velocity of 3 dB would be barely perceptible.

7.2.2 Grade Separations

A railroad-highway grade separation can be either an underpass, where the roadway goes under the railroad, or an overcrossing, where the road rises on a structure above the tracks. Due to vertical clearance requirements over railroads, overpasses need to rise higher up above the tracks than underpasses need to descend below the tracks. In addition, the vertical curve over the tracks is generally longer than for an equivalent vertical curve in an underpass. With the same maximum grade criteria, overpasses therefore require a longer length than do underpasses. Overpasses would not fit in the limited space between 2nd Street and 4th Street in Reno. For this reason, in addition to their potential visual impacts, overpasses were not reviewed as options in this PMP.

Design Requirements [55]

All existing streets that cross the railroad at-grade have right-of-way widths of 80 feet. Streets provide access to abutting properties and provide for movement of vehicles and pedestrians. A road going over or under the railroad must have adjacent frontage roads to maintain access to properties. Three separate roadways are needed, as shown in Appendix S. Previous studies of highway/rail grade separations (see Section 7.1.1) propose roadway configurations (number of lanes, lane widths, provisions for sidewalks, etc.) that would fit within the existing street rights-of-way. However, the roadway widths and horizontal clearances assumed in these studies are too narrow to accommodate even a two-lane underpass with frontage roads on both sides of the street.

Underpass roadways conforming to current standards for roadway widths and lateral clearances to obstructions would require a minimum right-of-way width in excess of 100 feet. A

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[55] See Appendix S for a discussion of roadway design standards.

multi-lane underpass would require additional width. Consequently, abutting property on at least one side of each street would have to be acquired. Depending on the use of the property and the extent of development, potential property impacts involve demolition of structures and acquisition of entire parcels.

The feasibility of constructing an underpass at any specific street depends largely on the extent and type of development on abutting property. Heavily traveled streets in the downtown core all have high-rise development on both sides of the streets, which effectively prevents construction of underpasses. Low-traffic-volume roads that are somewhat removed from the City center have less development, but underpasses on these streets would not mitigate the higher levels of congestion and delay present in the downtown area. Finding a suitable location for an underpass becomes a tradeoff between potential property impacts and traffic benefits. The criteria and process for selecting underpass locations are discussed in the next section.

With the exception of Keystone Avenue, all potential underpasses presented here have been designed to fit between 2nd Street and 4th Street. Compromises in design standards have been made to accomplish this. Vertical curvature (the length of vertical curve required for sight distance between changes in a street slope) in particular is substandard for the design speeds required for the roadway classifications. To minimize the amount that the underpass roadways must descend below grade, the DMJM study proposed separate through plate girder steel bridges for each railroad track. This bridge type requires a minimum structure depth, but it is costly. In addition, horizontal clearance to the girders requires that tracks be spread apart to approximately 22-foot track centers. In between the underpasses, the tracks could remain at their present spacing of approximately 13.5 feet, but having wiggles or kinks in track alignment is undesirable. Under such conditions, UP may want to realign its tracks through the downtown area to maintain uniform track spacing, especially if train speeds are increased. The remaining grade crossings would have to be reconstructed if the tracks were realigned.

Although the profiles of the possible underpass roads meet the current grade (elevation) at 2nd and 4th streets, roadway reconstruction would need to extend north of 4th Street and south of 2nd Street to accommodate the transition from the widened underpass and frontage roads. In the case of Keystone Avenue, where 4th Street is within 300 feet of the railroad tracks, major relocation of 4th Street and the intersection with Keystone Avenue would be needed. At other locations, partial or full parcels at street corners may need to be acquired.

Alternative types of bridge construction, such as pre-stressed concrete box girders would be more economical than steel girders, but would require greater structure depths. This would affect the underpass street profiles by requiring steeper grades or shorter vertical curves with even less stopping sight distance. These issues would be studied during preliminary engineering, if warranted.

Selection of Possible Grade Separation Locations

Each of the at-grade rail crossings in Reno was evaluated for possible highway/rail grade separation. Appendix T provides a description of each public at-grade rail crossing. A north and south view of each crossing is provided and relevant characteristics are listed, including adjoining

land uses in each quadrant, whether the street serves as an arterial or collector street (i.e., crosses the Truckee River or connects with I-80), and the average daily traffic. Reasons are provided for inclusion or exclusion of the crossing as a possible highway/rail grade separation location. Reasons include such factors as adjoining land uses, necessary property takes, traffic levels, proximity to downtown, freeway crossing or connection, and provision of a river crossing. After a review of previous studies and site visits by technical staff, underpasses were proposed to be studied at the following streets:

a) Keystone Avenue.
b) Ralston Street.
c) Arlington Avenue.[56]
d) Lake Street.
e) Evans Avenue.[57]
f) Valley Road.
g) Sutro Street.

On the basis of existing conditions and traffic volumes, all streets except Ralston are proposed to have four-lane underpass roadways (two lanes in each direction), with a pedestrian walkway on one side of the underpass roadway. Ralston Street was proposed to have a two-lane underpass roadway with a pedestrian walkway. Based on a review of the geometrics and a site visit, an underpass at the south end of Valley Road was added. To minimize property acquisition, all the underpasses, with the exception of Arlington Avenue, are configured to hold the right-of-way line on one side of the street or the other, based on a field review of abutting properties. Two alternatives were studied for Sutro Street, as it was not obvious which side of the street would have a less severe potential impact. Ralston Street was initially configured to acquire strips of property on both sides. After a site review, the configuration was changed to hold the east property line and acquire a larger strip of property on the west side.

Geometric layouts were developed for eight possible alternatives -- seven different streets, with two alternatives on Sutro Street (see Appendix U).

Description of Possible Mitigation Measures

General: Each of the roadway locations, with the exception of Ralston Street, is proposed to have four underpass lanes (two lanes in each direction, separated by a median), with a pedestrian walkway (sidewalk) on one side of the underpass roadway, and a one-way frontage road with sidewalks on each side of the street. Ralston Street provides only one lane in each direction. Frontage roads are connected by bridges over the underpass roadway parallel to the railroad bridge.

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[56] The prospect for underpasses at Arlington and/or Evans Avenue is discussed, to a limited extent, in the *Reno Downtown Traffic/Parking Study* City of Reno Redevelopment Agency, (December 1995), pg. 50.

[57] The prospect for underpasses at Arlington and/or Evans Avenue is discussed, to a limited extent, in the *Reno Downtown Traffic/Parking Study*, City of Reno Redevelopment Agency, (December 1995), pg. 50, and in *Revised Project Report - Railroad Merger Mitigation Alternatives, Appendix F*, July 10, 1996. Prepared for the City of Reno by Nolte and Associates, Inc.

The railroad structure is assumed to be a through plate girder structure to reduce structure depth. Traffic control and roadway transitions at the intersections with 4th Street and 2nd Street vary. In general, it is assumed that there will be a separate traffic signal phase to permit crossing movements between frontage road traffic and underpass traffic approaching the intersections. However, individual intersections could be configured to provide for right-turns only from the frontage road depending on traffic capacity at the intersection.

a) *Keystone Avenue*

Street Setting: Keystone Avenue is an arterial street that crosses the Truckee River and also has an interchange with I-80. It passes through a commercial and industrial area, although there are a few private residences between the UP tracks and 2nd Street.

Roadway Configuration and Abutting Property: Keystone Avenue is currently configured with two lanes in each direction, and a two-way painted median for left turns. The median becomes left-turn lanes at 2nd and 4th streets. There is an additional right-turn lane for northbound traffic at 4th Street. There are five-foot-wide sidewalks on each side of the street. Parking is generally prohibited on both sides, except for a segment in front of residences on the east side of the street south of the railroad tracks. There are numerous parcels with curb cuts along the street. A building housing the Reno Iron Works is located immediately north of the railroad tracks on the east side of the street. The building has a driveway and pedestrian access from the street.

Underpass Configuration: For the possible underpass, the property line on the east side of the street is held, with property acquisition necessary on the west side. On the north side of the tracks, 4th Street would need to be relocated, because the underpass profile cannot reach existing ground level at its current location. The draft *City of Reno Master Plan*, dated November 1, 1996, classifies 4th Street as a major arterial. The City of Reno *Public Works Design Manual* stipulates a design speed of 50 mph for major arterial streets. An alignment conforming to this standard would require demolition of the multi-story commercial and retail Keystone Square complex located on the north side of 4th Street about 700 feet west of Keystone Avenue. To minimize potential property impacts, the SEA study team based the realignment of 4th Street on a street design speed of 30 mph.

b) *Ralston Street*

Street Setting: Ralston Street is a local street that serves a mixed use of residential and light industrial properties. It crosses I-80 but not the Truckee River. It intersects 3rd Street, which runs parallel to the railroad tracks.

Roadway Configuration and Abutting Properties: Ralston Street has one lane in each direction with parking and striped bicycle lanes on both sides of the street within the study area. A strip of landscaping separates the five-foot-wide sidewalk from the street on both sides. A yellow broken line separates the through traffic, and there are no separate left turn lanes provided to 2nd and 4th streets. Properties between 2nd and 4th streets are mainly commercial with the exception of six residences on the north side of the tracks. Two are located on the east side of the street. The parking lot of the Sands Hotel is immediately north of the tracks on the east side of the street.

Underpass Configuration: The possible Ralston Street underpass would have one lane in each direction. The alignment is set by holding the property line at the east side of the street and encroaching into the properties at the west side. This street would have grade separations with both the railroad and 3rd Street. The new frontage roads would have an at-grade intersection with 3rd Street, providing for a three-way movement at this location. To minimize potential property impacts, no median is planned for the underpass roadway. A single combined bike/pedestrian path is proposed.

c) Arlington Avenue

Street Setting: Arlington Avenue is situated at the westerly limit of the downtown hotel and casino area. It crosses the Truckee River but not I-80. It serves commercial land use consisting of hotels, motels, and restaurants.

Roadway Configuration and Abutting Properties: Arlington Avenue is striped for two lanes in each direction. The center stripe is a double yellow line. There is parking on both sides of the street north and south of the tracks, with five-foot sidewalks on each side of the street. The Sands Hotel is located immediately north of the tracks on the west side, and the parking lot of the King's Inn (currently vacant) is on the east side of the street. Two motels abut the east side of the street north of the King's Inn. The Colonial Inn Hotel abuts the east side of the street south of the tracks. There is a surface parking lot for the Sands Hotel immediately south of the tracks on the west side. Farther south, the Town House Motor Lodge abuts the street.

Underpass Configuration: To minimize property acquisition and demolition costs, the potential underpass roadway is configured to avoid encroaching on the high-rise Sands and Colonial Hotel properties. On the south side of the tracks, the property line at the east side is held and the roadway encroaches into the west side properties. The street then transitions to the east just south of the tracks, while holding the west property line, north of the tracks and encroaching onto the east side properties fronting the street. At the intersection with 2nd Street, the current through lanes would be maintained and no left-turn lanes would be provided. The frontage road would intersect Commercial Street and provide a three-way intersection at this location, with the highway/rail grade separation structure over the underpass. A grade separation structure would be provided at 3rd Street, which would have a three-way intersection with the frontage roads. Arlington Avenue would provide left-turn lanes to 4th Street.

d) Lake Street

Street Setting: Lake Street crosses the Truckee River on the south and ends just north of 7th Street. It does not cross the I-80 freeway.

Roadway Configuration and Abutting Properties: Lake Street is classified as a minor arterial and has two lanes in each direction between 2nd and 4th streets. At the intersections with 2nd and 4th streets, two through lanes (one lane in each direction) and left turn lanes are provided. South of the tracks on the east side of the street, the properties consist of a number of surface parking lots, the Mizpah Hotel, and the Men's Club. North of the tracks on the east side, properties consist

of two surface parking lots, the American Inn, Roullete Hotel, and Paradise Store. The properties on the west side of the street consist of the National Bowling Stadium on the north side of the tracks and Harrah's, Santa Fe, and Hampton hotels on the south side of the tracks.

Underpass Configuration: For the possible underpass, the alignment is set by holding the property line on the west side of the street. At the intersection with 2nd Street, two through lanes in each direction and left turn lanes would be provided. The frontage roads south of the tracks would have a three-way intersection with Commercial Row, with a grade separation structure over the underpass. North of the tracks, Plaza Street would have an intersection with the frontage roads on both sides of the underpass. Two through lanes in each direction and left turn lanes would be provided at 4th Street. The street would transition to the existing alignment north of 4th Street.

e) Evans Avenue

Street Setting: Evans Avenue does not cross the railroad tracks. South of the tracks, the street begins at 2nd Street, turns to the west, becomes Commercial Row, and intersects with Lake Street. On the north side of the tracks, Plaza Street runs from Lake Street to Evans Avenue. Evans continues north and crosses over I-80.

Roadway Configuration and Abutting Property: Evans Avenue has a yellow stripe in the center, with parking on both sides. Some of the parking on the east side of the street is diagonal or perpendicular. On the east side is a fire station at 2nd Street and a historic building identified as "The Freight House" immediately south of the tracks. South of this building is a driveway entrance to freight warehouses located to the east. Parking lots occupy the west side of the street.

Evans Avenue does not have any traffic striping north of the railroad tracks. Parking is available on both sides of the street, and sidewalks and planters are about ten feet wide. The land immediately north of the tracks is being used as an air monitoring station. Parcels north of the tracks on the east side of Evans Avenue are used for material storage. The Juniper Court Hotel is on the east side of the street north of the tracks, with commercial buildings on the west side.

Underpass Configuration: The possible underpass configuration is set by holding the property line on the east side of the street, to avoid encroachment on the fire station or the Freight House. Property acquisition would be needed on the west side. A wide frontage road would be provided on the east side of the street to allow for truck movements into the fire station and to the freight transfer building behind the Freight House. This would result in some additional acquisition of parking lots south of the tracks on the west side of the street. The intersection with 2nd Street would be aligned with the diagonal leg of East 1st Street that extends between Lake Avenue and 2nd Street. This alignment would provide for a direct route from south of the Truckee River to north of the I-80 freeway.

The widened frontage road would allow fire trucks to enter the fire station without excess maneuvering. Trucks would be parked facing east, and would exit the station via the driveway on 2nd Street (which currently has a traffic signal). Emergency vehicles would have access to the underpass from 2nd Street.

f) Valley Road

Street Setting: Valley Road does not currently cross the railroad tracks. It begins north of the railroad tracks, continues north, and crosses the I-80 freeway through commercial and residential areas.

Roadway Configuration and Abutting Properties: North of 4th Street, Valley Road has one lane in each direction with a middle two-way left turn lane. The roadway south of 4th Street is a stub-ended single lane road that provides access to industrial properties north of the tracks. Ace Hardware is located on the east side of the street, and R Supply is located on the west side. The area south of the tracks is occupied by freight loading docks adjacent to the tracks. The area between these docks and 2nd Street is currently vacant.

Underpass Configuration: The potential underpass alignment is set by holding the east property line of the road north of the tracks and continuing on the same bearing to the south to an intersection with Kuenzli Street at the west side of the structure over the Truckee River. The intersection would be set to provide for all traffic movements to and from 2nd and Kuenzli streets. No frontage roads would be provided for this alternative, except for a two-lane, two-way access road for the east property north of the tracks. The highway/rail grade separation structure would provide for the east-west tracks as well as the spur tracks turning to the adjacent Record Street.

g) Sutro Street

Street Setting: Sutro Street is removed from the downtown area. This arterial street passes through an industrial area that the City proposes to turn into residential use. Sutro Street crosses the Truckee River and passes under I-80. Its right-of-way width is 100 feet between Commercial Row, south of the UP tracks, to a point about 180 feet north of the tracks. North of this point to 4th Street, the right-of-way is 80 feet wide.

Roadway Configuration and Abutting Property: Sutro Street has two lanes in each direction with five-foot sidewalks. There is a raised median immediately north and south of the UP tracks with no on-street parking. Sidewalks in the 100-foot wide right-of-way segment in the vicinity of the tracks have been constructed adjacent to property lines. The space between the roadway and the sidewalks is filled with temporary asphalt paving. Abutting land use on both sides of the street north and south of the tracks is industrial, consisting of material storage yards, warehouses, and factories. There is a small electrical substation on the east side of the street. There are no driveways on either side south of the tracks, but several exist north of the tracks, especially on the east side. Commercial Row intersects Sutro Street about 150 feet south of the tracks. If this intersection were to remain with a Sutro Street underpass, portions of Commercial Row east and west of Sutro Street would also have to be lowered. This could affect access to properties on Commercial Row.

Underpass Configuration (Options 1 and 2): The possible Sutro Street underpass begins at the north edge of the bridge over the Truckee River. None of the abutting properties south of the railroad tracks currently have access from Sutro Street, so no frontage road is proposed. For

Option 1 on the north side of the tracks, the alignment would be set to hold the property line on the west side of the street. The Option 2 alignment would be set to hold the property line on the east side of the street. The intersection of Sutro Street and Commercial Row would be in a retained cut. The retaining walls would need to be spread out at the intersection to provide stopping sight distance for vehicles on Commercial Row. Both legs of Commercial Row would be lowered to meet the profile of Sutro Street. The driveways of properties adjacent to Sutro Street would need to be reconstructed to maintain access from Commercial Row.

Grade Separation Cost Estimates

Cost Elements: Capital cost estimates for the possible underpasses consist of several elements:

- Costs that are estimated based on the technical studies.
- Contingencies, representing unknown costs.
- Mobilization and allowances, which are included in construction contracts.
- Project implementation costs.

Estimated Costs: Construction costs for the underpasses were calculated on the basis of the conceptual layouts and typical sections developed for each location. Unit costs were obtained from *Means Heavy Construction Cost Data, 1997* and from bid tabulations for recent projects furnished by the NDOT. Quantities were calculated on the basis of the conceptual layouts. In general, typical square-foot unit costs were developed for major elements of construction, such as bridges, retaining walls, or pavement. The unit costs include taxes and contractor overhead and profit.

Costs associated with railroad operations (crossovers and signals) were obtained from the DMJM grade separation study report. For this study, these costs have been included with each underpass. If two or more underpasses are constructed, then these costs could be reduced.

Property lines for individual parcels were obtained from the Washoe County Assessor's Maps and manually plotted on the base maps. Tenants and classifications were identified from visual inspections. Three types of potential property impacts have been estimated: full takes, partial takes, and impaired access. Full takes would involve acquisition of an entire parcel and usually the demolition of the structure, if one exists. Partial takes would involve acquisition of a portion of the property required for the widened roadway. Partial acquisition is generally possible when only land is involved, such as a parking lot. It is possible, however, to demolish part of a structure such as a warehouse. Impaired access would occur when a one-way frontage road replaces a two-way street in front of the property. Impaired access can also apply to partial takes. Table 7.2.2-1 summarizes the cost elements that are applicable to properties, based on the types of potential impacts.

Table 7.2.2-1 Cost and Impact Applicability Matrix			
Cost Elements	**Impact**		
	Full Take	**Partial Take**	**Impaired Access**
Acquisition	Yes	Yes	No
Severance	No	Yes	Yes
Demolition/ Reconstruction	Yes, for structures	Yes, if structures are demolished	No
Relocation and Moving	Yes	No	No

Property acquisition costs were estimated using the conceptual design drawings, Washoe County Assessor's data, and discussions with real estate brokers familiar with the subject areas. The analysis was not based on a detailed site-by-site assessment, and no formal appraisal was conducted for any property. Typical land values were estimated for each block, block face, and where relevant, corner parcel based on recent assessments, sales (where available), and the judgement of local brokers. For full takes, improvements (structures) were valued based on replacement cost for equivalent office, retail, industrial, or hotel space. Impaired access was calculated as a percentage of current estimated market value, ranging from a low of 2.5 percent to a high of 15 percent. The factor applied to each property was based on the type of use and its sensitivity to changes in accessibility, the degree to which access would be impaired, and an assessment of whether alternative access routes now exist or could be created.

In situations where parcels would be split but not entirely consumed by the project, it was assumed that marketable parcel remnants ("remainders") would be resold to private owners at market value, thus reducing the property acquisition cost.

Contingencies: Contingencies have been added to project estimates to allow for uncertainties or costs that cannot be estimated due to the preliminary nature of the designs. These costs include:

- Items that cannot be estimated due to the lack of detail.
- Increases in quantities due to the preliminary level of engineering.
- Changes in design standards that could occur during design.
- Changes in project scope, e.g., specific environmental mitigation measures or increases in potential property impacts and damages.
- Variations in unit prices that can be expected to occur among different contractors or due to short-term market situations. This item applies particularly to property acquisition. Long-term inflation is not included in this item.
- Changes in site conditions and variations in quantities that normally would occur during construction. This type of contingency is sometimes called a "Project Reserve."

Contingencies were calculated as percentages of the estimated items. The percentage depends on the level of detail of the estimate. For this conceptual study, the SEA study team has allowed 30 percent contingencies for construction and 25 percent contingencies for right-of-way.

Mobilization and Allowances: These items that are normally included in a construction bid. The SEA study team has estimated these items at 10 percent of the estimated items plus contingencies. The total of these items represents an estimate of what the construction would cost.

Project Implementation Costs: Project implementation costs are those in addition to the actual construction and right-of-way costs and include:

- Preliminary engineering.
- Detail design and preparation of construction documents.
- Right-of-way engineering and procurement.
- Construction management.
- Owner and agency administration.

These costs are normally calculated as percentages of total estimated construction and right-of-way costs. For this study, we have calculated these costs as 18 percent of construction costs and 15 percent of right-of-way costs. The figures do not include any provision for litigation. For a cost breakdown for the eight potential highway/rail grade separations, see Appendix V.

Cost estimates, in millions of dollars, for the underpasses are summarized in Table 7.2.2-2.

Table 7.2.2-2
Estimated Capital Costs for Grade Separations
(millions of 1997 dollars)

Location	Keystone Ave.	Ralston St.	Arlington Ave.	Lake St.	Evans Ave.	Valley Road	Sutro St.	
							Opt. 1	Opt. 2
Construction cost estimate	$17.3	$15.1	$15.8	$16.1	$15.8	$18.2	$15.0	$15.0
Right-of way / property cost estimate	$7.6	$1.5	$7.6	$8.6	$4.1	$1.6	$1.2	$0.7
Total	**$24.9**	**$16.6**	**$23.4**	**$24.7**	**$19.9**	**$19.8**	**$16.2**	**$15.7**

Source: De Leuw, Cather & Co., 1997

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic

Predicted Vehicular Traffic Delay and Accident Rates: Grade separations would reduce vehicular traffic delay and predicted vehicular accident rates associated with the post-merger increase in through freight trains. Table 7.2.2-3 summarizes the projected change in these two areas for each potential highway/rail grade separation.

Table 7.2.2-3
Effects of Grade Separations on Vehicular Delay and Accident Rates

Location	Total Hours of Delay per Day				Total Accidents per Year			
	Pre-merger 12.7 Trains	Post-merger - 24 Trains			Pre-merger 12.7 Trains	Post-merger - 24 Trains		
		Without Grade Separation	With Grade Separation	Difference		Without Grade Separation	With Grade Separation	Difference
Keystone	189	373	294	79	0.795	0.952	0.891	0.061
Ralston	189	373	364	9	0.795	0.952	0.918	0.034
Arlington	189	373	348	25	0.795	0.952	0.768	0.184
Lake	189	373	352	21	0.795	0.952	0.837	0.115
Evans	[a]				[a]			
Valley	[a]				[a]			
Sutro	189	373	344	29	0.795	0.952	0.899	0.053

Notes: [a] Reduction of delay and accidents by a highway/rail grade separation at Evans and Valley would depend on the amount of traffic diverted. If the street would carry traffic similar to Lake, the delay reduction would be about the same as the projected result for the highway/ rail grade separation at Lake. Accident reduction would be less than Lake, because Evans and Valley have no prior history of accidents.

As shown, the largest reduction in delay from a highway/rail grade separation would occur at Keystone. The second-largest reduction would occur at Sutro, followed closely by Arlington and Lake. The largest reduction in accident rates from construction of a highway/rail grade separation is predicted to occur at Arlington. This is principally due to the prior train/vehicle accident history at this location.

Noise: Table 7.2.2-4 shows the number of existing sensitive receptors (parcels) for 13 grade crossings that are present within both the post-merger and the pre-merger 65 dBA L_{dn} noise contours, i.e., all sensitive receptors within a 65 dBA L_{dn} noise contour, both pre- and post-merger.

Table 7.2.2-4 Number of Sensitive Receptors (parcels) within both the Pre- and Post-Merger 65 dBA L_{dn} Contours -- by Grade Crossing	
Grade Crossings [a]	**Number of Properties (parcels) within both the Pre- and Post-merger 65 dBA L_{dn} Contours [b]**
Del Curto	24
Virginia	15
Sierra	11
Ralston	10
West	9
Arlington	8
Stagg	8
Center	5
Washington	5
Lake	3
Woodland	3
Keystone	2
Sage	1
Total	**104**
Notes: [a] Crossings sorted in order of number of affected properties. [b] Includes hotels/casinos.	

Train horn noise could be eliminated at those grade crossings where highway/rail grade separations are constructed. Of the crossings listed, possible highway/rail grade separations are evaluated in this PMP for Ralston and Lake streets, with 10 and 4 receptors, respectively.

Impacts Introduced by the Mitigation Measure

The most critical potential environmental impacts of the possible highway/rail grade separations would be to adjoining properties. Tables 7.2.2-5a, b, and c summarize the full property acquisition, partial acquisitions, and impairment of access associated with each of the highway/rail grade separations.

Table 7.2.2-5a
Potential Property Impact Summary for Highway/Rail Grade Separation Options -- Number of Properties Requiring Full Acquisition

Grade Separation Option	Building/Property Category						Total
	Hotel/Motel	Retail	Commercial	Residential	Office	Industrial	
Arlington Avenue	5	0	1	0	0	0	6
Lake Street	3	1	1	0	0	0	5
Valley Road	0	0	1	0	0	2	3
Evans Avenue	2	0	2	0	0	2	6
Keystone Avenue	0	3	4	0	0	0	7
Ralston Avenue	0	1	0	0	0	0	1
Sutro St. (Option 1)	1	1	0	0	0	1	3
Sutro St. (Option 2)	1	0	1	0	0	2	4
Total	12	6	10	0	0	7	35

Table 7.2.2-5b
Potential Property Impact Summary for Highway/Rail Grade Separation Options -- Number of Properties Requiring Partial Acquisition

Grade Separation Option	Building/Property Category						Total
	Hotel/Motel	Retail	Commercial	Residential	Office	Industrial	
Arlington Avenue	3 [3]	0	2 [1]	0	0	0	5
Lake Street	1 [1]	0	7 [2]	0	0	0	8
Valley Road	0	0	4[1]	0	0	4[1]	8
Evans Avenue	1 [1]	1	6 [5]	0	0	0	8
Keystone Avenue	0	3[1]	1[1]	0	1	1	6
Ralston Avenue	1[1]	0	2[2]	5 [5]	0	0	8
Sutro St. (Option 1)	0	0	1	0	0	6 [3]	7
Sutro St. (Option 2)	0	1	1	0	0	5 [2]	7
Total	6	5	24	5	1	16	57

Note: The values in brackets are the number of properties out of the listed totals that also have impaired access and are included in Table 7.2.2-5c (Impaired Access).

Table 7.2.2-5c
Potential Property Impact Summary for Highway/Rail Grade Separation Options -- Number of Properties with Impaired Access

Grade Separation Option Street	Building/Property Category						Total
	Hotel/Motel	Retail	Commercial	Residential	Office	Industrial	
Arlington Avenue	7 [3]	0	1 [1]	0	0	0	8
Lake Street	3 [1]	0	3 [2]	0	0	0	6
Valley Road	0	0	1[1]	0	0	1[1]	2
Evans Avenue	3 [1]	0	9 [5]	0	0	3	15
Keystone Avenue	0	2[1]	2[1]	4	0	2	10
Ralston Avenue	3[1]	0	4[2]	8 [5]	0	0	15
Sutro St. (Option 1)	1	0	0	0	0	6 [3]	7
Sutro St. (Option 2)	1	0	0	0	0	5 [2]	6
Total	18	2	20	12	0	17	69

Note: The values listed above in brackets are the number of properties out of the listed totals that also require partial acquisition and are included in Table 7.2.2-5b (Partial Acquisition).

A more detailed discussion of these potential impacts follows:

Keystone -- Potential Property Impacts: The Keystone Avenue underpass would involve potential major impacts to properties. South of the tracks, several parcels would be acquired in full, while others would be partial takes. Properties on the east side of the street, primarily residences, would have impaired access from the frontage road.

Major property acquisition and reconfiguration would take place on the north side of the tracks. Properties abutting Keystone Avenue would have access restricted by the frontage roads. Complete acquisition may be required to compensate for damages during construction and potential permanent impacts to businesses. Buildings north of existing 4th Street would be demolished for the relocation of 4th Street. Complete parcel acquisition would probably be needed in many cases, with excess property sold after construction is complete. After 4th Street is relocated, the parcel boundaries could be readjusted.

Ralston -- Potential Property Impacts: A total of four commercial and five residential properties would be affected on the west side of Ralston Street. South of the tracks, the Castaway Inn and Geothermal Development Association would need to be partially acquired, and the Fleiner Properties parking lot would need to be partially acquired. The Northwest Tire at 4th Street would need to be fully acquired. The private residences on the west side of the street would need to be partially acquired. Properties that are not fully acquired would have impaired access from the frontage road on Ralston Street. The properties adjacent to the new east frontage road would have impaired access.

Arlington -- Potential Property Impacts: South of the tracks, three properties on the west side of Arlington Avenue would be affected. The Town House Motor Lodge would need to be fully acquired, and the two parking lots would need to be partially acquired and would have impaired access. North of the tracks, all four motels fronting on Arlington Avenue on the east side would need to be fully acquired. Two parking lots just north of 3rd Street would be partially affected and would have impaired access. The properties south of Second Street and north of 4th Street would not be affected.

Lake -- Potential Property Impacts: South of the tracks on Lake Street, the Mizpah Hotel and the Men's Club would need to be fully acquired. The remainder of the properties, consisting of parking lots, would need to be fully or partially acquired and would have impaired access due to the loss of access. North of the tracks, the Roullete Motel, the American Inn, and the Paradise Food and Liquor would have to be fully acquired. The rest of the properties north of the tracks consisting of parking lots, would need to be partially acquired and would have impaired access. The parking lot south of 2nd Street would need to be partially acquired. The store north of 4th Street would be affected and would require minor acquisition. The properties fronting on the new frontage road, notably the Santa Fe Hotel, would have impaired access.

Evans -- Potential Property Impacts: The parcels on the west side of the street, north of the tracks, contain motels and industrial buildings, and would require demolition and complete acquisition. Parcels south of the tracks are all surface parking lots that could be partially acquired. The roadway would encroach on the property on the northwest corner of the intersection with 4th Street. The parcel is currently a parking lot. Properties on the east side of the street, consisting mainly of commercial and industrial businesses, would have access impaired by the one-way frontage road. There would be excess property available on the west side of the street, just south of 4th Street. One parcel, which fronts on Lake Street, would have additional frontage from Evans Avenue.

Valley Road -- Potential Property Impacts: On the north side of the tracks, properties on the west side of the roadway would be affected and would have to be partially or fully acquired. On the south side of the tracks, a truck loading facility and a vacant lot would be affected and would require partial acquisition.

Sutro (Option 1) -- Potential Property Impacts: Two parcels south of the railroad tracks and two north of the tracks, which are currently used for industrial materials storage, would be partially acquired. North of the tracks, an electric substation would be acquired in full. At 4th Street, the Sutro Motel occupies two separate parcels on either side of Sutro Street. The parcel and building on the east side, which contains the motel office, would be acquired in full. It is possible that severance damages could be appropriate due to the acquisition of one-half of the business. The intersection at 4th Street and the transition of the roadways would require the acquisition of the Reno Mattress Company. In addition, a portion of the automobile parking lot on the northeast corner of the intersection would need to be acquired. Excess property will be created on the west side of the street, south of the tracks. Access to properties on the west side of the street, notably the Sutro Motel and the Sierra Fuel Company, would be impaired by the one-way frontage road.

Sutro (Option 2) -- Potential Property Impacts: South of the tracks on the east side of the street, a dumpster storage facility and a material storage facility would be affected and require partial acquisition. On the west side of the street, a material storage and a recycling depot would be affected, requiring partial acquisitions. North of the tracks, three properties would need to be fully acquired: Sierra Fuel Company, Sutro Motel, and Roadmaster Auto Repair Shop. A lot with a shed and a vacant lot, both just north of the tracks, would need to be partially acquired and would have impaired access due to loss of access to Sutro Street. The Big O Tires on the north side of 4th Street requires partial acquisition.

Potential impacts would also occur for drainage and utilities near the highway/rail grade separations, as described below.

Keystone -- Potential Utility Impacts: There are relatively few utilities along Keystone Avenue. No gravity storm drains or sewers presently cross under the tracks. Utilities exist on both sides of the tracks and none cross the railroad. On the north side, utilities consist of two sanitary sewer lines running parallel, a water line, and a storm drain line, which end just north of the tracks. South of the tracks, a gas and water line run along the street. Underground and overhead utilities could be relocated to one or both of the frontage roads. The sump in the underpass would be drained by a gravity storm drain emptying to the Truckee River.

Ralston -- Potential Utility Impacts: The majority of affected utilities are located north of the tracks, with the exception of a water line which runs along Ralston Street and crosses the railroad tracks. The affected utilities north of the tracks are gas, overhead utilities, water, a sanitary sewer that runs along 3rd Street, and a sanitary sewer line that runs in a west-east direction halfway between 3rd and 4th streets. North-south utilities could be relocated to the frontage roads. East-west pressure lines such as gas and water, and electric and telecommunication lines could be diverted under the underpass roadway or built into the underpass road structure. The east-west sewer lines would probably be buried at elevations that would conflict with the underpass roadway. As these are gravity sewers, they would need to be relocated out of the underpass roadway envelope, probably to 4th Street. Branch lines and laterals connecting properties to these sewers would need to be reconstructed to match the new inverts of the main sewers.

Arlington -- Potential Utility Impacts: No utilities exist along Arlington Avenue where it crosses the railroad, but a gravity storm drain crosses under the tracks about 100 feet west of Arlington and cuts diagonally under parking lots on the west side of the street south of the tracks. This storm drain would need to be relocated under the west frontage road.

North of the tracks, the affected utilities running along the street are sanitary sewer, overhead utilities, gas, and water lines. Two sanitary sewer lines running in an east-west direction, one along 3rd Street and the other between 3rd and 4th streets, would be affected. South of the tracks, affected utilities are gas, water, and storm drain lines. North-south utilities could be relocated to the frontage roads. East-west pressure lines such as gas and water, and electric and telecommunication lines could be diverted under the underpass roadway or built into the underpass road structure. The east-west sewer lines would probably be buried at elevations that would conflict with the underpass roadway. Gravity sewers would need to be relocated out of the underpass roadway envelope,

probably to 4th Street. Branch lines and laterals connecting properties to these sewers would need to be reconstructed to match the new inverts of the main sewers.

Lake -- Utility Potential Impacts: Sanitary sewer, overhead utilities, water, gas, and storm drain lines run along Lake Street. The storm drain does not cross the railroad tracks. They would all be affected by the underpass and would need to be relocated to the frontage roads.

Evans -- Potential Utility Impacts: A major 60-inch storm drain line runs along Evans Avenue between 2nd and 4th streets, crossing the railroad track. Gas and water lines run along Evans Avenue on both sides of the tracks, without crossing the tracks, and a sanitary sewer line exists for a small segment north of the tracks. As most of the width of Evans Avenue is incorporated in the east frontage road, most likely utility lines would not require relocation; however, if any utilities are affected, they would require relocation to the frontage roads.

Valley Road -- Potential Utility Impacts: A 60-inch storm drain line runs along Record Street between 6th and Plaza streets. At Plaza Street where Record Street ends, the line turns in a southeasterly direction and crosses the railroad tracks at the south end of the Valley Road. A 24-inch storm drain line south of the tracks joins the 60-inch line before it drains into the Truckee River. An east-west sanitary sewer line running along Plaza Street turns southeast at the intersection with Record Street and crosses the railroad tracks. South of the railroad tracks, a sanitary sewer line from 2nd Street joins this line before it crosses the Truckee River at the north side of the Kuenzli Street bridge. The Valley Road underpass would affect these lines, and they would require relocation. The 60-inch storm drain line may be relocated along 4th Street and to the east side of the underpass, crossing the railroad tracks to a point of intersection with the old line that drains into the Truckee River. The sanitary sewer line may need to be relocated along 4th Street and east of the underpass in a similar way to the 60-inch storm drain line. The sanitary sewer line along 2nd Street could be relocated by continuing along the 2nd Street and the Kuenzli bridge to a point of intersection with the existing sewer line south of the Truckee River. A water line north of the railroad tracks would be affected and may need to be relocated to the new Service Road.

Sutro -- Potential Utility Impacts: For Sutro Street, most of the utilities are located north of the tracks. They include a storm drain, overhead utilities, water, and gas lines. A sanitary sewer line at the westerly leg of Commercial Row extends to the west. The utilities north of the tracks would need to be relocated to the frontage roads.

For Option 1, the overhead electric lines on the east side of the street would need to be relocated in conjunction with the reconstruction of the electric substation. For Option 2, the electric line could remain.

Potential traffic impacts during construction are also a key issue, as described below.

Keystone -- Potential Traffic Impacts During Construction: Maintenance of street traffic through the construction site would be difficult. On the north side of the tracks, traffic could be detoured on excess property that would be acquired. However, there is not enough excess property south of the tracks for a detour. The underpass could be constructed one-half at a time, with traffic maintained on the half not under construction. Alternatively, traffic could be detoured to Vine Street.

Ralston -- Potential Traffic Impacts During Construction: Access to the properties during construction could be achieved by constructing the frontage roads on both sides, providing access to the properties and then constructing the depressed section. The frontage roads may have less than desirable widths during the construction of the retaining walls. Third Street may have to be closed during construction of the underpass bridge structure.

Arlington -- Potential Traffic Impacts During Construction: For traffic access to the adjacent properties during construction, the frontage roads would need to be constructed first followed by the underpass. The frontage roads may have less than desirable widths during construction of the retaining walls along the underpass.

Lake -- Potential Traffic Impacts During Construction: Construction easements on properties to the east could be obtained to accommodate a detour while the frontage roads and the underpass are constructed. An alternative to a separate detour would be the construction of the frontage roads for access to the local properties and then construction of the underpass.

Evans -- Potential Traffic Impacts During Construction: Because there is currently no grade crossing at this location, only local traffic to properties on the east side would need to be maintained during construction. The wide frontage road on the east side of the street could permit two-way traffic. Temporary traffic signals at the intersections would be needed during construction.

Valley -- Potential Traffic Impacts During Construction: An underpass at the Valley Road could be constructed with minimum potential impact on traffic because there is no street located south of the tracks or crossing the tracks. Local traffic would need to be maintained only on the north side of the tracks. The service road north of the tracks would need to be constructed first to maintain traffic to the adjacent properties. Traffic access to the properties north of the tracks and west of the undercrossing would be maintained through Record Street.

Sutro -- Potential Traffic Impacts During Construction: Maintenance of street traffic during construction of the underpass would be difficult. The intersection with Commercial Row would need to be closed during construction, and local traffic to properties on Commercial Row would have to use Morrill Avenue or Sage Street. Construction would be least expensive and would be completed in the shortest time if Sutro Street were closed during construction. Through traffic could be rerouted to Wells Avenue. Local traffic would be maintained on the frontage roads. Alternatively, the underpass could be constructed in two stages, with half the roadway constructed at a time. This would extend the construction duration and increase the cost.

Potential Construction Impacts -- All Grade Separations: During construction of any of these underpasses, air emissions issues associated with construction activities would be encountered. These issues include particulate matter generated as a result of construction and increased automotive air admissions resulting from traffic delays and rerouting. Construction noise is likely to be encountered. There are indications that groundwater in the area may be reached during construction. Control of groundwater discharge may be influenced by the presence of contaminants.

Construction of a highway/rail grade separation would have potential adverse impacts on historic and pre-historic resources, particularly given the close proximity of the right-of-way to the Truckee River.

Prior to undertaking this mitigation option, an analysis would need to be performed regarding the potential presence of these resources. In addition, monitoring for archeological resources likely would be required during construction. Moreover, additional consultation would need to occur with the Native Americans regarding possible impacts to Native American resources.

7.2.3 Depressed Railway

Description of Possible Mitigation Measure

General: The City of Reno and UP have studied a depressed railway through the downtown area. This concept would consist of placing the tracks in a retained cut essentially along the alignment of the existing tracks. Reference drawings showing the layout of the depressed railway are shown in Appendix W.

Under the plan considered by UP and the City, tracks would begin to be lowered in the vicinity of Sutro Street east of the downtown area and would rise in elevation to meet the existing grade near the 2nd Street overpass west of Keystone Avenue. For this proposal, major streets would cross over the depressed railway on bridges and minor streets would be closed.

The depressed railway would be 54-feet wide, the width of the existing UP right-of-way through the downtown area, between the inside faces of the retaining walls. To provide the required 23-foot vertical clearance above the tracks, the top of rail would be about 27 feet below the grade (elevation) of adjacent streets. The track structure would require that the subgrade of the railway be about 30 feet below grade. Ditches or underdrains for the railway would be below subgrade. Based on the profile of the current proposal, the existing grade crossing at Sutro Avenue would be lowered slightly, and the grade crossing at Morrill Avenue would be closed. The existing underpass at Wells Avenue also would be closed. The profile of Keystone Avenue would be raised more than 12 feet to cross the tracks. The depressed railway would contain two tracks plus a maintenance access road. Some access to the railway may be needed in or near the downtown area.

The depressed railway would eliminate all at-grade crossings in the downtown area, thereby eliminating traffic and pedestrian delays and noise due to whistle blowing and crossing bells. Several potential environmental impacts would relate to the concept, including:

- Maintenance of vehicular and train traffic during construction.
- Noise, dust, vibration, and inconvenience during construction.
- Relocation of underground utilities.
- Modification of adjacent structures.
- Groundwater impacts, both during construction and permanent.
- Storm water discharge from the depressed railway.
- Property impacts and acquisition.
- Construction duration.

These issues were addressed in the Nolte *Railroad Merger Mitigation Alternatives* report and the *Re-Evaluation of Downtown Depressed Railway* report. In addition, UP has developed a conceptual plan for a shoofly (train detour) track to permit the maintenance of rail traffic during construction of the railway.

After reviewing these documents, the SEA study team determined that there was a need for further analysis of the depressed railway with respect to costs and potential impacts, including:

- Methodology of constructing the depressed railway walls.
- Potential impacts to properties along Keystone Avenue.
- Use of inverted siphons for conveying drainage under the depressed railway.

Costs of the Mitigation Measure

Methodology and Considerations: Cost estimates for the depressed railway were prepared by the Nolte & Associates team as part of the original *Railroad Merger Mitigation Alternatives* study, and refined in the *Re-Evaluation of Downtown Depressed Trainway* report. The costs are summarized in Table 7.2.3-1. The SEA study team has identified items for which additional review appears to be warranted, and these items could affect overall construction costs. The primary items warranting additional review include construction methodology and potential property impacts, and the additional review could result cost increases beyond the costs set out in Table 7.2.3-1.

Table 7.2.3-1
Depressed Railway Capital Cost Estimate Summary

Item	Description	Cost ($ Millions)
Depressed Section without street crossing structures	Excavation; depressed structure; shoofly construction; railway construction and lighting; permanent and temporary fencing; utility relocation & adjustments; pump and treat water; construction signing & flagmen; mobilization, preliminary engineering; miscellaneous work; engineering & contingencies	$123.22
Street Overcrossings	Substructure; superstructure & waterproofing; fencing & railings; surfacing; utilities; construction signing & flagmen; mobilization; preliminary engineering; miscellaneous work; engineering & contingencies.	$21.81
	Total Construction Cost	**$145.03**
General Damages, Main Line		$5.00
Shoofly	Damages $6.3 Million + construction easement $4.3 Million	$10.60
Contingencies	15%	$22.00
	Total Project Cost	**$182.63**

Source: Nolte and Associates, 1996

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic

Traffic Delay: With Year 2000 traffic, the depressed railway would reduce the projected post-merger total vehicular traffic delay attributable to freight trains from 373 hours per day to 33 hours per day, well below the projected total pre-merger traffic delay of 189 hours per day.

Train/Vehicle Accident: With Year 2000 traffic, a depressed railway would reduce the projected post-merger total train-vehicle accidents attributable to freight trains from 0.952 accidents

per year to 0.146 accidents per year. The pre-merger accidents were projected to be 0.795 accidents per year.

Air Quality: Tables 7.2.3-2, -3, and -4 show the effects on air quality of a depressed railway. Intersections that would become grade-separated as part of the depressed railway option are assumed to revert to the peak background CO level of 6.0 ppm because queuing-related emissions would be eliminated. It should be noted, however, that a depressed railway through downtown Reno could result in locomotive emissions being released just below street level in an open or semi-open depression, and it is possible that this could cause localized PM problems or create nuisance odors for pedestrians.

Pedestrian Safety: The depressed railway option would remove the potential conflicts between the trains and pedestrians resulting in a substantial reduction in pedestrian safety concerns.

Emergency Vehicle Access: The depressed railway option would also eliminate any blockage of emergency vehicles for those streets that would be grade-separated.

Noise: A depressed railway from Keystone to Sutro would eliminate the need for horn sounding in that area and would reduce potential noise impacts to 62 noise-sensitive properties (parcels), including hotels/casinos. Table 7.2.2-4 (Section 7.2.2) shows the number of sensitive properties (parcels) within both the pre- and post-merger 65 dBA L_{dn} contours for 13 grade crossings. All but four of these crossings (Woodland, Del Curto, Stag and Sage) would be grade-separated under the depressed railway option.

Potential Impacts Introduced by the Mitigation Measure

Maintenance of Vehicular and Train Traffic During Construction: It has been proposed that during construction of a depressed railway, train traffic would be maintained by constructing a detour track, known as a shoofly, for the entire length of the depressed railway. The shoofly track would be located entirely outside the limits of the depressed section. The railroad through Reno currently has two tracks. Due to land use and geometric constraints in the downtown area adjacent to hotels and casinos, a two-track shoofly is not practical. To maintain space along Commercial Row currently used by hotels for charter bus staging, the railroad has revised its shoofly plan to a single track between Arlington Avenue and Evans Avenue. The single-track segment of the shoofly is likely to adversely affect freight train schedules and operations.

The shoofly track is proposed to run along a former track spur alignment about 200 feet south of the existing tracks from Keystone Avenue to Washington Street, where it would curve across UP-owned property to just south of the existing tracks at Arlington Avenue. From there, the shoofly track would run adjacent to and partially in Commercial Street in the downtown area. Existing parking along the street would be lost during the construction period while the shoofly track is in place. The shoofly would avoid the Freight House, but would encroach on other properties. East of Evans Avenue, the shoofly would run south of the existing tracks mostly through UP-owned property to a point east of Sutro Street, where the depressed railway ends.

Table 7.2.3-2
Total Emissions in Washoe County Related to Through Freight Trains in Reno – Depressed Railway Mitigation Option (tons per year)

VOCs			
	Pre-merger	**Post-merger without further mitigation**	**Depressed Railway Option**
Locomotive emissions	19.0	35.9	35.9
Idling vehicle emissions	2.1	3.9	0.5
Total emissions	21.1	39.8	36.4
Washoe County emission inventory	16,596	16,596	16,596
Total as % of inventory	**0.13%**	**0.24%**	**0.22%**

NO_x			
	Pre-merger	**Post-merger without further mitigation**	**Depressed Railway**
Locomotive emissions	443.4	838.0	838.0
Idling vehicle emissions	0.7	1.4	0.2
Total emissions	444.2	839.4	838.2
Washoe County emission inventory	27,271	27,271	27,271
Total as % of inventory	**1.63%**	**3.08%**	**3.07%**

Source and notes:

1. Calculations considered only UP/SP and BN/SF through trains on the study line.
2. Number of trains per day (for calculating locomotive emissions): 12.7 pre-merger, 24.0 post-merger, based on UP/SP operating plan estimates (De Leuw, Cather fax dated March 24, 1997).
3. Locomotive emission factors (lb/gal) are from *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources,* 1992, EPA. The proposed EPA locomotive emissions standards will not significantly affect locomotive emission rates in 2000. Hydrocarbon emission rates are converted to VOCs by multiplying by 1.005.
4. Locomotive fuel consumption (gal/train) is based on information provided to Acurex Environmental by De Leuw, Cather (fax dated April 29, 1997), and is a weighted average based on the relative frequency of various train types, as specified in the UP/SP operating plan.
5. On-road vehicle emission rates are based on EPA MOBILE5a model runs for idling conditions (2.5 mph as specified by EPA). Runs for January 2000 and July 2000 were averaged to estimate the average daily emissions for the entire year.
6. Estimates of total hours of delay for queuing automobiles were provided by De Leuw, Cather (fax dated July 9, 1997).
7. Washoe County emission inventory figures are from: *(a) Washoe County, Nevada, 1995 Inventory for Particulate Matter*, Washoe County District Health Department, Air Quality Management Division, 1995, and (b) *Washoe County Nevada, Ozone Non-Attainment Area: Emission Inventory of Ozone Precursors,* Washoe County District Health Department, Air Quality Management Division, November 1995.
8. Numbers may not sum precisely due to rounding.

Table 7.2.3-3
Total Emissions in Truckee Meadows CO/PM Nonattainment Area Related to Through Freight Trains in Reno -- Depressed Railway Mitigation Option (tons per year)

PM			
	Pre-merger	**Post-merger without further mitigation**	**Depressed Railway**
Locomotive emissions	3.0	5.6	5.6
Idling vehicle emissions	0.01	0.02	0.00
Total emissions	3.0	5.7	5.6
Truckee Meadows emission inventory	3,983	3,983	3,983
Total as % of inventory	**0.08%**	**0.14%**	**0.14%**

CO (Carbon Monoxide)			
	Pre-merger	**Post-merger without further mitigation**	**Depressed Railway**
Locomotive emissions	16.1	30.4	30.4
Idling vehicle emissions	21.4	40.5	5.5
Total emissions	37.7	71.2	36.2
Truckee Meadows emission inventory	58,871	58,871	58,871
Total as % of inventory	**0.06%**	**0.12%**	**0.06%**

Source and notes:

1. Calculations considered only UP/SP and BN/SF through trains on the study line.
2. Number of trains per day (for calculating locomotive emissions): 12.7 pre-merger, 24.0 post-merger, based on UP/SP operating plan estimates (De Leuw, Cather fax dated March 24, 1997).
3. Locomotive emission factors (lb/gal) are from *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources,* 1992, EPA. The proposed EPA locomotive emissions standards will not significantly affect locomotive emission rates in 2000. Hydrocarbon emission rates are converted to VOCs by multiplying by 1.005.
4. Locomotive fuel consumption (gal/train) is based on information provided to Acurex Environmental by De Leuw, Cather (fax dated April 29, 1997), and is a weighted average based on the relative frequency of various train types, as specified in the UP/SP operating plan.
5. On-road vehicle emission rates are based on EPA MOBILE5a model runs for idling conditions (2.5 mph as specified by EPA). Runs for January 2000 and July 2000 were averaged to estimate the average daily emissions for the entire year.
6. Estimates of total hours of delay for queuing automobiles were provided by De Leuw, Cather (fax dated July 9, 1997).
7. Washoe County emission inventory figures are from: *(a) Washoe County, Nevada, 1995 Inventory for Particulate Matter*, Washoe County District Health Department, Air Quality Management Division, 1995, and (b) *Washoe County Nevada, Ozone Non-Attainment Area: Emission Inventory of Ozone Precursors,* Washoe County District Health Department, Air Quality Management Division, November 1995.
8. Numbers may not sum precisely due to rounding.

Table 7.2.3-4 Estimated Worst-case CO concentrations at Selected Intersections Near Grade Crossings in Truckee Meadows — Depressed Railway Mitigation Option (ppm, 8-hr average)			
	Pre-merger	**Post-merger without further mitigation**	**Depressed Railway Option**
Keystone	7.1	7.5	7.2
Sierra	7.2	7.8	7.4
Galletti	6.4	6.6	6.5

Sources and notes:

1. NAAQS for CO is 9 ppm (8-hour average).
2. Results are based on screening-level dispersion modeling using the CAL3QHC model.
3. Assumptions for worst-case analysis include:
   - All trains (12.7 pre-merger and 24.0 post-merger) pass grade crossing within an 8-hour period.
   - All trains have the length of the longest observed through train (6,698 ft on February 6, 1997).
   - Year 2000 traffic volumes for 4 p.m. to midnight used.
   - Worst-case meteorology used: stagnant air, January temperatures.
   - Second highest 1995 8-hour average from CO monitor near Galletti crossing used as background CO level: 6.0 ppm, which occurred from 8 p.m. to 4 a.m. on November 7-8, 1995.
   - "Double-counting" of localized vehicle contribution to background CO level not corrected for.

At-grade crossings would be required at the shoofly track, except at streets that could be permanently or temporarily closed. Construction of a depressed railway would require that each street be closed for some extended period. Construction could be staged so that only one street or selected streets would be closed at any one time. Moreover, it may be possible to use construction techniques that allow for streets or portions of streets to remain open for most of the construction period. It is anticipated, however, that traffic patterns would be changing throughout the duration of the construction.

Noise, Dust, and Vibration During Construction: Heavy construction required for the depressed railway would create noise and vibration. In addition, excavated material would be removed by hauling it along adjacent streets. Dust could be minimized with watering and covering of haul trucks. Potential impacts from noise and vibration could be reduced by using specialized construction techniques and by limiting construction to daytime hours.

Relocation of Underground Utilities: Every existing street contains some utilities that would be disrupted by a depressed railway. Depending on the nature and size of the utilities, some reconstruction would be needed. Water, telephone, gas, and electric lines could be carried in bridges that cross the railway, or they could be diverted to go under the railway, but such construction is expensive and restricts access for maintenance of utilities. In some cases, major relocation and rerouting may be needed.

Gravity lines such as storm sewers have been proposed to pass under the depressed railway in what is known as inverted siphons. These are U-shaped sections of pipe with the bottom of the "U" passing under the railway. Pressure from normal flow in the upstream reaches of the pipe pushes the water out of the low point in the "U."

There are four storm drains crossing the railroad corridor: A 96-inch line in Vine Street, a 54-inch CMP just west of Arlington Avenue, a 60-inch line in Evans Avenue, and a 60-inch line in Record Street. Sanitary sewers appear to be located in three streets crossing the railroad: Vine Street, Spokane Street, and Record Street. In addition, there is a sanitary sewer running parallel to the railroad tracks in 3rd Street from Vine Street to Virginia Street.

Inverted siphons are generally undesirable, especially in areas such as Reno that have little or no flow during dry seasons. Based on an inquiry from the SEA study team, the City evaluated the cost of diverting storm water around the depressed railway as an alternative to constructing inverted siphons. The study estimated that an interceptor storm drain would cost approximately $2.0 million more than the inverted siphons. The City feels that this additional cost could be absorbed by the contingencies.

Two major utilities are located along the railroad right-of-way and in adjacent streets: a fiber optics line and a petroleum pipeline. Both lines would need to be relocated. The Nolte Re-Evaluation report included refined cost estimates for the relocation of these utilities. The relocation of the petroleum pipeline involves a shoofly and the permanent relocation in the depressed railway. Some costs could possibly be reduced if the pipeline could be permanently relocated under streets.

Modification of Adjacent Structures: Foundations of some structures, such as the parking garage over the tracks between Virginia and Center and the National Bowling Stadium, would need to be modified to allow construction of a depressed railway. There are construction techniques that allow this to be done without interrupting operation of the structures. Some foundation work may also be needed at structures close to the railroad right-of-way between Keystone Avenue and Ralston Street.

Construction Methodology: A depressed railway would require some type of vertical retention on both sides of the tracks to hold back the adjacent ground. There are several types of walls that could be used, and different techniques available to construct such walls. The Nolte report proposed shoring held in place by tie-backs as part of the permanent railway structure. Tie-backs are essentially large anchor bolts driven into the soil adjacent to the structure. Alternative construction techniques not involving tie-backs, either for temporary shoring or especially for permanent stability of the retaining structure, could be more suitable. The railroad would have no control over tie-back anchors, which could be disturbed by excavation for utility construction or development of properties, even with easements and use limitations.

For example, a system of struts and soldier piles within the trench could possibly be constructed as excavation proceeds downward to support the shoring. The struts would be replaced by struts or braces between the tops of the retaining walls to provide a self-supporting structure. This configuration was used for the lowering of the Southern Pacific (SP) tracks in El Paso, Texas.

Additional issues related to the construction of the depressed railway are discussed in the section on Potential Groundwater Impacts.

Historic and Pre-Historic: Construction of the depressed railway could have potential adverse impacts on historic and pre-historic resources, particularly given the close proximity of the right-of-way to the Truckee River. Prior to undertaking this mitigation option, an analysis would need to be performed regarding the potential presence of these resources. In addition, monitoring for archeological resources would likely be required during construction. Moreover, additional consultation would need to occur with Native Americans regarding possible impacts to Native American resources.

Potential Groundwater Impacts: The depressed railway would intercept the groundwater table, which is located from 10 to 40 feet below ground based on available data. Based on recent discussions with casino owners, and corroborated by observation well data, groundwater levels have apparently raised several feet due to large amounts of rain fall in the last two years. During construction, the groundwater level would need to be lowered or otherwise kept out of the excavation. There are several techniques available. Based on recent studies (see Section 6.2.5), the groundwater in this area is contaminated, so it is likely that water that is removed would have to be treated before being discharged.

The permanent railway structure design as well as the construction methodology would need to consider the groundwater. The entire depressed structure could be designed as an impermeable barrier to resist hydrostatic uplift forces (the upward forces created by water under a structure). Alternatively, the trench could be constructed with a permeable layer and an underdrain behind the walls. The underdrain would divert the groundwater around the depressed railway. Periodic cleaning of the underdrain would be accomplished by a series of cleanouts either rising to the ground or accessible from the railway. A third possibility would involve construction of a series of holes in the retaining walls to allow the groundwater to flow into ditches in the railway. This solution would mix the groundwater with storm water runoff, and thus could require treatment of large volumes of water during the rainy season.

The design concept for the permanent railway structure presented in the Nolte report (pg. 10) consists of underdrains behind the retaining walls to collect groundwater. A back-up system of weep holes would also be provided. The weep holes would be actuated in case of failure of the primary system (i.e., underdrains).

Storm Water Discharge: The profile developed for the currently proposed depressed railway would allow for gravity flow of water from the low point of the trench to the Truckee River when the river is low. However, the depressed railway would require a storm water pumping facility to discharge runoff to the Truckee River when the river surface is high. This situation would occur during the rainy season when runoff is greatest.

A pump station would normally include electric pumps and a diesel generator for backup in case of power failure. The diesel pump would require fuel storage, which would need to be located in a suitably zoned area.

Potential Property Acquisition and Impacts: Although the depressed railway would be located within the approximate limits of the existing railroad right-of-way, construction and the

permanent configuration of the depressed railway would have potential impacts on adjacent property related to access and the acquisition of necessary property for building the shoofly and the depressed railway itself.

Shoofly Construction: The shoofly track is proposed to run along a former spur track alignment about 200 feet south of the existing tracks from Keystone Avenue to Washington Street. Although UP presumably owns this land, there are several businesses that use this alley for truck access. These businesses may have acquired rights by adverse possession with respect to the use of the space; compensation may be required during the operation of the shoofly for loss of access.

The shoofly would require demolition of some structures in the downtown area, such as the pedestrian bridge from the Flamingo Hilton Parking Garage, the Turf Club, the Amtrak Station and possibly the Men's Club. The shoofly has been laid out to avoid the Freight House on Evans Avenue. However, freight transfer that occurs on the building behind the Freight House would be interrupted by the shoofly alignment passing adjacent to the loading docks.

Potential Permanent Impacts: Several structures would need to be demolished to permit the construction of the depressed railway: the building housing the Fitzgerald's Group Employment Center; the Men's Club; and possibly the Turf Club and the Amtrak Station. In addition, as noted in the section on storm water discharge, property would possibly need to be acquired for the storm water pumping and treatment station.

The most critical potential property impacts would occur on Keystone Avenue, due to the need to raise the elevation of this street more than 12 feet above its present elevation at the railroad tracks. Raising the grade of Keystone Avenue this much would affect access to abutting properties, probably requiring the acquisition of whole parcels. Even if access could be maintained, the entire roadway would have to be built in a way that would avoid encroaching on abutting buildings.

To allow the grade to be raised, the shoofly for the trains is proposed to be located approximately 160 feet south of the existing tracks, along an alignment previously occupied by railroad spur tracks. The shoofly is proposed to be constructed across Keystone Avenue at an elevation approximately 3.0 feet above the existing grade to accommodate the revised Keystone Avenue elevation. This would require three-stage construction on Keystone Avenue and it would be necessary to:

- Raise the grade of Keystone Avenue to the grade of the shoofly track. This work would presumably be done on one-half of the street at a time, with traffic maintained on the half not being worked on.
- Construct the shoofly track and grade crossing. Construct overpass at final elevation, and revise elevation of Keystone Avenue between shoofly and overpass. This work would again be done one-half roadway at a time. The elevation between the shoofly and the railway overpass would be suitable for temporary traffic, but not for a permanent roadway.
- After the overpass is completed, it would be necessary to remove the shoofly and revise the elevation south of the tracks for a permanent vertical alignment. Again, work would be done on one half of the roadway at a time.

The amount that Keystone Avenue needs to be raised is controlled by the track profile (i.e., the slope of the rail line). UP has established a one percent maximum grade (slope) for this area, but train track charts indicate a 1.16 percent grade between MP 225 and MP 229.5, and a two percent grade between MP 229.5 and MP 230. It appears that the need to raise Keystone Avenue and the associated potential impacts could be minimized if the maximum grade of the railroad were increased to the maximum or ruling grade between Sparks and Truckee. Alternatively, the one percent grade could be shifted westward, but it appears that this would significantly lengthen the west limit of the depressed railway.

Construction Duration: Construction of the depressed railway, involving demolition, utility relocations, [illegible]y construction, and construction of the depressed structure and track, is estimated to last three years. Although certain elements of the construction could be staged to occur at different times and at different locations, the entire railway would have to be completed before trains could run on it.

Items Associated with the Mitigation Measure Needing Further Study

The following section identifies some elements of the depressed railway that, based on the SEA study team's analysis, could warrant additional consideration.

Construction Methodology: To construct the railway, the Nolte report suggested several construction techniques involving chemical or jet grouting of the soil around and below the railway. These construction techniques would create a nearly impermeable cut-off wall that would minimize groundwater infiltration during construction. The grouting would be done behind shoring and held in place by tie-backs that would become part of the permanent railway support structure. Presumably, weep holes would need to be drilled through the impermeable curtain.

As shown in the typical sections on Plate 3 of the Nolte report (Appendix W), the proposed depressed railway would involve construction of a vertical barrier located just behind the face of the interior lining walls. Under this approach, some method would be needed for installation of an underdrain behind the structure wall. It appears that overexcavation (i.e., excavation beyond the final limits of the proposed trainway) would be needed to allow for the drain rock and perforated underdrain, and this overexcavation would need to be accounted for in final cost estimates.

A minimum width of about four feet on each side of the trench appears to be needed to allow for installation of an underdrain. The overexcavation would then need to be compacted and backfilled. The wider limits of the trench for the overexcavation may create additional potential impacts to adjacent streets and structures.

If the trench is overexcavated to allow for underdrains, the permanent railway walls could possibly be constructed as stand-alone cantilever retaining walls on spread footings. This would eliminate the need for permanent tie-backs.

As an alternative to the use of underdrains, and the associated overexcavation, the structure could be designed as a bathtub type reinforced concrete section with waterproofing to resist the

hydrostatic forces up to ground level. This design would eliminate the necessity of providing a relief system of weep holes to be actuated if the underdrains fail. The required bottom slab thickness would likely be about one-half that of the grout bottom diaphragm.

Storm Water Discharge: With regard to storm water pumping, the January 13 *Re-evaluation of Downtown Depressed Trainway* report states that the revised cost estimates include costs for a storm water pump and for water treatment. For this approach, a storage reservoir location would need to be identified, and the property acquisition costs for the reservoir and pump station would need to be included in the final cost estimates.

Shoofly Construction and Keystone Avenue Potential Impacts: The feasibility of maintaining vehicular traffic on Keystone Avenue depends on developing acceptable profiles for the shoofly track and Keystone Avenue, and it is not clear that compatible profiles could be developed. Closing Keystone Avenue between 2nd and 4th streets for an extended duration could be necessary if the appropriate geometrics cannot be developed. This would have potential impacts on traffic and abutting properties. The same considerations apply, to a lesser extent, at Vine Street and other streets to the east where the street profile would need to be raised by more than a nominal amount.

7.2.4 Elevated Railway

Placing the tracks on an aerial structure through the downtown area would eliminate all at-grade crossings in the downtown area, as well as traffic and pedestrian delays and noise due to whistle blowing and crossing bells. To cross over all the streets between Keystone Avenue and Lake Street, the tracks would need to start rising at Wells Avenue in the east and would return to the existing track profile about 2, 400 feet west of the existing 2nd Street underpass. The total length of the aerial structure would be about 9,500 feet, with retained fill sections at each end of the structure. The aerial structure would be constructed generally along the alignment of the existing tracks. The profile of the tracks would follow the existing profile, resulting in no increase in rise and fall. To pass under the existing Wells Avenue overcrossing and over the downtown streets, the track profile would require a 2,500-foot-long grade of approximately 1.3 percent, which exceeds the one percent maximum grade established by UP.

The primary advantage of an aerial structure is that it could be constructed with potentially minimal impacts to street traffic and adjacent properties during construction. Construction cost and duration would be significantly less than with a depressed railway. Additionally, there would be potentially minimal impacts to groundwater and utilities.

Downtown business interests and the City have raised concerns about potential adverse environmental impacts associated with an aerial structure. These interested parties raised the following issues: the visual barrier that would be created by an aerial structure through the downtown and the associated division of the City, possible derailments and spills of hazardous materials from the elevated trains, and the need to demolish existing structures over the tracks. As with the depressed railway, a shoofly track would be needed to permit the construction.

Given these concerns, the Downtown Improvement Association and UP have requested that the aerial structure mitigation option be eliminated from further consideration in the mitigation study.

7.2.5 Train Bypass

The City of Reno has requested that consideration be given to a bypass whereby the UP tracks would be relocated out of the downtown area on a new rail line running south of I-80. However, there is no support in the Board's precedent for requiring a railroad seeking merger authority to construct a new railroad line to bypass a city. Nonetheless, private parties could decide to pursue and fund an I-80 bypass. This would require that the parties seek authority to construct and operate from the Board. At that time, the Board would undertake the appropriate environmental review for a bypass alternative.

In more recent actions, the City has indicated that, while it does not want to drop the bypass from consideration, the depressed railway is a priority in Reno (see Section 2 and Appendix F).

7.2.6 Additional Mitigation Options

This section discusses a series of additional physical or rail operational improvements that could serve to further mitigate the potential environmental impacts in Reno resulting from the increase in through train traffic associated with the merger. Subject areas studied include:

- Improved vehicular grade crossing safety measures.
- Improved pedestrian safety measures.
- Emergency vehicle access measures.
- Noise suppression.
- Air quality measures.
- Landscaping.
- Hazardous materials mitigation.
- Mitigation of impacts at specific grade crossings outside the downtown area.

a) Improved Grade Crossing Safety Measures (vehicular):

Introduction: Section 6.2.4 discusses the likelihood of train/vehicle accidents at the grade crossings in Reno. While the frequency of train/vehicle accidents is not expected to increase with increased train speeds (see Section 7.2.1), the severity of train/vehicle accidents is projected to increase.

Description of Possible Mitigation Measure(s): Mitigation measures that would improve grade crossing safety include the following (See also grade separations, Section 7.2.2, and depressed railway, Section 7.2.3):

- Four-quadrant gates at nine two-way streets: (1) Sutro, (2) Lake, (3) Virginia, (4) West, (5) Arlington, (6) Ralston. (7) Washington, (8) Vine, and (9) Keystone streets.

- Street median barriers.
- Conversion of existing two-way streets to one-way.
- Gate violation enforcement cameras.
- Safety training program.

Unlike two-quadrant gates, four-quadrant gates prevent drivers from going around the gates in the right (through) traffic lanes by the placement of additional gates in the (left) oncoming lanes. The gates are timed so that the far-side gate (in the direction of traffic) comes down later than the near-side gate (in the direction of traffic), providing an escape route for vehicles that could be trapped inside the gates.

Installation of four-quadrant gates for the seven two-way streets identified above could reduce accidents by preventing drivers from going around the current two-quadrant gates at these locations. The highway crossings recommended for installation of four-quadrant gates were identified by considering four factors:

- Those having post-merger predicted accident rates of 0.05 or above.
- Those having an ADT above 5,000.
- Those having high levels of pedestrian traffic (four-quadrant gates in conjunction with pedestrian gates provide a continuous gate across the highway).
- Those which, in succession, possibly could be incorporated into a future "quiet zone." (This would be subject to future FRA regulations that have yet to be promulgated -- See noise suppression discussion below.)

Street median barriers could also be installed at these locations, preventing drivers from going around the gates. However, these would reduce the width of the traffic lanes and could introduce access problems from adjoining land uses.

Conversion of two-way streets to one-way streets (with two-quadrant gates on the near side of the rail line) would also prevent driving around closed gates. While such conversions would serve to improve rail crossing safety, they would have more far-reaching implications for downtown traffic circulation and businesses. Therefore, such a strategy should be part of a broader transportation, land use, and property access planning process for the areas surrounding the grade crossings.

The use of one-way streets in couplets (pairs of one-way streets) was reviewed in Reno during a 1995 analysis of downtown traffic and parking.[57] In addition to permitting more secure two-quadrant gates, a main advantage of one-way streets is to reduce traffic conflict, thereby increasing intersection capacity without the disruption of physically widening streets. The report stated that one-way streets offer some advantages, but can confuse motorists, especially to visitors, who constitute a significant proportion of drivers. Additionally, one-way streets can be frustrating

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[57] *Reno Downtown Traffic/Parking Study, Final Report.* Prepared for the Reno Redevelopment Agency by Barton-Aschman Associates, Inc.; Strategic Project Management; and Lumos & Associates, Inc., December 1995 pp. 24, 27

to local motorists by requiring a more circuitous route. Local businesses may also oppose one-way streets because of potential access problems.

Cameras could be mounted at specific crossings and used as enforcement tools for drivers violating the crossing gates. Such a strategy would require special equipment and/or the manpower to issue tickets to violators.

SEA considers safety training programs, particularly in the schools, an effective way to help drivers or prospective drivers understand the dangers associated with trains and warning signals. The current "Operation Lifesaver" program is an example of the training that can occur in the community and the schools. Moreover, UP could provide a safety training program for Reno's downtown employees.

Costs of the Mitigation Measure(s): The estimated cost for four-quadrant gates at the seven identified streets is $1.21 million. Median barriers for the seven streets would cost an estimated $700,000. Gate violation enforcement cameras at seven crossings is estimated to cost $1.4 million.

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: According to FRA statistics, cars driven around the crossing gates appear to account for about 15 percent of total grade crossing accidents.[58] Each of the measures identified above would serve to reduce overall train/vehicle accidents in the Reno area.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): Conversions of two-way streets to one-way, crossing closures, and street median barriers all would have potential traffic and access impacts on Reno. No potential secondary environmental impacts appear to be associated with four-quadrant gates, gate violation enforcement cameras, or safety training programs.

b) Improved Pedestrian Safety Measures

Introduction: Pedestrian safety is discussed in Section 6.2.2. Effects of increased train speeds on pedestrian safety is discussed in Section 7.2.1. In the downtown core, pedestrian overcrossings or undercrossings could be constructed to reduce the number of pedestrians crossing the tracks at grade during the passage of a train. As shown in Table 7.2.2-1, 68 percent of the pedestrians delayed by trains during the train survey week were on Virginia Street. The second highest number (21 percent) was on Sierra Street.

Description of Possible Mitigation Measure(s): Possible mitigation measures for pedestrian safety are described below (See also grade separations, Section 7.2.2, and depressed railway, Section 7.2.3.)

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[58] Federal Railroad Administration, *Nationwide Study of Train Whistle Ban,* April 1995, pg. 45.

Under an agreement with UP, Fitzgerald's Hotel has proposed to construct, with financial help from UP, a pedestrian overpass west of Virginia Street. This overpass would pass directly from the second floor of Fitzgerald's Hotel over the tracks to 3rd Street, where it would connect to street level. Thus, the proposed pedestrian overpass would connect to street level only on the north side of the tracks. If Fitzgerald's Hotel agreed, the overpass could also be connected to street level on the south side of the tracks with the addition of stairs, escalators, and elevators. Absent such an agreement by Fitzgerald's Hotel, other options for Virginia Street include a different pedestrian overpass or a pedestrian underpass.

In addition to Virginia Street, either a pedestrian underpass or overpass would be possible on the east side of Sierra Street. Conceptual drawings for these possible pedestrian overpasses and underpasses are provided in Appendix X.

Other options related to pedestrian safety include installation of skirts on the existing pedestrian crossing warning arms and/or the construction and operation of electronic signs to provide advice to pedestrian near the right-of-way. Crossing guards could be deployed, and safety training programs could be implemented or expanded. Moreover, UP could provide a safety training program for Reno's downtown employees.

Costs of the Mitigation Measure(s): Cost estimates for these mitigation measures are as follows:

- Street connection (escalators) to Fitzgerald's pedestrian overcrossing on the south side of the tracks = $0.8 million.
- Pedestrian undercrossing on the west side of Virginia = $2.5 million.
- Pedestrian overcrossing on the east side of Sierra = $2.0 million.
- Pedestrian undercrossing on the east side of Sierra = $2.4 million.
- Installation of pedestrian gate skirts on six downtown crossings = $50,000.
- Installation of electronic signs at four downtown crossings = $400,000.

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: As discussed in sections 6.2.2 and 7.2.1, no formula is available to calculate the anticipated frequency of pedestrian accidents. However, proposed pedestrian grade separations would enable a high percentage of pedestrians in the downtown area (estimated at 89 percent) to cross over or under the train during a train passage. Other optional measures described also could serve to reduce the likelihood of pedestrian/train accidents.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): Construction of overcrossings would have visual effects on the downtown area. Design of the overcrossings would need to take into account any visual blockage of commercial signs or facades, e.g., the neon lights at the Flamingo. Safety and security in the pedestrian overcrossing and undercrossing also need to be considered. Use of crossing guards would entail ongoing labor costs.

Depending on the type of construction, underpasses could require temporary closure of railroad tracks for varying periods of time with consequent impacts to train schedules and operations. A cast-in-place subway would probably require single-track operation for extended periods, similar to the construction of a roadway underpass. Supplementary train signals and crossovers on either side of the underpass might be needed to maintain the single-track operation. A subway consisting of precast concrete box sections could be constructed with durations of a day or so of single-track operation on each track. Jacking or tunneling techniques would not require any closure of railroad tracks, but such techniques are expensive and may not be suitable for the type of soil or the restricted working space at the locations being considered for underpasses. The underground construction could involve potential adverse impacts on historic and pre-historic resources similar to the construction of underpasses or the depressed railway.

c) Emergency Vehicle Access Mitigation Measures

Introduction: Section 6.2.3 discusses the effects of the increased freight train traffic associated with the merger on emergency vehicle access. Woodland and Del Curto emergency access issues are discussed below (Section 7.2.6.g).

Description of Possible Mitigation Measure(s): Measures for mitigation of emergency vehicle access are discussed below (see also Woodland Avenue and Del Curto Drive).

If a CTC system were installed by the railroad as part of the increased train speed concept, color displays could be placed in Reno's emergency dispatch center. These displays would show the location of trains and the crossing gates that are down or soon to be down between Woodland Avenue and the Sparks Yard.

Installation of the monitors would assist the emergency vehicle dispatchers to determine the location of trains and notify/route emergency vehicles accordingly. Cameras could also be located beside or over the tracks with video monitors in a dispatch center to serve a similar purpose.

Costs of the Mitigation Measure(s): $0.3 million

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: The installation of displays and video monitors, depicting the approach or presence of a train in the rail network in Reno could be connected to a Reno emergency central dispatch facility. Such a facility, staffed by trained personnel, would then be in a position to advise emergency response vehicle drivers of the presence or imminent presence of an obstructed train crossing, and to suggest alternate routes, alternative destinations (i.e., health care facilities), or alternative resources for dispatch. Such a mitigation measure is expected to have a beneficial effect on response time for emergency vehicles. Training of personnel, communications connections, and equipment upgrades would be required to implement this mitigation measure.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): No adverse impacts appear to be associated with the proposed mitigation measures.

d) Noise Suppression

Potential noise impacts from increased train traffic levels in Reno associated with the merger are evaluated in Section 6.2.9, as are the public safety aspects of train horns.

Description of Possible Mitigation Measure(s): Possible noise suppression measures include: highway/rail grade separations, a depressed railway, four-quadrant gates (or median barriers), and "quiet zones," local grade crossing warning devices (directional horns), nighttime street closure(s), restricted nighttime train operations, source noise control, noise barriers, and building sound insulation.

Under the highway/rail grade separation or depressed railway options, train horn noise could be eliminated for the affected crossings. Grade separations do not appear to be cost-effective solely for noise mitigation. However, if grade separations or a depressed railway were constructed to alleviate traffic delay and other potential impacts, noise reduction benefits would follow. Table 7.2.2-4 (in Section 7.2.2) shows the number of sensitive receptor properties (parcels) that would fall within both the pre- and post-merger 65 dBA L_{dn} noise contours for 13 grade crossings in Reno. A depressed railway from Keystone to Sutro would eliminate the need for horn sounding in that full area and would reduce by 62 the number of properties affected by noise associated with increased train traffic levels. This includes hotels and casino parcels.

Four-Quadrant Gates and Quiet Zones, Median Barriers, and Quiet Zones: The FRA currently has under consideration criteria identifying the circumstances under which "quiet zones" could be developed. The criteria describe the use of four-quadrant gates and median barriers to keep motorists from driving around crossing gates as a train approaches. If ultimately permitted under future Federal regulations, this approach could eliminate train horn noise (hence the term "quiet zone") at specific grade crossings. (See Section 6.2.9 for a discussion of these pending Federal regulations.) Under the current draft FRA criteria, a "quiet zone" must be at least ½ mile long.

Local Grade Crossing Warning Devices: FRA and UP have been assessing the viability of alternative local grade crossing warning devices, such as locating a horn or loudspeaker at the grade crossing. The intended benefit of such a device is to limit the extent noise effects on the community. Currently, train horns are sounded 1/4 mile from a grade crossing, resulting in noise exposure to sensitive receptors in a fairly large area. Since the sole purpose of the horn is to warn motorists and others at the crossing, a device that delivers horn noise only to the area at or near the crossing could be preferable.

FRA has tested a prototype automated horn system (AHS) designed to increase the warning effectiveness at grade crossings while minimizing potential community noise impacts. The system consists of a single electronic horn placed directly at a grade crossing and directed along approaching roadways. Since the horn is located at the grade crossing, the community noise exposure due to horn noise on the train is eliminated. The devices can be aimed in a specific direction, resulting in sound levels that are higher when aimed directly in front of the device, and lower when aimed to the rear and sides. Consequently, the area of potential impacts can be reduced.

Figure 7.2.6-1 shows the estimated 65 dBA L_{dn} contours for AHS devices in downtown Reno compared with the contour for conventional horn noise. As can be seen, the AHS would provide a substantial reduction in the potential noise impact area.

Nighttime Street Closure(s): Closing crossings at night would eliminate the need for the train horns to be sounded for the closed crossings.

Restricted Nighttime Train Operations: Reducing the number of nighttime train operations could serve to mitigate potential safety, vehicle delay, and noise impacts. Potential noise impacts would be reduced disproportionately and favorably due to nighttime penalties in the calculations of L_{dn}.

Source Noise Control: Source noise control refers to reduction of noise at the source. In the case of freight trains, source noise controls apply to wheel/rail and diesel engine noise. Source noise controls could reduce the area of potential impact in regions where impact is not due to horn noise. However, since such potential impacts in Reno are limited, source noise controls would only have a minor benefit for this project. Controls of horn noise (duration, loudness, pitch, and direction) could affect noise levels favorably, but must be considered only in the additional context of public safety.

Noise Barriers: Noise barriers are effective for reducing wheel/rail noise that reaches the community. Because train horn noise is the dominant noise source associated with this merger, noise barriers would be useful only in those areas where horn noise is not present. The SEA study team performed an analysis using the GIS to determine whether noise barriers would be effective noise mitigation for freight trains in Reno, and the team determined that there are no areas in Reno that would substantially benefit from noise barriers.

Acentech

SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

PRELIMINARY MITIGATION PLAN

UP/SP MERGER MITIGATION STUDY RENO

September 1997

FIGURE 7.2.6-1

UP/SP Merger-Reno Automated Horn System vs. Train Noise Impacts

Building Sound Insulation: Building sound insulation refers to improving the noise attenuation characteristics of a building envelope to reduce intrusion of outdoor noise into the building. Sound insulation treatments usually involve improving the noise insulation characteristics of windows, since windows are usually the weak acoustical link. Special acoustical windows or modifications to existing windows can provide up to a 10 dBA reduction in noise. Unlike other mitigation options, building sound insulation can only reduce the noise inside buildings.

Cost of the Mitigation Measures and Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: Costs for highway/rail grade separations, a depressed railway, four-quadrant gates, and median barriers are provided earlier in this section. The approximate cost of an AHS installation at a grade crossing is $12,000-$15,000. The range of costs depends on whether or not the road is two-lanes or a divided highway, which affects the complexity of the installation. This cost assumes that the crossing is state-of-the-art with appropriate circuitry for the AHS. Nominal sound insulation treatment costs run approximately $10,000-$20,000 per dwelling unit, depending on air-conditioning costs. Total cost of sound insulation is roughly estimated at $9 million, of which a preliminary estimate of $5-$6 million would be for sound insulation of older hotels and casinos that lack adequate insulation. The SEA study team found noise barriers to be ineffective for Reno conditions, so costs were not developed for this option.

Capital costs would be minor for nighttime street closure(s) or restricted nighttime train operations. For these options, ongoing costs would be borne by the traveling public or the railroad.

The SEA study team did not perform a detailed analysis of the actual feasibility and costs for source noise control, which was beyond the scope of this study. Determination of the viability of this option would involve an inventory and review of the entire UP locomotive fleet, a review of train horn and locomotive retrofit options, and a determination of the costs and effectiveness of such retrofits.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): Potential secondary impacts associated with possible highway/rail grade separations and a depressed railway are discussed in section 7.2.2 and 7.2.3, respectively. As discussed in Section 7.6.2.a, no potential adverse secondary environmental impacts would be anticipated with four-quadrant gates. Median barriers, on the other hand, could adversely affect the width of street travel lanes and would restrict property access and possibly through streets where implemented. For example, a median barrier extending 200 feet from the tracks on Virginia Street would block through traffic for Commercial Row and for 3rd Street. Application of directional horns is designed to reduce overall potential noise impacts, but could adversely affect properties close to and in the direction of the localized horns. Closure of crossings could adversely affect current travel patterns for local residents, employees, or visitors. Restrictions on nighttime train operations could have ongoing effects on the efficient movement of goods along the rail line. The addition of new building sound insulation would introduce adverse environmental effects typically associated with remodeling, including mainly potential noise and air impacts.

e) *Air Quality Mitigation*

Description of Possible Mitigation Measure(s): Possible mitigation measures for potential locomotive emission impacts are discussed below. Where possible, the discussion notes the potential emissions implications associated with the various mitigation options. However, it is difficult to exactly quantify the extent and timing of emissions mitigation if various options were imposed and implemented.

Requiring that the Proposed EPA Locomotive Emission Standards be Followed: Emissions from locomotives are currently unregulated. In December 1996, the EPA issued a Notice of Proposed Rulemaking entitled, "Control of Air Pollution from New Locomotives and New Engines used in Locomotives." The EPA is proposing emission standards and emission testing procedures for locomotives that are similar in some respects to the emission standards for heavy-duty on-highway truck engines. Under the proposed standards, locomotive engines would have to meet emission limits for HC, CO, NO_x, PM, and exhaust opacity (visible smoke). Proposed standards are shown in Table 7.2.6-3.

Three tiers of standards are proposed, depending on the locomotive's original date of manufacture. Tier 0 standards would be applicable at the time of remanufacturing of units originally manufactured during 1973-1999. Tier I standards would apply to units originally manufactured during 2000-2004; Tier II standards would apply to units manufactured during the Year 2005 and thereafter. The Tier I and Tier II standards would be enforceable at the time of the locomotive's original manufacture, and during each subsequent remanufacture.

The proposed standards would begin taking effect in January 2000. Recognizing the long life and low fleet turnover rate of locomotives, the regulations would subject locomotives originally manufactured during the period between 1973-1999 to emission standards at the time of their remanufacture.

Table 7.2.6-3 EPA Tier 0 Standards (g/bhp-h)				
	THC	CO	NO_x	PM
Line Haul Cycle	1.00	5.0	9.5	0.60
Switch Cycle	2.10	8.0	14.0	0.72
Max. in Run 4-8	none	none	11.9	0.75

Applicable to locomotives originally manufactured between January 1973 and December 1999. Would become effective in January 2000, and would be enforceable during remanufacturing.

Tier I Standards (g/bhp-hr)

	THC	CO	NO_x	PM
Line Haul Cycle	0.55	2.2	7.4	0.45
Switch Cycle	1.20	2.5	11.0	0.72
Max. in Run 4-8	none	none	9.3	0.57

Applicable to locomotives originally manufactured between January 2000 and December 2004. Would become effective in January 2000, and would be enforceable at the time of original manufacture and during remanufacturing.

Tier II Standards (g/bhp-hr)

	THC	CO	NO_x	PM
Line Haul Cycle	0.30	1.5	5.5	0.20
Switch Cycle	0.60	2.4	8.1	0.24
Max. in Run 4-8	none	none	6.9	0.25

Applicable to locomotives originally manufactured on or after January 1, 2005. Would become effective in January 2000, and would be enforceable at the time of original manufacture and during remanufacturing.

Class I railroads usually upgrade locomotive engines to the latest available configuration during remanufacturing. EPA envisions that the proposed emission standards would provide an incentive to engine manufacturers to develop and certify suitable procedures and materials for the rebuild of 1973-1999 locomotive models.

An estimate of the effect of the proposed locomotive emission standards, should they become regulations, is shown in Table 7.2.6-4.

Table 7.2.6-4 Effect of Proposed EPA Emission Standards on Locomotive Emission Rates				
	Line Haul NO_x Rate		Line Haul PM Rate	
	Absolute (g/bhp-hr)	Relative to Baseline	Absolute (g/bhp-hr)	Relative to Baseline
Current Baseline	13.5	100%	0.34	100%
Tier 0 Standard	9.5	70%	0.60	176%
Tier I Standard	7.4	55%	0.45	132%
Tier II Standard	5.5	41%	0.20	59%

Concentrating Operation of New EPA-Certified Low-Emission Locomotives in Reno: Requiring UP to comply with the EPA's proposed locomotive emission standards would result in locomotive fleet NO_x reductions between 30 and 45 percent, over the period of 2000-2005. The analysis presented in the previous section indicates that a minimum of five years is needed to completely remanufacture existing locomotives to meet the Tier 0 standards. Because locomotives have long service lives, replacing existing units with new emission controlled models would take much longer. Even with the accelerated process of locomotive replacement currently being conducted by the Class I railroads (because of the huge productivity improvements realized by modern high horsepower locomotives with AC traction), replacing the existing fleet with new units certified to the Tier I or Tier II standards would take 20 years or more.

As part of its approval of the merger, in Decision No. 44, the Board mandated that the merged railroad concentrate low-emission locomotives meeting the proposed EPA standards in several corridors, including the study line through Reno. This requirement applies both to existing locomotives remanufactured to meet Tier 0, and to new locomotives meeting Tier I or Tier II. The SEA study team is unable at this time to quantify with precision the emission reduction in Washoe County of this mitigation strategy.

Early Introduction of Low-emission Locomotives: A variety of emission control techniques have been applied to locomotives in research, development, and demonstration programs conducted over the last decade. These include:

- Diesel engine modifications.
- Improved diesel fuels.
- Diesel exhaust after treatment.
- Use of alternative fuels.

Some or all of these techniques could, in principle be applied to UP locomotives operating through Reno, prior to the proposed EPA locomotive emission standards taking effect. Even though the actual standards have yet to be adopted and the overall emission reduction resulting from their application is difficult to predict, imposition of the proposed standards could produce emission reductions prior to January 2000, when the standards are proposed to begin phasing in.

Offsetting the Increase in Locomotive Emissions by Decreasing Emissions from Other Sources: An alternative to mitigating the increase in locomotive emissions by reducing those emissions directly would be to reduce an equivalent amount of emissions from some other source in Washoe County, thereby "offsetting" the locomotive emissions increase. An arrangement to accomplish this objective could take several forms. For example, UP could contribute funding a fund used to provide incentives for reducing emissions (e.g., by replacing old wood stoves or retrofitting trucks or agricultural equipment to reduce NO_x emissions).

It is important to note, however, that this type of mitigation technique is mitigating the adverse effects on Reno of increased freight train levels in Reno associated with the merger and might not be imposed by the Board in the absence of a private settlement between UP and the City of Reno.

f) Hazardous Materials Mitigation

Description of Possible Mitigation Measure(s): System-wide and corridor specific mitigation measures (see Section 7.2.7) imposed in Decision No. 44 provide a high level of protection from hazardous materials events in the Reno and surrounding area. Moreover, UP has sophisticated detection equipment (hot box, dragging equipment, and high, wide, shifted load detectors) throughout the Reno area. Section 6.2.5 reviews the detection equipment already present on the UP mainline in Reno, Washoe County, and the surrounding area. Installation of additional detectors could reduce the likelihood of hazardous materials spills.

In addition, UP could establish a Community Advisory Panel, consisting of representatives of the Reno/Sparks/ Washoe County community, including Native Americans, who are willing to work with UP management on a regular basis to review safety, environment, and health issues associated with rail operations, particularly as they relate to the transport of hazardous materials.

Costs of the Mitigation Measure(s): Cost estimates for the detector equipment are:

- Hot box detector = $86,000.
- Dragging equipment detector = $66,000.
- High, wide, shifted load detector = $100,000.

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: As noted in Section 6.2.5, intervals between dragging equipment detectors on either side of the Sparks Yard therefore range from five to ten miles. Hot box detectors exist for eastbound trains at intervals of less than 20 miles; and, except for the 27.7-mile interval between MP 251.6 and 223.9, hot box intervals for westbound trains are also less than 20 miles. High, wide, shifted load detectors exists on both tracks at MP 231.8 and on the single track at MP 260.5 This equipment at these intervals represents a high level of detection for railroad operations. However, installation of additional detectors would offer additional protection for Reno, Washoe County, the Truckee River, and the surrounding areas.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): The addition of detection equipment would provide additional protection to Reno and the surrounding area and would not introduce adverse secondary impacts.

g) Landscaping

Description of Possible Mitigation Measure(s): Existing chain link fencing along the tracks could be replaced with more aesthetically pleasing railing or other barriers. Buffer strips between the railroad tracks and parallel streets could be landscaped, e.g., with honeysuckle as identified in City and Redevelopment Agency plans. [59,60] Addition landscaping along the right-of-way in downtown Reno could provide a more pleasant environment for shoppers, gamers, pedestrians, and hotel guests.

Costs of the Mitigation Measure(s): The estimated cost for landscaping would vary depending upon the extent of the area landscaped, and the type and size of the landscaping. Ongoing maintenance costs would also exist.

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: Although not identified as a critical impact, provision of landscaping along the right-of-way in the downtown area would enhance the resort theme being promoted by the City of Reno.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): Provision of landscaping could lead to increased vagrants on the right-of-way, which has been identified by the Reno Police Department as a problem.

h) Mitigation of Potential Impacts at Specific Grade Crossings Outside the Downtown Area

There are two areas outside of the downtown Reno area at Woodland Avenue and Del Curto Drive that, at the initiation of this study, had a single access road that crossed the tracks at grade. Local representatives expressed concerns that stopped and slow trains block the grade crossing and hinder emergency access to the communities. These representatives noted that a train blocking the road due to a derailment or hazardous waste spill could prevent emergency access or community evacuation. In addition, as noted in Section 6.2.6, the practice of adding "helper" locomotives at or near Woodland Avenue has led to extended blockage of vehicular traffic.

Description of Possible Mitigation Measure(s): A road that runs parallel to and south of the tracks connects Woodland Avenue with Mayberry Drive (which passes the railroad) has recently been widened and paved, and the gate that formerly prohibited its use has been opened. This recent

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[59] City of Reno Redevelopment Agency (December 1992), "Railroad Treatment (Present & Proposed)."

[60] City of Reno Redevelopment Agency, *Amendment to the Redevelopment Plan for the Downtown Redevelopment Area Reno, Nevada 1990* (November 1990), pg. 26.

improvement serves to mitigate emergency access impacts for the Woodland area. Moreover, UP has recently discontinued the practice of adding "helper" locomotives in the Woodland area.

Del Curto Drive has daily street traffic levels of 130 vehicles. Mitigation options for Del Curto presented to SEA by the City and Washoe County would involve construction of a new road along and possibly through parklands and/or a bridge over the Truckee River.

Costs of the Mitigation Measure(s): For Woodland Avenue, the mitigation measure of widening, paving, and dedicating the existing road south of the tracks that connects to Mayberry Drive has been implemented. For Del Curto Drive, a new bridge over the Truckee River is estimated at $2.8 million, not including the right-of-way or environmental mitigation costs.

Degree to Which the Measure Would Reduce Potential Environmental Impacts of the Merger-Related Increase in Freight Train Traffic: Measures described (and already implemented for Woodland Avenue) have the effect of reducing vehicular traffic delays caused by the addition of a helper locomotive and of providing alternative emergency vehicle access to the area via Mayberry, which is grade-separated from the railroad.

Potential Secondary Environmental Impacts Introduced by the Mitigation Measure(s): No potential environmental adverse impacts appear to be associated with the Woodland Avenue mitigation measures. The Del Curto measure would introduce construction, property, visual, hydraulic, parkland acquisition, and biological issues for the bridge over the river.

7.2.7 System-wide and Reno-specific Improvements Already in Place

In Decision No. 44, the Board imposed system-wide and corridor-specific mitigation measures that are directly applicable to Reno and include:

Derailments/Spills/Safety

- Use of formula-based standards for track inspection.
- Adoption of UP's existing tank car inspection programs.
- Provision of signs at grade crossings with a [toll-free] number to call if signal crossing devices malfunction.
- Establishment of a toll-free telephone number for emergency response forces.
- Development of hazardous materials and emergency response plans.
- Redistribution of UP personnel to respond to hazardous materials emergencies.
- Development of an emergency response training program for communities.
- Preparation of an implementation plan for UP security forces in Truckee Meadows.
- Adoption of UP's training program for community and emergency response personnel.
- Use of head-hardened rail on curves in mountainous territory.
- Equipment of trains with two-way end of train devices (on Central Corridor).
- Consultation with FRA to develop a priority list for upgrading grade crossing signals, where necessary (including in Nevada).

Air Quality

Operating Practices: As part of the August 1996 approval of the merger, the Board required UP/SP to comply with the following list of improved operating practices:

- Use throttle modulation.
- Use dynamic braking.
- Increase use of pacing and coasting trains.
- Isolate unneeded horsepower.
- Shut down locomotives when not in use for more than an hour at temperatures above 40°F.
- Maintain and upgrade SP locomotives to UP standards.
- Close boxcar doors to decrease wind resistance.
- Convert all locomotives to South Coast Air Quality Management District (SCAQMD) standards for visible smoke reduction.
- Visible smoke reduction.
- Implementation of EPA draft emissions standards for diesel-electric locomotives, and assignment of these locomotives to the Central Corridor (which includes Reno).
- Consultation with local and state air quality officials (including in Washoe County and Nevada)

Taken together, these practices should reduce locomotive emissions for UP freight trains that travel through Reno and Washoe County.

7.3 Mitigation Options Summary Matrix

The following Table 7.3-1 summarizes the mitigation options under consideration, their characteristics including costs, their level of effectiveness in the mitigation of potential environmental impacts, their potential secondary environmental impacts, and the feasibility of implementation.

Table 7.3.1
Summary of Mitigation Measures Reviewed

Potential Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
Increased Train Speeds	Increase 20 mph train speed limit to 30 mph between Keystone and Sage Streets	$7.34	• Total daily vehicular delay reduced to 35 hours below pre-merger conditions. • Gate down time for emergency vehicles reduced by 44 min./crossing, 12 min above pre-merger value of 43 min/ crossing in the downtown. • Total post-merger emissions of VOCs, No_x and PM reduced slightly; CO emissions reduced by 33%. Total emissions are all slightly above pre-merger levels, though vehicle emissions are lower than in pre-merger case. Worst-case CO concentrations reduced to slightly higher than pre-merger, but within federal standards.	• No increase in likelihood of accidents but train/vehicular accidents potentially more severe. (See four-quadrant gate mitigation measure in table below.) • Pedestrian safety an issue. (See mitigation measures in Grade Crossing Safety [pedestrian] in table below.) • Likelihood of spills increased but probably offset by system-wide safety mitigation • No increase in Ldn	Positive due to reduction in train delays and improved switching equipment.	Can be mandated by Board.	High.
Grade Separations:							
• Keystone	Underpass at Keystone, Fourth Street relocated northward.	$24.90	• Total vehicular delay reduced by 79 hours. • Gate down time for emergency vehicles reduced to 0 at Keystone. • Total accident rate reduced by 0.605/ year. • Positive air quality effect.	• Property impacts of 7 full acquisitions, 6 partial acquisitions, and impaired access to 10 parcels. • Increase of traffic on Keystone.	Minor adverse effect during construction.	Board could require, but permits needed, e.g., from City of Reno.	Moderate, due to probable need for condemnation and major property impacts.
• Ralston	Underpass at Ralston.	$16.60	• Total vehicular delay reduced by 9 hours. • Gate down time for emergency vehicles reduced to 0 at Ralston. • Total accident rate reduced by 0.0340/ year. • Positive air quality effect.	• Property impacts of 1 full acquisition, 8 partial acquisitions, and impaired access to 15 parcels. • Increase of traffic on Ralston.			
• Arlington	Underpass at Arlington.	$23.40	• Total vehicular delay reduced by 25 hours. • Gate down time for emergency vehicles reduced to 0 at Arlington. • Total accident rate reduced by 0.1835/ year. • Positive air quality effect.	• Property impacts of 6 full acquisitions, 5 partial acquisitions, and impaired access to 8 parcels. • Increase of traffic on Arlington.			
• Lake	Underpass at Lake.	$24.70	• Total vehicular delay reduced by 21 hours. • Gate down time for emergency vehicles reduced to 0 at Lake. • Total accident rate reduced by 0.1145/ year. • Positive air quality effect.	• Property impacts of 5 full acquisitions, 8 partial acquisitions, and impaired access to 6 parcels. • Increase of traffic on Lake.			
• Evans	Underpass at Evans, creating a new railroad crossing point.	$19.90	• Total vehicular delay reduced by 21 hours if like Lake. • Accident rate reduction depends on how much and where traffic is diverted. • Positive air quality effect.	• Property impacts of 6 full acquisitions, 8 partial acquisitions, and impaired access to 15 parcels. • Diversion of traffic to Evans.			
• Valley	Underpass at Valley, creating a new railroad crossing point.	$19.80	• Total vehicular delay reduced by 21 hours if like Lake. • Accident rate reduction depends on much and where traffic is diverted. • Positive air quality effect.	• Property impacts of 3 full acquisitions, 8 partial acquisitions, and impaired access to 2 parcels. • Diversion of traffic to Valley.			
• Sutro (option 1)	Underpass at Sutro	$16.20	• Total vehicular delay reduced by 29 hours. • Gate down time for emergency vehicles reduced to 0 at Sutro. • Total accident rate reduced by 0.0524/ year. • Positive air quality effect.	• Property impacts of 3 full acquisitions, 7 partial acquisitions, and impaired access to 7 parcels. • Increase of traffic on Sutro.			
• Sutro (option 2)	Underpass at Sutro	$15.70		• Property impacts of 4 full acquisitions, 7 partial acquisitions, and impaired access to 6 parcels. • Increase of traffic on Sutro.			

Table 7.3.1
Summary of Mitigation Measures Reviewed

Potential Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
Depressed Trainway	Trainway depressed below street level between Keystone and Sutro; Morrill closed at tracks.	$182.63	• Total vehicular delay reduced by 340 hours to 156 hours less than pre-merger. • Gate down time for emergency vehicles reduced to 0. • Total accident rate reduced by 0.8058/ year, 3.6495/yr below pre-merger levels. • Improved pedestrian safety. • Total post-merger emissions of VOCs, No_x and PM reduced slightly; CO emissions reduced to below pre-merger levels. Other total emissions are all slightly above pre-merger levels, though vehicle emissions are lower than in pre-merger case. Worst-case CO concentrations reduced to slightly higher than pre-merger, but within federal standards. • 62 fewer noise-sensitive receptors (parcels) affected by 65 dBA Ldn.	• Construction impacts from shoofly (e.g., demolition of Turf Club, Amtrak station, pedestrian bridge from the Flamingo Hilton, Fitzgerald's employment center, the Men's Club). • Raised grade of Keyston produces adverse impacts to adjacent properties. • Property impacts amounting to $15.6 million for temporary (construction) or permanent impacts. • Impaired maintenance of vehicular traffic during construction, impaired access to properties along Commercial Row • Construction noise, dust, and vibration. • Necessary relocation of underground utilities. • Necessary modification of adjacent structures (e.g., parking garage) • Possible historic and pre-historic resource impacts (e.g., Native American resources) • Groundwater impacts. Property needed for pumping and treatment.	Major adverse during construction.	Limited: • mitigates pre-existing conditions. • mitigate more than merger impacts. • agreement needed from permitting agencies, e.g., City of Reno	Would depend upon private negotiations and ability to find joint funding.
Elevated trainway Not supported by downtown business association. Considered and withdrawn from evaluation.		No costs developed.	• Would reduce traffic delay, emergency vehicle blockage, vehicular and pedestrian safety concerns, and horn noise.	• Major visual effects on downtown. • Would divide downtown.	Major adverse during construction.	Limited: • mitigates pre-existing conditions. • mitigate more than merger impacts. • agreement needed from permitting agencies, e.g., City of Reno	Would depend upon private negotiations and ability to find joint funding.
I-80 Train by-pass	Considered and withdrawn from evaluation	Unknown	• Would reduce traffic delay, emergency vehicle blockage, vehicular and pedestrian safety concerns, and horn noise.	• Adverse impacts to properties along I-80 corridor, e.g., hospital, residential.	Minor during construction	None: • Would require application from Railroad. • mitigates pre-existing conditions. • mitigate more than merger impacts. • agreement needed from permitting agencies, e.g., City of Reno.	Would depend upon private negotiations, application from railroad, and ability to find joint funding.

Table 7.3.1
Summary of Mitigation Measures Reviewed

Potential Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
Grade Crossing Safety (vehicular) -- see also grade separations, depressed trainway above							
• Four-quadrant gates at two-way streets of Sutro, Virginia, Wes[illegible]ington, Ralston, Washington, Va[illegible], and Keystone streets.	Gates on all lanes of each street to keep drivers from going around barriers.	$1.21	• Total accident rate for Reno reduced to 0.8715/yr, which is 9.6% above pre-merger rate or one additional accident every 13 years	• None	None	Board can impose.	High
• Street median barriers	Unmountable barriers at 7 streets above.	$0.70	• Potential further improvement in accident rate	• Localized impairment of traffic circulation, especially on Commercial Row and Third Street.	None	Board could require, but agreement needed from permitting agencies, e.g., City of Reno	Moderate, due to circulation impacts
• Conversion of two-way street(s) to one-way	Allows for two-quadrant gates to prevent drivers from going around barriers.	Depends upon streets selected.	• Should be part of a larger transportation planning, land use, economic strategy.	• More confusion for motorists, particularly tourists. • Perceived reduction in access by businesses. • River and freeway bridges limit candidates.	None	Board could require, but agreement needed from permitting agencies, e.g., City of Reno	Low to moderate, due to circulation impacts and need for coordinated transportation & land use planning.
• Gate violation enforcement cameras	Station cameras placed at select crossings	Depends upon streets selected.	• Provides additional disincentive to crossing gate violations.	• Special equipment and necessary authority to issues tickets needed.	None	Board could impose, but requires implementing agency.	Moderate
• Safety training program	For example: • Participation in "Operation Lifesaver." • Supplementing school educational programs in Reno & Washoe County (e.g., driver's training) • Establishing a safety training program for Reno's downtown employees.	(range of options) ± $0.2	• Enhanced community awareness of safety hazards	• None	None	Board could impose.	High
Grade Crossing Safety (pedestrians) -- see also grade separations, depressed trainway above							
• Pedestrian overpass at Virginia	Street connection to Fitzgerald's pedestrian overpass	$0.50	• Reduction in train/pedestrian conflicts & safety issues.	• Visual intrusion at street level	Minor adverse during construction	Board could impose, but permits needed, e.g., from City of Reno	High
• Pedestrian underpass at Virginia	Subsurface walkway under RR with stairs or escalators	$1.40		• Potential pedestrian security issues.			
• Pedestrian overpass at Sierra	Overhead walkway over RR with stairs or escalators	$2.10		• Adverse visual effects on adjoining businesses.			
• Pedestrian underpass at Sierra	Subsurface walkway under RR with stairs or escalators	$1.30		• Potential pedestrian security issues.			
• "Skirts" on pedestrian grade crossing gates	Gate extends closer to street surface.	$0.05	• Additional disincentive to violation of pedestrian crossing gates	• Slightly adverse visual effect.	None		
• Electronic signs for pedestrians	Electronic signs warning of on-coming trains or two tracks occupied.	$0.40	• Additional warning of trains.	• Slightly adverse visual effect.	None		

Table 7.3.1
Summary of Mitigation Measures Reviewed

Potential Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
• Safety training program	For example: • Participation in "Operation Lifesaver." • Supplementing school educational programs in Reno & Washoe County (e.g., driver's training). • Establishing a safety training program for Reno's downtown employees.	(range of options) ± $0.2	• Enhanced community awareness of safety hazards	• None	None	Board could impose.	High
• Crossing Guards	Guard to direct pedestrians on safe crossings	Annual ≥0.08/street	• Additional disincentive to violation of pedestrian crossing gates	• None	None	Board could impose.	High
Emergency Vehicle Access -- (see also Woodland Ave. and Del Curto Drive below)							
• Electronic color display in the communications center showing location of trains	Color monitors showing presence and location of trains in Reno area.	$0.30	• Improved ability of some emergency vehicles to avoid blocked crossings.	• None	None	Board could impose, but requires participation of City and its agents.	High
• Television monitors in the communications center with cameras mounted in rail right of way	Actual camera display of train activities in right-of-way.		• Improved ability of some emergency vehicles to avoid blocked crossings.				
Derailments / Spills							
• Formula-based standards for track inspection	See Board Decision No. 44.	Not estimated.	• Reduced likelihood of hazardous materials release.	• No known adverse impacts.	Extensive capital and operating investments.	Already imposed on UP in Board's Decision No. 44.	High -- Already imposed by Board.
• Adoption of UP's existing tank car inspection programs							
• Signs at grade crossing with toll free number to call if signal crossing devices malfunctioning							
• Provision of UP's toll free numbers for emergency response forces to call							
• Hazardous material and emergency response plans							
• Redistribution of UP personnel to respond to hazardous materials emergencies							
• Adoption of UP's training program for community and emergency response personnel							
• Use of head-hardened rail on curves in mountainous territory							
• Installation of additional hot box detector(s) for train-related defects or problems	Detect hot locomotive and car wheel bearings.	±$86,000	• Increased likelihood for detection of train-related defect or problem. • Reduced likelihood of hazardous materials release	• No known adverse impacts.	Beneficial	High	High
• Installation of additional dragging equipment detector(s) for train-related defects or problems	Detects equipment or other objects hanging from the bottom of a locomotive or car.	±$66,000					

Table 7.3.1
Summary of Mitigation Measures Reviewed

Poteatial Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
• Installation of additional high, wide, shifted load detector(s) for train-related defects or problems	Detects loads or other items that protrude from the top and side of a train	±$100,000	• Increased likelihood for detection of train-related defect or problem. • Reduced likelihood of hazardous materials release.	• No known adverse impacts.	Beneficial	High	High
• Community Advisory Panel	Panel would include representatives of the Reno/Sparks/ Washoe County community, including Native Americans, who are willing to work with UP management on a regular basis to review safety, environment, and health issues associated with rail operations, particularly as they relate to the transport of hazardous materials.	Ongoing	• To promote additional communication and exchange of information regarding UP rail operations in general and the transport and handling of hazardous materials in particular.	• None	Improved communications & possible operational changes	High	High
Noise Suppression							
• Grade Separations	See Grade Separation entries in table above.		• Could enable elimination of train horn noise at/near specific RR crossings -- train horns are the major source of noise from trains passing though Reno	See Grade Separation entries in table above.			
• Depressed Railway	See Depressed Railway entry in table above.		• Could enable elimination of train horn noise -- the major source of noise from trains passing though Reno	See Depressed Railway entry in table above.			
• Quiet Zone	Physical changes at or near RR crossings allowing for train horns to not be blown	Unknown	• Under pending FRA regulations, could enable elimination of train horn noise -- the major source of noise from trains passing though Reno	Must recognize safety requirements imposed by Swift Act and associated regulations to be promulgated.			Awaiting FRA regulations under Swift Act.
• Four-quadrant gates at two-way streets of Keystone, Ralston, Arlington, West, Virginia, Lake, and Sutro.	See Four-quadrant gate entry in table above.						
• Street median barriers	See Median Barriers entry in table above.						
• Conversion of two-way street(s) to one-way	See Conversion of Two-way Streets entry in table above.		• Should be part of a larger transportation planning, land use, economic strategy.	• More confusion for motorists, particularly tourists. • Perceived reduction in access by businesses. • River and freeway bridges limit candidates.	None	Board could impose, but agreement needed with implementing agencies.	Moderate
• Local Grade Crossing Warning Devices	Directional horns located at grade crossing.	$.012 - $0.15 per crossing	• Reduced peak noise	None	Changed whistle procedures.	Must recognize safety requirements imposed by Swift Act and associated regulations to be promulgated.	Limited
• Nighttime street closure(s)	Street closure(s) at night.	Minimal	• Reduced nighttime noise levels	• Potential adverse effects on traffic circulation	None	Board could impose, but agreement needed with implementing agencies.	Moderate
• Restricted nighttime train operations	Fewer or no trains at night.	Unknown	• No adverse effects to Reno.	• None	Would affect UP's ability to deliver goods under interstate commerce provisions.	Must be proposed and accepted by UP/SP.	Low, because of interference with interstate commerce.
• Source Noise Controls	Application of controls to wheel/rail and diesel engine noise.	Unknown	• Only have a minor benefit for Reno area	• None	Major equipment retrofit may be needed.	Low	Low given limited benefit
• Noise Barriers	Found to be ineffective in Reno for freight trains.						

Table 7.3.1
Summary of Mitigation Measures Reviewed

Potential Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
• Building Sound Insulation	Insulate/retrofit older, non-insulated sensitive receptors.	± $9	• Reduced interior noise for affected buildings.	• Construction/retrofit disruption to affected buildings	None	Could require, but agreement needed from affected building owners and permitting agencies, e.g., City of Reno	Low
Air Quality							
• Use throttle modulation.	Reduces average engine output	Minor training costs	• All line haul locomotives in study area • Minor reduction in all emissions, fuel consumption.	• None.	Modification of operating procedures	Already imposed on UP in Board's Decision No. 44.	High -- Already implemented.
• Use dynamic braking	Reduces use of air brakes	Minor training costs	• All line haul locomotives in study area • Minor reduction in brake wear and attendant particulate release		Modification of operating procedures		
• Increase use of pacing and coasting trains	Reduces average engine output	Minor training costs	• All line haul locomotives in study area • Minor reduction in all emissions, fuel consumption.		Modification of operating procedures		
• Isolate unneeded horsepower	Reduces engine output on helper locomotives	Minor training costs	• All helper locomotives in study area • Minor reduction in all emissions, fuel consumption.		Modification of operating procedures		
• Shut down locomotives when not in use for more than an hour at temperatures above 40°F	Reduces idling emissions and fuel consumption	Increased maintenance costs	• All line haul and switcher locomotives in study area • Minor reduction in all emissions, fuel consumption.		Slightly lower fuel costs. Units failing to start to could reduce fleet availability		
• Maintain and upgrade SP locomotives to UP standards	Improves emission performance and reliability of SP units	Upgrade costs	• All line haul and switcher locomotives in study area. • Moderate reductions in HC and PM; minor decrease in fuel consumption.		Improved fleet reliability, less need to over-power trains.		
• Close boxcar doors to decrease wind resistance	Reduces air drag on trains.	Minor labor costs	• Minor reduction in all emissions, fuel consumption.		Modification of operating procedures		
• Convert locomotives to South Coast Air Quality Management District (SCAQMD) standards for visible smoke reduction	Aggressive engine maintenance/upgrade, with older GE units kept out of study area..	Potential significant engine upgrade and locomotive dispatch cost	• Applies mainly to older line haul and switcher locomotives. • Minor to moderate reductions in PM and fuel consumption in study area..		Change to locomotive maintenance and dispatching procedures		
• Implementing the proposed EPA locomotive emission standards	Establishes legally enforceable emission standards for locomotives	Engine testing, development and certification costs	• All 1973 and later locomotives • Initial 30-50 percent NOx reduction, moderate PM increase	• 2 percent increase in fuel consumption.	Limited in-use testing. Rebuild engine kits must be certified.	None - authority is reserved for US EPA	High for Tier 0 and Tier I standards. Tier II standards may be difficult to achieve by 2005, as proposed
• Concentrating operation of New EPA-certified low-emission locomotives in Reno	New locomotives will haves lowest NOx rates when emission standards take effect.	Dispatching costs	• Line haul locomotives • Significantly greater NOx reduction than with random dispatching	• None.	Segregation of low NOx locomotives, dispatching changes	Low. Railroads have already committed to concentrating new units in Souther California.	
• Early Introduction of Low-emission Locomotives - Diesel engine modifications - Improved diesel fuels - Diesel exhaust after treatment - Use of alternative fuels	More rapid emission reduction could be achieved by introducing known technologies in advance of US EPA emission standards	Moderate to high, depending on technique	• Diesel engine modifications to all line haul locomotives would give 20 - 40 percent NOx reduction. • Alternative fuels could give higher NOx reduction.	• Engine modifications would increase fuel consumption by 1 - 2 percent.	Changed maintenance procedures for engine modifications; tenders, fueling facilities for alternative fuels.	None - authority is reserved for US EPA	High for retarded timing. Low for other techniques due to rebuild requirements, lack of alternative fuels.
• Offsetting the Increase in Locomotive Emissions	Generates equivalent reduction from other source	Unknown	• Could include payments to improve traffic signals, buy back wood stoves	None.	None.	Minimal absent an agreement by the parties.	High.

Table 7.3.1
Summary of Mitigation Measures Reviewed

Potential Mitigation Measure	Characteristics	Est. Cost (millions of 1997 $)	Benefits of Mitigation Measures	Adverse Impacts Associated with Mitigation Measure	Impacts on Rail Operations	Authority of Board to Implement	Feasibility of Implementation
Landscaping	Honeysuckle bushes between Center and Arlington.	Est. $0.25	• Enhanced visual environment for pedestrians, hotel guests, shoppers, etc.	• May provide location for vagrants to hide.	Maintenance of landscaping.	High.	High
Woodland Avenue							
• Access road for Woodland Ave.	Widening, paving, and dedicating existing road south of tracks at Woodland Avenue to connect to Mayberry Drive	Already implemented.					
• Change location for the addition of "helper" locomotives.	Relocated away from Woodland Avenue.	$0.00	• Reduced vehicular blockage at Woodland Avenue.	• No known adverse effects	Minimal	High	High
Del Curto Drive							
• Construction of new roadway	Construction of a roadway along the south side of the tracks to connect with either West 4th Street near McCarran Boulevard on the west or Dickerson Drive on the east	Not estimated	• Low traffic levels, so minimal	• Construction, property and parkland acquisition, and biological issues.	None	Limited due to parkland and river issues.	Low, due to adverse impacts and minimal benefits.
• Construction of new bridge	Construction of a new bridge over the Truckee River from the south end of the community	$2.8 million		• Construction, property, visual, hydraulic, parkland acquisition, and biological issues for the bridge.			

Section 8
PRELIMINARY RECOMMENDED MITIGATION MEASURES

8.1 Introduction

As directed by the Surface Transportation Board (Board) in its Decision No. 44, the Board's Section of Environmental Analysis (SEA) is conducting the Reno Mitigation Study to determine what additional mitigation could be appropriate to further address the unique local concerns of Reno and Washoe County. As described in Sections 6 and 7 of this Preliminary Mitigation Plan (PMP), the SEA study team has evaluated the potential environmental impacts and possible additional mitigation options for the merger-related increase in train traffic on the Union Pacific (UP) rail line (formerly the Southern Pacific rail line) through Reno and Washoe County. Based on UP projections,[61] freight trains through Reno are expected to increase by an average of 11.3 trains per day, which includes 7.3 additional UP freight trains and four Burlington Northern/Santa Fe (BN/SF) freight trains.[62] This would result in an average of 24 freight trains per day.

Although local conditions are affected by other train traffic, including local UP and yard switching trains and Amtrak, the SEA study team has not evaluated the potential impacts of these activities or possible options to mitigate the potential environmental impacts of these trains, because they are not directly related to the merger and they were specifically excluded in Decision No. 44. Table 8-1 shows the pre- and post-merger projected freight train volumes through Reno and Washoe County.

Table 8-1
Average Daily Freight Train Volumes Through Reno (1995 and Projected Future Year 2000)

Source of Train	Number of Trains		
	1995 [1]	Projected for Five Years Following UP/SP Merger [2]	Increase
Amtrak [3]	1.1	1.1	0.0
Burlington Northern/Santa Fe	0.0	4.0	4.0
Union Pacific/Southern Pacific	12.7	20.0	7.3
Daily Total	**13.8**	**25.1**	**11.3**

Notes: [1] Based on train statistics provided by UP/SP.
[2] Based on UP/SP Operating Plan and verified statements filed with the Board, 1995 and 1996.
[3] Amtrak train operations are not under the jurisdiction of the Board. Amtrak's California Zephyr now operates daily one passenger train in each direction. For consistency between the merger application, the Environmental Assessment (EA), and Post EA, the 1.1 average Amtrak trains per day is shown in this Section.

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[61] Projected train traffic levels are based on the UP/SP operating plan and its verified statements filed with the Board. These projections were formulated using computer models developed by UP, and were carefully reviewed by SEA and its independent third-party contractor (see Section 4 of this Preliminary Mitigation Plan (PMP)).

[62] Under the merger, BN/SF now has trackage rights along the rail line through Reno.

In this section, based on the information currently available, the environmental analyses completed for the Reno Mitigation Study, and the public input received to date, SEA presents its preliminary recommendations. These preliminary recommendations suggest that the Board require UP to implement additional mitigation measures related to the increased merger train traffic beyond those imposed in Decision No. 44 to respond to the unique local conditions in Reno and Washoe County. The preliminary recommended additional mitigation measures are set forth in this section for public review and comment.

After consideration of the public comments received on this Preliminary Mitigation Plan (PMP), SEA will issue a Final Mitigation Plan (FMP), which will also be available to the public for review and comment. SEA will then make its final recommendations to the Board. After reviewing the PMP, the FMP, SEA's final recommendations, and public comments, the Board will issue a decision imposing final mitigation for Reno and Washoe County.

Throughout the environmental review process, SEA has consistently encouraged discussion and negotiation between UP and other interested parties. SEA recognizes that, through voluntary agreements, parties can achieve more far-reaching solutions to issues facing the community. Such agreements may go beyond what the Board would impose (i.e., because the agreements would solve preexisting problems as well as those that are directly related to the effects of the merger). During the mitigation study, the SEA study team has examined potential additional mitigation measures that the Board would require UP to implement and fund (Tier 1, described in Section 8.4), as well as measures that would go beyond what the Board would impose on UP and that would require voluntary agreement between affected parties and UP (Tier 2, discussed in Section 8.5). The Board could impose as a condition UP's compliance with such a voluntary agreement.

This section describes SEA's mitigation selection process, SEA's preliminary proposal for the mandatory, UP-funded additional mitigation (Tier 1), and the voluntary mitigation options that could be a more far-reaching solution if the affected parties can reach an agreement (Tier 2).

8.2 Process for Selecting Proposed Preliminary Mitigation Measures

In developing preliminary environmental mitigation recommendations, SEA considered numerous factors, including the results of the further environmental impact analysis (Section 6), the study team's evaluation of possible additional mitigation options (Section 7), and the scope of the Board's authority to impose conditions (i.e., Board-imposed conditions must be reasonable and address merger-related issues).

In determining whether additional mitigation measures are reasonable, SEA considered the following questions for each option:

- Is it consistent with the Board's directives in Decision No. 44 and Decision No. 71?
- Does it apply directly to the potential environmental impacts of the merger-related increase in trains on existing right-of-way in Reno and Washoe County?
- Is it effective in achieving a high degree of mitigation for Reno and Washoe County while still protecting public health and safety?

- Is the degree of mitigation tailored to the degree of potential environmental impacts from the merger-related increase in train traffic?
- Does it unduly interfere with UP's right to conduct its business and provide rail freight service to its customers?

Regarding the issue of whether each mitigation addressed merger-related concerns, in this study SEA followed its long-standing policy of mitigating potential environmental impacts related to train traffic changes on existing rail lines. Under the National Environmental Policy Act (NEPA), the Board has the responsibility to address the environmental effects of the transaction it is licensing (i.e., the merger). In applying these guidelines, the Board (and previously the Interstate Commerce Commission) consistently mitigates only those conditions that result directly from the merger. The Board does not mitigate preexisting conditions, which are not a direct result of the merger.

SEA carefully studied the environmental effects of the merger-related increased traffic (see Section 6) and potential options to mitigate its environmental effects (see Section 7). Based on this analysis, SEA developed further mitigation (Tier 1) that reasonably addresses the unique environmental impacts in Reno and Washoe County (see Section 8.4). SEA also examined options (Tier 2) that have further benefits for addressing existing local conditions caused by existing train and vehicle traffic (Section 8.5). Because these options are more far-reaching than that required to mitigate the impacts of the merger-related increase in train traffic, they warrant voluntary participation by other parties potentially benefitting from improved local conditions.

8.3 Two Levels (Tiers) of Mitigation Measures

In its Decision No. 71 issued on April 15, 1997, the Board clarified its intent regarding mitigation requirements for the Reno Mitigation Study. Decision No. 71 states that there will be two levels of mitigation developed for Reno. The first level, Tier 1, will be mandated or baseline mitigation, which the Board will require UP to implement and entirely fund. The second level, Tier 2, will be alternative mitigation that might be a more far-reaching resolution for all concerned, but which would not be implemented absent a voluntary agreement by the parties to share in its costs or expend greater resources.

While the Board cannot compel the parties to reach a voluntary agreement, this PMP reviews potential Tier 2 actions to encourage discussion and agreement among potential participants. SEA recognizes that Tier 2 mitigation measures would provide benefits beyond mitigation of the potential environmental impacts of the merger-related increase in train traffic, and that these measures could effectively address a variety of local concerns in Reno and the surrounding area.

SEA has reviewed all potential mitigation options (see Section 7) to determine which of the options that have been raised in this case could be considered Tier 1 options (i.e., mitigation that would be funded fully by UP). Tier 1 mitigation measures were selected using the following rationale:

- They are a reasonable exercise of the Board's jurisdiction and are consistent with the Board's directives in Decisions No. 44 and No. 71.

- They would be fully funded by UP.
- They would further mitigate the potential environmental impacts of the merger-related increase in train traffic.

8.4 SEA's Preliminary Recommendations for Tier 1 Mitigation[63]

Because emergency vehicle response, train-vehicle accidents, pedestrian safety, derailment/spills, and air quality all relate to public health and safety, SEA determined that these areas of environmental concern should receive the highest attention in developing further mitigation. SEA also determined that vehicular and public transit delay, which are important local concerns, would be given strong consideration.

Because four of these seven environmental issues (vehicle delay, public transit delay, emergency vehicle response, and air quality) are affected by crossing blockage, SEA's initial approach was to address grade crossing blockage and traffic delay. Based on the analysis described in Section 7.2.1, SEA has determined that increasing train speeds substantially would mitigate the potential impacts to traffic and transit delay. Increased train speeds would reduce the waiting time at grade crossings for motor vehicles, including transit buses, to levels below the pre-merger delay. Emergency vehicles would also wait for less time if they were stopped by a train, although the potential for being stopped by a train would increase due to the increased number of trains. By reducing the delay time, the air emissions emanating from waiting vehicles at the crossing would also be reduced.

Based on these results, SEA has concluded that increasing train speed is an effective option for mitigating potential environmental impacts related to traffic delay and crossing blockages. However, additional measures are required to address other potential environmental impacts.

Because safety is a paramount concern, as described by the Board in Decision No. 44 (Appendix A), SEA examined the potential impacts on safety of the projected increase in trains and the possible increase in train speeds. As described below in Section 8.4.1, the SEA study team has evaluated additional measures to address emergency response, potential train-vehicle accidents, pedestrian safety, and derailment risks and spills.

8.4.1 Safety

Vehicular Delay

Vehicular traffic delay from trains has been cited as an important issue in Reno. Public, at-grade rail crossings are located at 16 streets including: Woodland, Stagg, Del Curto, Keystone, Vine, Washington, Ralston, Arlington, West, Sierra, Virginia, Center, Lake, Morrill, Sutro, and

[63] SEA notes that its recommendations in this PMP assume that there is no voluntary agreement for more far-reaching mitigation (i.e., Tier 2 mitigation).

Sage. The total daily pre-merger vehicle delay is estimated at 189 hours[64] for these 16 crossings, while the total post-merger vehicle delay is projected to be 373 hours -- an increase of 184 hours.

The total number of vehicles delayed by pre-merger trains is estimated at 5,740, and these vehicles are delayed an average of 1.98 minutes each. For post-merger trains, 11,130 vehicles per day are projected to be delayed an average of 2.01 minutes each.

Total daily traffic crossing the 16 grade crossings, including those stopped by trains and those not stopped by trains, is projected to be 124,400 vehicles in the Year 2000. The 11,130 vehicles projected to be delayed by post-merger freight trains represents about nine percent of this total traffic, which is an increase over the estimated six percent stopped for pre-merger conditions.

For the total 124,400 vehicles crossing the rail line, the estimated pre-merger average delay per vehicle is 5.5 seconds, while the post-merger average delay is 10.8 seconds.

To evaluate increased train speeds as a potential mitigation option, the SEA study team first calculated the speed of each freight train that passed through downtown Reno during the train survey in February 1997 (see Section 5.3). SEA used the observed crossing gate down times and actual length of each train (provided by UP) to calculate the speed of each train during the survey week (see Section 7.2.1). The calculated average train speed during the February survey week was 18.7 miles per hour (mph), which is near the current UP-established train speed limit of 20 mph.

SEA then evaluated the effects of increasing the speed of each train in downtown Reno by 10 mph. For example, a train that was calculated as traveling at eight mph was assumed to travel at 18 mph, a different train traveling at 20 mph was assumed to travel at 30 mph, and so on. Under this assumption, SEA then calculated total vehicular traffic delay for the pre- and post-merger number of freight trains. With the assumed 10 mph speed increase per train, the projected total post-merger vehicular traffic delay for the 16 grade crossing studied is 154 hours. This is a reduction of 219 hours from the projected post-merger 373 hours of delay without increased train speeds. Indeed, with a 10 mph per train increase in speed, the total post-merger vehicular delay is 35 hours less than the total pre-merger delay of 189 hours.

Additionally, with increased train speeds, the number of vehicles delayed is projected to drop to 7,290 per day, as compared to 5,740 vehicles for pre-merger conditions and 11,130 vehicles for post-merger conditions without increased train speeds.

Increasing the speed of each train by 10 mph would result in the average delay per vehicle delayed dropping to 1.27 minutes, as compared with the pre-merger delay of 1.98 minutes and unmitigated post-merger delay of 2.01 minutes per vehicle delayed. The average delay per vehicle for all 124,400 vehicles crossing the tracks would likewise decrease to 4.5 seconds per vehicle with increased train speeds. This compares with 5.5 seconds per vehicle under pre-merger conditions and 10.8 seconds per vehicle under unmitigated post-merger conditions.

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[64] One hour of delay, for example, means 30 vehicles stopped for two minutes each or 60 vehicles stopped for one minute each due to a blocked rail crossing.

Table 8-2 summarizes these vehicular delay statistics.

Table 8-2
Delay Statistics for 16 Grade Crossings in Reno

	Pre-merger	Post-merger	Increased Train Speeds [1]
Total daily number of vehicles crossing tracks at-grade in the Year 2000	124,400		
Total daily number of vehicles delayed by trains	5,740	11,130	7,290
Percent of total vehicles crossing the tracks that are delayed by trains	4.6%	8.9%	5.9%
Total daily hours of delay	189	373	154
Average delay per vehicle delayed	1.98 minutes (or 118.8 sec.)	2.01 minutes (or 120.6 seconds)	1.27 minutes (or 76.2 seconds)
Average delay per vehicle for all 124,400 vehicles crossing the tracks	5.5 seconds	10.8 seconds	4.5 seconds

[1] Data are calculated assuming an increase of 10 mph for each train over the actual train speeds monitored by SEA during Phase 1 of the study. This included the period of time when additional trains were diverted through Reno as a result of flooding on the Feather River Route (see Section 5.3).

UP has informed SEA that, not only is it feasible to increase the speed of each train by 10 mph (which is the basis for the above analysis), UP can consistently maintain train speeds of all trains through downtown Reno at 30 mph with appropriate capital investments. However, to be conservative, SEA assumed for its analysis only that each train would travel at a speed 10 mph greater than observed during the survey week, rather than assume that all trains would travel at 30 mph.

Under the assumption that all trains would travel at 30 mph, the total daily amount of vehicular traffic delay for the 16 at-grade crossings would be 134 hours, which is 239 hours less than the post-merger level with no change in train speeds, and 55 hours less than the pre-merger level.

The amount of warning time for vehicles (and pedestrians) would not be reduced with an increase in train speeds. FRA regulations (49 CFR 234.225) state, "A highway-rail grade crossing warning system shall be maintained to activate in accordance with the design of the warning system, but in no event shall it provide less than 20 seconds warning time for the normal operation of through trains before the grade crossing is occupied by rail traffic." Thus, the warning time at 30 mph would be no less than the current 20 mph speed.

Therefore, SEA's preliminary recommendation is that the Board require UP to make the capital improvement and rail operating changes that would be necessary to enable trains to operate over the rail segment between the east end of the Sparks yard (approximately MP 247) and a point just west of Keystone Avenue (approximately MP 242) in Reno at a speed of 30 miles per hour (mph). SEA also proposes that the Board impose a condition that would require that UP operate, and that UP in turn require BN/SF to operate, all trains over this rail segment at a speed of 30 mph

consistent with safe operating practices dictated by conditions present at the time each train traverses the segment.

UP's feasibility analysis of this option (see Appendix R) shows that UP would be able to comply with such a condition with the following capital improvements:

- Replacement, between Woodland Avenue and Vista (which is east of Sparks Yard) of the current automatic block signal (ABS) system with centralized traffic control (CTC.)
- Replacement of various turnouts (switches) in the Sparks Yard from size No. 10 to a larger size (No. 14) that would be power-operated.
- Addition of a universal power-operated No. 20 crossover west of Reno.
- Tie replacement and track surfacing, as needed.
- Installation of power-operated track switches, or, where not power-operated, installation of electric locks on the switches for each main line track in an automated train control area between Woodland and Vista.

UP has publicly stated its willingness to consider such improvements.

Emergency Vehicle Response

Reducing grade crossing blockage would reduce possible adverse impacts to emergency vehicle access. The SEA study team determined that, with increased train speed, emergency vehicles would be delayed at crossings for a shorter length of time if they were stopped by a train. However, because there would be more trains, there would be an increased possibility of an emergency vehicle being stopped by a train. Accordingly, the SEA study team considered additional measures to further reduce potential impacts to emergency vehicle access.

These include measures that would provide notification to the emergency response dispatch center of the location and movement of trains on the UP tracks. SEA believes that such a notification system would be a reasonable, effective measure to offset the potential impacts to emergency response access.

Therefore, SEA recommends that the Board require UP to implement a communication system to alert the Reno and Washoe County emergency response dispatch center of train locations and movements on the UP rail line in Reno. This system would provide a visual location display of trains and closed crossing gates so dispatchers could reroute emergency vehicles around potential delays.

In addition to these train location displays, SEA's preliminary recommendation is that the Board require UP to place television cameras over or near the rail line along with corresponding video monitors at the same emergency communications center identified above. These video monitors would continuously show real-time conditions on the right-of-way through downtown Reno, in the area bounded by and including the grade crossings at Keystone and Lake streets. This would allow the dispatchers to view the rail right-of-way in each direction, providing an actual live

view of oncoming train(s) and other activities along the right-of-way (e.g., stalled vehicles, trespassers, or vagrants).

SEA has also examined emergency vehicle response for two areas on the west end of town -- the Woodland Avenue area and the Del Curto Drive area.

At the initiation of the mitigation study, Woodland Avenue, which crosses the tracks at-grade, was the only access road to the relatively new development that exists south of the tracks off of Woodland Avenue. Blockage of emergency vehicle access to this area has been identified as a community concern.

A road that runs parallel to and south of the tracks connects Woodland Avenue with Mayberry Drive to the east, and Mayberry Drive passes under the railroad. The road parallel to the rail line has recently been widened and paved, and the gate that formerly prohibited its use has been opened. This recent improvement provides emergency vehicle access via Mayberry Drive to the Woodland Avenue area if Woodland Avenue is blocked by a train.

Another problem in the Woodland area was UP/SP's prior practice of adding "helper" locomotives to trains to provide additional power for the train to travel over Donner Pass. At times, this practice blocked the Woodland Avenue crossing as the train was stopped to add the "helper" engine, creating additional vehicular traffic delay and emergency access concerns. UP has recently discontinued the practice of adding "helper" locomotives in the Woodland area. SEA proposes that the Board require UP to permanently cease adding "helper" locomotives in the Woodland Avenue area.

Residences built south of the tracks off of Del Curto Drive have only one access road that crosses the tracks at-grade. Daily street traffic levels are minor, with only 130 vehicles. Mitigation would be costly as it would involve construction of a new road along and possibly through parklands and/or a bridge over the Truckee River. SEA believes that, given the low vehicular traffic levels, no mitigation is warranted, particularly with the possible adverse impacts to parklands and the Truckee River. Therefore, SEA does not recommend that mitigation measures for Del Curto be imposed.

Train-Vehicle Accidents

Given its preliminary recommendation to increase train speeds, SEA examined the potential for increased likelihood of train-vehicle accidents and the increase in the consequences of such accidents as a result of increasing train speeds. According to the Federal Railroad Administration (FRA) Rail Highway Accident Prediction Formula (see Appendix K) for grade crossings with active warning devices (i.e., signals or crossing gates), train speed is not a factor. However, FRA data provided to the SEA study team show that accidents are likely to be more severe with increased train speeds. Specifically, Figure 7.2.1-2 (in Section 7.2) shows that anticipated fatality rates (number of

fatalities per accident) increase as train speeds increase.[65] An estimated 15 percent of train-vehicle accidents result from drivers going around crossing gates.[66] Therefore, SEA's preliminary recommendation is that the Board require the installation of additional crossing gates to cover all four quadrants of nine two-way street grade crossings in or near downtown Reno: Sutro, Lake, Virginia, West, Arlington, Ralston, Washington, Vine, Keystone streets. These crossings currently have gates for only two of the four quadrants.

Unlike two-quadrant gates, four-quadrant gates prevent drivers from going around the crossing gates that are in the right-side (through) traffic lanes by placing additional gates in the (left) oncoming lanes. The gates are timed so that the far-side gate (in the direction of traffic) comes down later than the nearside gate (in the direction of traffic), providing an escape route for vehicles that could be trapped inside the gates. Figure 8.1-1 shows two-quadrant gates, and Figure 8.1-2 shows four-quadrant gates.

Installation of four-quadrant gates for the nine two-way streets identified above is designed to reduce train-vehicle accidents by preventing drivers from going around the current two-quadrant gates at these nine locations.[67]

Safety training programs, particularly in the schools, are an effective way to help drivers or prospective drivers understand the dangers associated with trains and the importance of warning signals. Therefore, SEA's preliminary recommendation is the continuation of and participation by UP in these programs to further reduce the likelihood of train-vehicle accidents.

Pedestrian Safety

As a resort and gaming destination, downtown Reno experiences a high level of pedestrian activity. Pedestrians cross the railroad tracks as they walk from one casino/hotel to another or to other downtown Reno destinations. Pedestrian activity continues 24 hours a day.

Special events held in the downtown central business district create additional concerns regarding pedestrian/train safety. These events attract large numbers of people. According to the Reno Police Department, intoxication is sometimes a problem. There are special events almost every weekend throughout the summer. Up to 100,000 people have attended "Hot August Nights" in the past, and, according to the Reno Police Department, the event places a major burden on local public safety officials. Local officials are concerned with trains operating with these crowds present. Pedestrian accidents may also result from pedestrian failure to heed warning lights, barriers, and warning sounds.

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[65] Unpublished graph depicting Actual 1975-1995 Train Speed vs Severity of Highway/Rail Grade Crossing Accidents, entitled "Figure 3.2 Fatalities on Autos struck by Train," presented by Federal Railroad Administration, Deputy Associate Administrator for Safety, Grady Cothen at a meeting held July 16, 1997 with SEA staff and study team.

[66] Federal Railroad Administration, *Nationwide Study of Train Whistle Ban*, April 1995, pg. 45.

[67] Two-quadrant gates already exist on one-way streets, preventing drivers from driving around the gates.

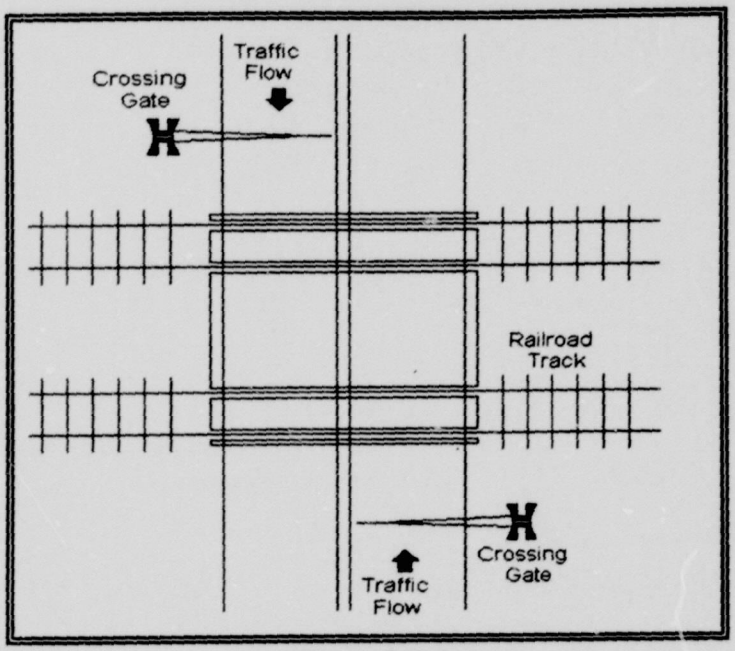

Figure 8.1-1
Drawing of Two-quadrant Gates

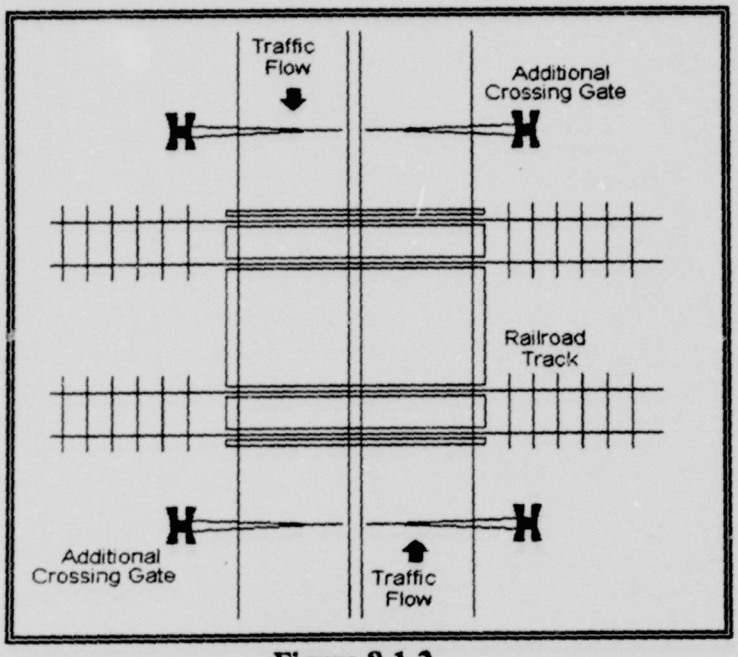

Figure 8.1-2
Drawing of Four-quadrant Gates

While no known quantitative method exists to precisely evaluate risks to pedestrians in downtown Reno, the high pedestrian activity levels indicate that additional mitigation to protect pedestrians would be warranted, particularly given the increased number of freight trains and possible increased train speeds.

Because it was observed during SEA's train survey that pedestrians in Reno sometimes slip under existing pedestrian gates, SEA currently believes that the Board should require UP to install "skirts" on pedestrian crossing gates at the six locations where pedestrian crossing gates already exist, i.e., at Lake, Center, Virginia, Sierra, West, and Arlington streets. Figure 8.1-3 shows a picture of a pedestrian gate skirt.

Figure 8.3-3
Pedestrian Gate "Skirt"

SEA proposes that the Board require UP to install electronic warning signs at these six locations. The signs would be designed to offer text warnings and advise pedestrians regarding oncoming trains, the presence of two tracks and possibly two trains, and the need for caution and safety. At this time, SEA believes that the installation of pedestrian crossing gate skirts and electronic signs would be effective additional measures to reduce the potential increased risks to pedestrians from merger-related increases in train levels and the possible increase in train speeds through downtown Reno.

In addition, SEA's preliminary recommendation is that the Board require UP to construct either a pedestrian underpass or overpass at two locations -- one at Virginia Street and the second at Sierra Street. These two streets are appropriate locations because nearly 90 percent of all pedestrians in downtown who are delayed by trains are on Virginia and Sierra streets.[68] The two

[68] See Section 6.2.2 and train survey data in Appendix G.

pedestrian underpasses/overpasses need to be fully accessible to the public at street level on both sides of the tracks. Several options exist for these two pedestrian overpasses/underpasses.

Appendix X provides conceptual drawings for four possible options -- two at Virginia Street and two at Sierra Street. These options are discussed in Section 7.2.6.

For example, under an agreement with UP, Fitzgerald's Hotel has proposed to construct, with financial help from UP, a pedestrian overpass west of Virginia Street. This overpass would pass directly from the second floor of Fitzgerald's Hotel over the tracks to 3rd Street, where it would connect to street level. Thus, the proposed pedestrian overpass would connect to street level only on the north side of the tracks.

If Fitzgerald's Hotel agreed, the overpass could also be connected to street level on the south side of the tracks with the addition of stairs, escalators, and elevators. If an agreement with Fitzgerald's can be reached, this would accomplish SEA's recommendation for UP to construct a pedestrian grade separation at Virginia Street. Absent such an agreement by Fitzgerald's Hotel, other options for Virginia Street include a different pedestrian overpass or a pedestrian underpass.

Derailments/Hazardous Materials Spills/Water Quality

Because of the potential for requiring area evacuation or causing numerous casualties, the risks associated with transport of hazardous materials deserve careful consideration. The SEA study team discussed rail spills on the UP (formerly SP) mainline through Reno, Washoe County, and the states of Nevada can California of hazardous materials with Pete Tuttle, Fish and Wildlife Biologist with the U.S. Fish and Wildlife Service (USFWS) Contamination Response, and with Bob Sack, Environmental Supervisor with the Washoe County Environmental Health Department. Mr. Tuttle, from the Washoe County Health Department, stated that there have not been any rail spills in the last ten years that have required USFWS action.[69]

For a broader geographic review, the SEA study team requested information regarding railroad-related spills in the State of Nevada and along the UP/SP mainline in California from the U.S. Department of Transportation (DOT), Research and Special Programs Administration (RSPA), which has collected information on unintentional releases of regulated hazardous materials being transported for commerce since 1971. The data show that, since 1971 when that agency began maintaining records of hazardous materials spills, 26 events have occurred along the UP (formerly SP) rail lines in the area of the Truckee River in California and Nevada. These events are predominantly very minor releases which did not meet the FRA's reporting thresholds for incidents or accidents. Of the 26 events, the RSPA report indicates that: (1) most were minor instances involving loose fittings or valves, (2) four required response by Disposal Control Services (a private disposal company in Sparks, NV.), and (3) the largest event involved a 40-gallon spill of hazardous

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[69] In the event of a rail spill, the Nevada Emergency Management staff responds and evaluates the situation. If they determine that the spill has the potential to affect a surface water, they notify the USFWS, which reviews the spill information to determine if USFWS involvement is warranted. USFWS involvement is based on a case-by-case review of the nature and quantity of the spilled substance.

materials. None of these spills resulted in hazardous materials entering the Truckee River. Relevant sections of this report are contained in Appendix L.

For that pre-merger UP rail system, which does not embrace the rail line though Reno, four hazardous materials events occurred in 1995 (involving five rail cars) and four hazardous materials events in 1996 (involving four rail cars).[70] These system-wide FRA-reportable releases of hazardous materials included incidents on mainlines, yards, sidings, and industrial tracks.

Based on hazardous materials rail car traffic flow projections developed by UP for the merger, approximately 40 total car loads of hazardous materials per day (25.8 non-intermodal and 14.2 intermodal) are anticipated post-merger on the UP mainline through Reno and Washoe County. This represents about 3.3 percent of the total of about 1,212 average daily loaded rail cars (588 non-intermodal and 624 intermodal) passing through Reno post-merger.

For 1994, an estimated 25 car loads per day of hazardous materials out of a total of 744 rail cars (630 non-intermodal and 114 intermodal) passed through Reno. These hazardous materials rail cars represent about 3.4 percent of the 1994 pre-merger total rail traffic. An average daily increase of 15 hazardous materials rail cars (13.8 intermodal and 1.2 non-intermodal) is projected for post-merger train levels, but the percentage of hazardous materials rail cars per train is anticipated to remain generally the same as the pre-merger level, i.e., at 3.3 percent.[71]

The SEA study team independently estimated the likelihood of a hazardous materials release (pre- and post-merger) associated with a derailment on the portion of the UP rail line (formerly SP line) from Truckee, California east through Reno to Fernley, Nevada. SEA chose to analyze this segment given that a portion of the rail line in this segment is near the Truckee River. Surface water, including the Truckee River, provides approximately 75 to 80 percent of the Reno-area drinking water. The length of the Truckee River from Lake Tahoe to Pyramid Lake, is approximately 115 miles. The UP mainline is generally within 200 feet of the river for approximately 25 miles of the river's length, or about 22 percent.

The SEA study team used the UP projections for hazardous material rail cars (pre- and post-merger) as provided above, the national average annual derailments rates (by train miles and rail-car miles), and national data for derailments resulting in a hazardous materials releases to estimate the likelihood of a hazardous spill on the rail line segment described above. (Appendix N describes the methodology used to develop these statistics.) As part of this analysis, the SEA study team reviewed other local and national reports prepared on this subject.

Based on SEA's independent estimate, the likelihood of a hazardous materials release between Truckee, California and Fernley, Nevada is once every 39.8 years for pre-merger conditions.

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[70] U.S. Department of Transportation, Federal Railroad Administration *Accident Incident Bulletin* for calender years 1995 and 1996

[71] Memo from Clyde Anderson, Union Pacific Railroad, August 17, 1997, pg. 2 (see Appendix M).

The estimated number of years between hazardous materials spill events for post-merger trains (with the increased number of hazardous materials cars) is once every 27.4 years, a reduction of 12.4 years.

The SEA study team also estimated the likelihood of hazardous materials spills into the Truckee River resulting from incidents on the mainline. Factors used to make these calculations included SEA's independently developed hazardous materials release estimates, the distance between the rail line and the Truckee River over this rail segment, the amount of the rail line that passes over the river on a bridge, assumptions regarding the distance that a derailed train car could travel, the types of hazardous materials being transported, the associated likelihood that these materials would flow into the river, and the probable severity of the release. Appendix N describes the methodology used to develop the likelihood of River contamination from hazardous materials on a UP freight train. Based on SEA's estimates, contamination of the Truckee River is expected to occur every 112.2 years for pre-merger conditions, and every 77.3 years for post-merger trains and hazardous materials levels.

Thus, while the likelihood of a spill or river contamination is increased for post-merger conditions, the probabilities are still remote. Notwithstanding the low probabilities, SEA has reviewed possible mitigation measures for hazardous materials spills.

System-wide mitigation measures to provide critical protection in the areas of derailments/ hazardous materials spills/water quality have already been imposed on UP in the Board's Decision No. 44 and include:

- Formula-based standards for track inspection.
- Adoption of UP's existing tank car inspection programs.
- Signs at grade crossings with a toll-free number to call if signal crossing devices malfunction.
- Provision of UP's toll-free numbers for emergency response forces to call.
- Hazardous materials and emergency response plans.
- Redistribution of UP personnel to respond to hazardous materials emergencies.
- Adoption of UP's training program for community and emergency response personnel.
- Use of head-hardened rail on curves in mountainous territory.

In considering whether there is a need for additional mitigation to address the issue of derailments and hazardous materials spills in the Washoe County area, SEA has examined existing DOT/FRA regulations as well as UP's internal safety programs and practices.

The Federal agency primarily responsible for railroad safety is the FRA, which has issued substantive safety regulations in more than 20 subject areas. Most of these rules specifically address one of three major elements of the railroad system: the rolling equipment, the track and signal system over which it operates, and the rules for conducting rail operations. These regulations have evolved and been updated over the last 100 years so as to implement the latest technology and improved safety practices known. It is through the FRA's enforcement of these regulations that safety is assured for railroad employees and the public. FRA currently is conducting an in-depth

safety review of the UP/SP, including the rail line through Reno and Washoe County, to assess any merger-related safety issues.

DOT prescribes the standards for the safe transportation of hazardous materials. These materials are defined as "a substance or material which the Secretary of Transportation has determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce." There are 11 principal classes of hazardous materials. Classes are based on chemical and/or physical properties, i.e., gasses, flammable liquids, oxidizers and organic peroxides, corrosive materials, etc.

UP has developed its own specific instructions regarding hazardous materials, which are contained in UP's booklet, *Instructions for Handling Hazardous Materials*. UP employees must have a copy of, be familiar with, and comply with the instructions when working on UP property. Briefly, these instructions require that each car (or block of cars) containing hazardous materials has the proper documentation, including identification of the material and an emergency response telephone number. Hazardous materials cars display placards (a special sign) and/or other markings. These placards use words, numbers, symbols, and colors to indicate the type of material by DOT hazard class. Hazardous materials cars must be inspected for mechanical condition and leakage before they are accepted from a shipper, and once accepted, the rail cars must be moved promptly, usually within 48 hours. The location in a train of hazardous materials cars is also regulated, and cars containing incompatible commodities are not to be located next to each other.

Under current UP procedures, trains carrying specified numbers of loaded rail cars, trailers, and containers of hazardous materials are designated by UP as a "key train" and are subject to special operating practices. Key trains contain five or more tank cars having environmentally sensitive chemicals, inhalation hazardous materials, or a combination of both; or 20 or more loaded hazardous materials shipments. These trains are limited to a length of 6,000 feet or 100 cars, a maximum speed of 50 mph and, when practical, do not use siding tracks.

In addition to reviewing current Federal hazardous materials controls and regulations and current UP practices, the SEA study team reviewed UP's specialized equipment along the rail line in the Reno and Washoe County area for detection of potential train-related problems or defects. Railroads use a number of devices to enhance operational safety, including track-side detectors that are designed to identify various types of potential trouble. The detectors are automated, and when unsafe conditions are sensed, the detector equipment alerts either the train engineer or the dispatcher, and the engineer stops the train. Common types of detectors include:

- Hot box detectors -- which detect hot locomotive and car wheel bearings.
- Dragging equipment detectors -- which detect equipment or other objects hanging from the bottom of a locomotive or car.
- High, wide, shifted load detectors (which detect loads or other items that protrude from the top and side of a train).

Based on a review of UP's track diagrams, the UP/SP mainline tracks through Washoe County have multiple detectors. For both the eastbound and westbound tracks west of Reno,

dragging equipment detectors exist at Mile Posts (MP) 206 (Truckee, CA.), 212.5, 220, 224 (about 19 miles west of Reno), 235 and 240 (about three miles west of Reno). For the single track east of Reno, dragging equipment detectors exist at MP 251.6 and 270.5. Intervals between dragging equipment detectors on either side of the Sparks Yard therefore range from five to ten miles.

Hot box detectors exist at MP 270.5 and 251.6 for the single-track rail line east of the Sparks Yard. For the double-track rail line west of Reno, hot box detectors exist on the eastbound track at MP 206 (Truckee, CA.), MP 224 (about 19 miles west of Reno), and MP 240 (about three miles west of Reno). For the westbound track, hot box detectors exist at MP 206 (Truckee), and MP 223.9 (about three miles west of Reno). Thus, hot box detectors exist for eastbound trains at intervals of less than 20 miles. Except for the 27.7-mile interval between MP 251.6 and 223.9, hot box intervals for westbound trains are also less than 20 miles.

High, wide, shifted load detectors exist on both tracks at MP 231.8 and on the single track at MP 260.5 Given that all trains stop at the Sparks Yard to change crews, the proximity of the stopped trains to yard personnel, supervision, and mechanical forces increases the probability of discovering train-related problems or defects.

Based on its extensive analysis, SEA believes that the system-wide mitigation measures imposed in Decision No. 44 provide a high level of protection from hazardous materials events in the Reno and surrounding area. Moreover, UP has sophisticated detection equipment (hot box, dragging equipment, and high, wide, shifted load detectors) throughout the Reno area.

In order to augment the mitigation imposed in Decision No. 44, however, SEA recommends that the Board require UP to install at MP 240 an additional high, wide, shifted load detector to screen both main rail lines. SEA also makes the preliminary recommendation that the Board require UP to install a hot box detector at MP 240 for the westbound tracks. SEA believes that these additional measures would be appropriate to provide optimum detection capability in the Reno area.

The system-wide mitigation measures already imposed in conjunction with SEA's preliminary proposal for additional detection equipment will offer further protection for the Truckee River and Pyramid Lake, for the local water quality and water supply in Reno and the surrounding area, and, in particular, for the cui-ui lakesucker and Lahontan cutthroat trout (Federally listed endangered or threatened species), and these measures address concerns raised by Native American interests in Reno and the surrounding area.

SEA also proposes that UP be required to establish a Community Advisory Panel, consisting of representatives of the community, including Native Americans, who are willing to work with UP management on a regular basis to review safety, environment, and health issues associated with rail operations, particularly as they relate to the transport of hazardous materials.

8.4.2 Air Quality

Potential air quality impacts on Reno primarily relate to the amount and duration of vehicular delay at grade crossings and locomotive emissions. As discussed above, SEA has concluded that total vehicular traffic delay could be reduced to below pre-merger levels by increasing the speed of freight trains through Reno. Increased train speeds would allow trains to approach and pass through at-grade crossings in less time. This in turn would reduce the total time that vehicles are delayed at the crossings and the associated levels of air pollution emitted by these vehicles.

System-wide air quality measures have already been imposed on UP pursuant to Decision No. 44. These measures, which reduce the level of emissions from the locomotives as they pass through Reno, include:

- Use of throttle modulation.
- Use of dynamic braking.
- Increased use of pacing and coasting trains.
- Isolation of unneeded horsepower.
- Shutting down locomotives when not in use for more than an hour at temperatures above 40° F.
- Maintenance and upgrading of SP locomotives to UP standards.
- Closing of boxcar doors to decrease wind resistance.
- Conversion of all locomotives to South Coast Air Quality Management District (SCAQMD) standards for visible smoke reduction.

Total emissions generated by the increase in freight trains associated with the merger are quite small when compared with the total emissions inventory for the County. For NO_x, the increased train traffic generates an emissions increase equivalent to about 1.5 percent of the County inventory, and the increase in the percentages for VOCs, PM_{10}, and CO are all well below one percent. The combination of the system-wide conditions is likely to reduce total locomotive emissions traveling through Reno and Washoe County by improving rail operating efficiency.

8.4.3 Monitoring and Compliance

During SEA's public process for developing this PMP, questions arose regarding the Board's ability to enforce imposed environmental mitigation conditions. The Board has established a five-year oversight period for reviewing the merger under which UP files quarterly merger progress reports with the Board. The Board's continued monitoring of UP's compliance with the environmental mitigation measures for Reno and Washoe County is important to ensure that UP properly implements the required mitigation of the potential merger-related environmental impacts. Accordingly, SEA recommends that the Board require UP to specifically address in its quarterly progress reports the status of its implementation of all environmental mitigation and that UP provide a copy of these reports to the City of Reno and Washoe County until completion of the Board's oversight proceeding. SEA also notes that the Board has continuing jurisdiction over the actions it licenses (including mergers) and can use this jurisdiction to ensure compliance with its mitigation conditions.

8.4.4 Summary of Currently Proposed Tier 1 (UP Mandated and Fully Funded) Mitigation Measures

In summary, at this time, SEA proposes that the Board impose the Tier 1 mitigation measures detailed in Table 8.4.4-1 as additional environmental conditions to the UP/SP merger to be fully funded by UP. SEA emphasizes that these recommendations are still preliminary, and SEA invites full public review and comment.

Table 8.4.4-1
Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public

Mitigation Measure	Proposed Board Conditions	Purpose
Increased Train Speeds	1. UP shall make the necessary operating changes and capital improvements such as centralized traffic control (CTC), track reconfiguration, and track rehabilitation, as appropriate in the Reno/Sparks, Nevada area, to enable trains to operate over the rail line segment between the east end of the Sparks yard (approximately Mile Post [MP] 247) and a point just west of Keystone Avenue (approximately MP 242) in Reno at a speed of 30 miles per hour. UP shall then operate, and require BN/SF to operate, all trains over the described rail line segment at a speed of 30 miles per hour **consistent with safe operating practices dictated by conditions present at the time each train traverses the segment.**	• To reduce total vehicular traffic delay to below pre-merger levels. • To further reduce air emissions from delayed vehicles. • To improve emergency vehicle response capability.
Train Location Color Video Displays	2. Subject to the written concurrence of the City of Reno, UP shall install in the new City of Reno emergency communications center (or another location if desired by the City) color video displays coordinated with the UP signal system circuitry showing the location of each train present on the rail line segment from approximately MP 245 on the west side of the Sparks Yard to MP 238 (approximately Woodland Avenue) on the west side of Reno.	• To improve emergency vehicle response capability.
Cameras and Video Monitors Showing Rail Line	3. Subject to the written concurrence of the City of Reno, UP shall install television cameras over or near the rail line along with corresponding video monitors at the same emergency communications center location that continuously show real-time conditions on the right-of-way through downtown Reno in the area bounded by and including the grade crossings at Keystone and Lake Streets.	

Table 8.4.4-1
Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public

Mitigation Measure	Proposed Board Conditions	Purpose
Discontinued Use of the Addition of "Helper" Locomotives in Woodland Area	4. UP shall discontinue the practice of adding "helper" locomotives in the Woodland Avenue area.	• To improve emergency vehicle response capability. • To reduce vehicular delay at Woodland Avenue.
Four-quadrant Crossing Gates at Nine Locations	5. UP shall install four-quadrant crossing gates at rail-highway crossings at Sutro, Lake, Virginia, West, Arlington, Ralston, Washington, Vine, and Keystone streets.	• To reduce the risk of train-vehicle accidents.
Enhanced Rail Safety Programs	6. UP shall augment its safety training programs for drivers and pedestrians including: A. Supplementing its participation in the "Operation Lifesaver" Program, and B. Supplementing existing school educational programs in Reno and Washoe County (e.g., driver's training), and C. Establishing a safety training program for Reno's downtown employees.	• To reduce the risk of train-vehicle and train-pedestrian accidents.
Pedestrian Crossing Gate "Skirts" at Six Locations	7. UP shall install devices known as pedestrian crossing gate "skirts" on pedestrian crossing gates at Lake, Center, Virginia, Sierra, West, and Arlington streets.	• To reduce the risk of train-pedestrian accidents and enhance pedestrian safety.
Electronic Warning Signs for Pedestrians at Six Locations	8. UP shall install electronic warning signs for pedestrians at Lake, Center, Virginia, Sierra, West, and Arlington streets. These signs shall be designed and constructed so that they are clearly visible and easily read by pedestrians.	
Construction of a Pedestrian Grade Separation at Virginia Street	9. UP shall construct a pedestrian overpass or underpass at Virginia Street with street level access on both sides of the tracks	
Construction of a Pedestrian Grade Separation at Sierra Street	10. UP shall construct a pedestrian grade overpass or underpass at Sierra Street with street level access on both side of the tracks	

Table 8.4.4-1
Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public

Mitigation Measure	Proposed Board Conditions	Purpose
Prehistoric and Historic Survey for Pedestrian Underpass(es) and Monitoring During Construction for Archeological Resources	11. Prior to construction of a pedestrian underpass at either Virginia or Sierra streets, UP shall conduct a survey of potential historic and prehistoric resources in consultation with the Nevada State Historic Preservation Office (SHPO). If any such resources are discovered during construction, UP shall cease construction and consult with the SHPO.	• To protect historic and prehistoric resources
Consultation with Native Americans	12. Prior to construction of a pedestrian underpass at either Virginia or Sierra streets, UP shall consult with Native American interests regarding possible impacts to Native American resources from underground construction. If any such resources are discovered during construction, UP shall immediately stop construction and consult with Native American interests and the SHPO.	
Installation of a high, wide, shifted load detector at MP 240	13. UP shall install a high, wide, shifted load detector at MP 240 for both mainline tracks.	• To supplement the already imposed, comprehensive hazardous materials mitigation measures and provide additional preventive measures for hazardous materials incidents. • To further protect the Truckee River and Reno's water supply. • To further protect threatened and endangered species in the Truckee River.
Installation of a Hot Box Detector at MP 240	14. UP shall install an additional hot box detector on the westbound track at MP 240.	
Establishment of a Community Advisory Panel	15. UP shall establish a Community Advisory Panel, consisting of representatives of the Reno/Sparks/ Washoe County community, including Native Americans, who are willing to work with UP management on a regular basis to review safety, environment, and health issues associated with rail operations, particularly as they relate to the transport of hazardous materials.	• To promote additional communication and exchange of information regarding UP rail operations in general and the transport and handling of hazardous materials in particular.

Table 8.4.4-1 Preliminary Tier 1 (Fully Funded by UP) Mitigation Measures for Consideration by the Board and Public		
Mitigation Measure	**Proposed Board Conditions**	**Purpose**
Certification to the Board and Notice to the City of Reno and Washoe County of UP's Compliance with Installation Requirements	16. When compliance has been completed for each of the installations required in Conditions 1, 2, 3, 5, 7, 8, 9, 10, 13, and 14 above, UP shall certify such completion to the Board, with copies to the City of Reno, and Washoe County. Each certification shall be made within two weeks of the date of compliance for each condition.	• To certify to the Board and advise the City of Reno and Washoe County that UP has complied with these mitigation measures
Environmental Mitigation Status in Quarterly Reports	17. UP's quarterly reports to the Board shall include the status of compliance with the environmental mitigation measures pertaining to Reno and Washoe County for the duration of the Board's oversight proceeding. Copies of these reports shall also be provided to the City of Reno and Washoe County.	• To assure continued monitoring and oversight of the status of the environmental mitigation measures.

Based on its further analysis, the information available to date, and consideration of public comments, SEA currently believes that, with the above preliminary Tier I mitigation measures and the system-wide and regional mitigation measures imposed in Decision No. 44 that benefit Reno and Washoe County, the potential environmental effects in Reno and Washoe County of the merger-related increased freight train traffic would not be significant.

8.5 Possible Tier 2 Mitigation

Each of the Tier 2 mitigation measures described below would require voluntary participation, shared funding, and a mutual binding agreement by UP and the interested parties, such as the City of Reno and Washoe County. The Tier 2 measures that SEA has identified are expected to offer more far-reaching, long-term benefits by reducing conflicts and impacts resulting from existing land uses and pre-merger train traffic. Because they could directly address effects that are not related to the merger (preexisting conditions), SEA believes these measures could have a benefit for the long-term economic development of Reno and Washoe County and the efficiency of railroad operations in the county. SEA encourages interested parties to continue constructive discussions and explore the possibilities described here. Section 9 of this PMP reviews possible funding for these measures.

8.5.1 Depressed Railway

The City of Reno has strongly advocated the construction of the depressed railway. In fact, recently the City and UP jointly studied the feasibility of this option as part of their private negotiations (see Section 2.9). The position of the City reflects the historical relationship of downtown Reno and rail operations. The City has stated its views that a depressed railway would substantially alleviate a variety of delay and safety (both pedestrian and vehicular), noise, emergency response, and air quality problems that currently exist in Reno.

In evaluating the potential benefits of the depressed railway, SEA has been aware that such a mitigation measure would not only further reduce potential environmental impacts directly related to the merger, but also pre-existing conditions. Studies conducted separately by the City and UP demonstrate that in Reno, casinos and hotels have developed next to the existing UP (formerly SP) tracks for several decades.

It is recognized that a depressed railway would bestow substantial benefits on the City as well as private property owners in the area of the existing track. A depressed railway would also benefit the railroad, which has offered to pay $35 million of the estimated $183 million cost of the depressed railway. But since it is undisputed that the conflict between rail operations and adjacent land uses pre-date this merger, SEA does not believe that it would be appropriate to require UP alone to absorb the extensive costs associated with implementing a depressed railway.

Construction of a depressed railway also would involve its own potential environmental impacts. The impacts during construction have been noted as a concern of local businesses. Section 7 discusses the potential secondary impacts that have been identified to date (e.g., construction, groundwater, and emergency vehicle access).

SEA encourages the parties to continue negotiations with respect to the depressed railway in the hope that a mutually acceptable agreement can be reached for a depressed railway, if appropriate.

8.5.2 Rail/Highway Grade Separations

The Board, in its Decision No. 44, directed a review of highway/rail grade separations as possible mitigation measures for potential merger-related impacts in Reno. The Board noted in its decision that SEA had determined in the Post EA that separated grade crossings would be needed to address vehicular safety concerns on the existing rail lines in Reno. However, SEA's determination that separated grade crossings would be required did not take into account the benefits of increasing train speeds in Reno.

Section 7.2.2 reviews the possible costs, benefits, and potential environmental impacts of seven rail/highway grade separations in Reno. Given the information now available and SEA's further focused analysis in this PMP, SEA now believes that separated grade crossings in Reno are not warranted and would create serious secondary environmental problems. Therefore, SEA does not recommend in the PMP any rail/highway grade separations in the Reno area as Tier 1 mitigation.

However, if the parties could resolve the potential adverse effects of separated crossings and reach agreement regarding costs and other issues, then such mitigation could be appropriate as Tier 2 mitigation.

8.5.3 Elevated Railway

An elevated railway is another potential Tier 2 mitigation option. However, downtown business interests and the City have raised concerns about potential adverse environmental impacts

associated with an elevated railway in Reno. These interested parties raised the following issues: the visual barrier that would be created by an aerial structure through the downtown and the associated division of the City, possible derailments and spills of hazardous materials from the elevated trains, and the need to demolish existing structures over the tracks. As with the depressed railway, a shoofly track would be needed to permit the construction. Letters of opposition to this option were received from the UP and the downtown business association.

8.5.4 I-80 Bypass

The City of Reno has requested that consideration be given to a bypass whereby the UP tracks would be relocated out of the downtown area on a new rail line running south of I-80. However, there is no support in the Board's precedent for requiring a railroad seeking merger authority to construct a new railroad line to bypass a city. Nonetheless, private parties could decide to pursue and fund an I-80 bypass. This would require that the parties seek authority to construct and operate from the Board. At that time, the Board would undertake the appropriate environmental review for a bypass alternative.

8.5.5 Grade Crossing Safety Measures (Vehicular)

Street Median Barriers

Street median barriers could also be installed at two-way streets in Reno, preventing drivers from going around the railroad crossing gates. However, these barriers would reduce the width of the street traffic lanes and could introduce access problems from adjoining land uses. Moreover, these barriers would not be needed if the four-quadrant gates proposed as Tier 1 mitigation for Board consideration are implemented.

Conversion of Existing Two-way Streets to One-way

Conversion of two-way streets to one-way streets (with two-quadrant gates on the near side of the rail line) would also prevent driving around closed gates. While such conversions would serve to improve rail crossing safety, they would have more far-reaching implications for downtown traffic circulation and businesses. Therefore, such a strategy should be part of a broader transportation, land use, and property access planning process for the areas surrounding the grade crossings.

The use of one-way streets in couplets (pairs of one-way streets) was reviewed in Reno during a 1995 analysis of downtown traffic and parking.[72] In addition to permitting more secure two-quadrant gates, a main advantage of one-way streets is to reduce traffic conflict, thereby increasing intersection capacity without the disruption of physically widening streets. The report stated that one-way streets offer some advantages, but can confuse motorists, especially visitors, who constitute a significant proportion of drivers. Additionally, one-way streets can be frustrating to

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[72] *Reno Downtown Traffic/Parking Study, Final Report.* Prepared for the Reno Redevelopment Agency by Barton-Aschman Associates, Inc.; Strategic Project Management; and Lumos & Associates, Inc., December 1995 pp. 24, 27

local motorists by requiring a more circuitous route. Local businesses may also oppose one-way streets because of potential access problems.

Strictly from the standpoint of railroad/highway safety, the four-quadrant gates preliminarily proposed as Tier 1 mitigation measures eliminate the need for conversion to one-way streets.

8.5.6 Grade Crossing Safety Measures (Pedestrians)

Crossing Guards

Preliminary Tier 1 mitigation measures recommended by SEA include pedestrian gate skirts, electronic warning signs, and actual pedestrian/rail grade separations, all in addition to the existing pedestrian warning signals and gates that currently exist at the heavily-used pedestrian crossings in Reno. Given this extensive mitigation and the ongoing costs associated with crossing guards, SEA suggests at this point in time that the use of crossing guards to enhance pedestrian safety be considered solely as a Tier 2 mitigation measure, if other parties are willing to share the costs.

8.5.7 Air Quality Measures

Implementing the Proposed EPA Locomotive Emission Standards

The EPA has issued a Notice of Proposed Rulemaking entitled, "Control of Air Pollution from New Locomotives and New Engines used in Locomotives." The EPA is proposing emission standards and emission testing procedures for locomotives that are similar in some respects to the emission standards for heavy-duty on-highway truck engines. Under the proposed standards, locomotive engines would have to meet emission limits for HC, CO, NO_x, PM, and exhaust opacity.

It is not appropriate for SEA to require these standards until such time as the EPA determines the costs of these regulations on the railroad industry and their effectiveness at reducing potential air quality impacts. SEA deems the application of these standards to be strictly voluntary as Tier 2 mitigation measures. Moreover, the other system-wide mitigation measures that are already imposed appear to mitigate potential impacts.

Other Optional Air Quality Measures

SEA has drawn similar conclusions for the other optional air quality mitigation measures, namely: concentrating operation of new EPA-certified low-emission locomotives in Reno, early introduction of low-emission locomotives, diesel engine modifications, improved diesel fuels, diesel exhaust after treatment, and use of alternative fuels.

Offsetting the Increase in Locomotive Emissions

Offsetting the increase in locomotive emissions would not directly mitigate effects of the increased train levels, so it is not proposed as a Tier 1 mitigation measure here. However, as with all Tier 2 mitigation options, memoranda of agreement between UP and the City regarding any air

quality mitigation measures would certainly be considered by the Board, as was done in Truckee, California for its air quality mitigation agreement.

Table 8.5-1 provides a summary list of possible Tier 2 mitigation measures.

Table 8.5-1
Measures Identified as Potential Tier 2 Mitigation

Mitigation Measures	Comments
Depressed Railway	• Would reduce potential environmental impacts related to the merger, but also pre-existing conditions. • Rail impacts on surrounding land uses pre-date the merger, so it would not be appropriate to require UP alone to absorb extensive costs of a depressed railway. • Casinos and hotels have consistently built their facilities next to the existing UP (formerly SP) tracks. • Impact of rail operations has been a matter of local concern for decades. In a 1980 ballot measure, the citizens of Reno considered the issue of a depressed railway. (In the 1980 ballot measure, the citizens of Reno voted down a bond issue for construction of a depressed railway through downtown Reno.) • A depressed railway would bestow substantial benefits on the City as well as private property owners in the area of the existing track. • A depressed railway would benefit the railroad. • Would involve secondary environmental impacts (e.g., construction, groundwater, emergency vehicle access). • Cannot equate benefits of a depressed railway to potential merger-related impacts only. • SEA urges the parties to continue negotiations with respect to the depressed railway, if appropriate. • If a mutually acceptable agreement were reached for a depressed railway, SEA could recommend that the Board impose an obligation upon UP to comply with such agreement.
Rail/Highway Grade Separations	• Tier 1 mitigation measures comprise a package that provides substantial additional mitigation beyond that already imposed in the Board's Decision No. 44. • Grade separations would have major property acquisition, displacement, and other impacts. • Grade separations would adversely affect vehicular access to properties that front on the adjoining streets. • Increasing train speeds serves to reduce the vehicular delay associated with merger-related increases in train traffic to below pre-merger levels, and none of the highway/rail grade separations would achieve this level of delay reduction. • The City of Reno has stated its opposition to grade separations as a mitigation measure.
Elevated Railway	• Downtown business interests and the City have raised concerns about potential adverse environmental impacts associated with an elevated railway in Reno, including the visual barrier that would be created, the associated division of the City, possible derailments and spills of hazardous materials from elevated trains, and the need to demolish existing structures over the tracks. • As with the depressed railway, a shoofly track would be needed to permit the construction.

Table 8.5-1
Measures Identified as Potential Tier 2 Mitigation

Mitigation Measures	Comments
I-80 Bypass	• No support in the Board's precedent or case law for requiring a railroad seeking merger authority to construct a new railroad line to bypass a City. • No source of funding. • Questionable feasibility. • The City has indicated that, while it does not want to drop the bypass from consideration, the depressed railway is a priority in Reno. • Private parties could pursue and fund an I-80 bypass. Doing so would require that the appropriate authority to construct and operate be sought from the Board. At that time, the Board would undertake the environmental review that was warranted for a bypass alternative.
Grade Crossing Safety Measures (Vehicular)	
• Street median barriers	• Would reduce the width of the street traffic lanes and could introduce access problems from adjoining land uses. • Not be needed with four-quadrant gates (proposed as Tier 1 mitigation).
• Conversion of existing two-way streets to one-way	• Far-reaching implications for downtown traffic circulation and businesses. • Should be part of a broader transportation, land use, and property access planning process for the areas surrounding the grade crossings. • One-way street couplets (pairs of one-way streets) were reviewed during a 1995 analysis of downtown traffic and parking to reduce traffic conflict and increase intersection capacity. Study notes that one-way streets offer some advantages but can confuse motorists, especially visitors, and can be frustrating to local motorists. • Local businesses may also oppose one-way streets because of potential access problems. • Four-quadrant gates proposed as Tier 1 mitigation eliminate advantages from the standpoint of railroad/highway safety.
Grade Crossing Safety Measures (Pedestrians)	
• Crossing guards	• Proposed Tier 1 mitigation measures include pedestrian crossing gate skirts, electronic warning signs, and pedestrian/rail grade separations, all in addition to the pedestrian warning signals and gates that currently exist at the heavily-used pedestrian crossings in Reno. • Would entail unnecessary ongoing costs.

Table 8.5-1 Measures Identified as Potential Tier 2 Mitigation	
Mitigation Measures	**Comments**
Air Quality Measures	
• Implementing the proposed EPA locomotive emission standards	• EPA regulations not yet in place. • Would be applicable to all locomotives operating through Reno and introduce unknown costs. • Inadequate information exists to recommend at this point. • Other system-wide mitigation measures that are already imposed appear to mitigate impacts.
• Concentrating operation of new EPA-certified low-emission locomotives in Reno	
• Early Introduction of low-emission locomotives	
• Diesel engine modifications	
• Improved diesel fuels	
• Diesel exhaust after treatment	
• Use of alternative fuels	
• Offsetting the Increase in Locomotive Emissions	• Would not directly mitigate effects of the increased train levels. • Goes beyond authority of the Board and requires voluntary compliance, e.g., Truckee Memorandum of Understanding (MOU). • Other system-wide mitigation measures that are already imposed appear to mitigate impacts.

In conclusion, SEA would certainly review and consider any of the above Tier 2 mitigation measures if they were agreed upon voluntarily and became part of a memorandum of understanding between UP and appropriate interested parties.

8.6 Noise

Noise is a distinct and separate area of environmental concern, because of its paramount role in providing for the public safety. The overwhelming majority of noise generated by rail operations in Reno is that which emanates from warning horns located on the locomotives. The Board addressed the public safety implications of the train horn noise in its Decision No. 44. Specifically, the Board noted that "[a]ny attempt significantly to reduce noise levels at grade crossings would jeopardize safety, which we consider to be of paramount importance."

Train horn noise poses an unusual and complex issue for consideration. Unlike other potentially adverse environmental impacts, this noise is a deliberately created annoyance that takes place to ensure safety. In evaluating the increase in potential horn noise impacts resulting from post-merger activities, SEA notes the following:

- There are beneficial impacts of the noise, i.e., the warning to pedestrians and vehicles at grade crossings.
- Safety considerations take precedence over other factors.
- The consequences of train horn noise are known to be an annoyance.
- Federal law presently requires the sounding of the horn.
- Development of properties adjacent to the right-of-way has occurred within the pre-merger noise contours previous to and independent of the UP/SP merger.

Given these factors, the following noise suppression measures merit discussion.

8.6.1 Quiet Zones

The conflict between safety and noise impacts was recognized in the recently passed Federal legislation entitled the Swift Act (49 U.S.C. §20153). This act directs the Secretary of DOT to promulgate regulations relating to noise and rail safety measures. Although the regulations have yet to be promulgated, it is anticipated that they will include an ability to establish a "quiet zone" within which train horns would not need to be sounded. However, at this time, no legal requirements exist for the establishment of quiet zones.

FRA is the Federal agency within DOT responsible for train horn requirements. FRA has noted that it is unlikely to have "quiet zone" regulations in place before 1999. Until the new regulations related to "quiet zones" and other alternatives to train horns are promulgated and adopted, train horns must be sounded to ensure public safety.

When the new regulations go into effect, Federal law is likely to preempt current State and local requirements regarding train horns. The new regulations would most likely seek to establish a system or procedures for local traffic control or law enforcement authority to provide supplementary safety measures that can be used in lieu of the train horn. Under the Federal regulations, once adopted, officials within Reno and Washoe County may have some authority over the sounding of the horn. While there is no authority for establishing "quiet zones" at this time, FRA's regulations could alleviate noise concerns in Reno if and when the regulations become effective.

8.6.2 Directional Horns

Although still considered experimental in nature, directional horns appear to be a promising new approach to warning motorists of oncoming trains at grade crossings. The use of directional horns involves placement of fixed horns at a grade crossing directed at oncoming traffic lanes. When a train approaches the crossing, the horns at the crossing are activated, similar to the visual signals and gates, and the horns located on the locomotives are not sounded. By directing the noise

at the highway vehicles, directional horns can reduce the unintentional noise impacts on residences and other sensitive noise receptors.

As a Tier 2 mitigation, a pilot program could be instituted between the UP and the City of Reno and/or Washoe County to work with FRA to test the feasibility and effectiveness of directional horns at one or a series of grade crossings in Reno or Washoe County.

8.6.3 Restricted Nighttime Train Operations

While restrictions on nighttime train operations would reduce noise levels during the nighttime hours in Reno, railroad operations are conducted on a system-wide basis 24 hours per day. Accordingly, time restrictions on train operations in one specific location could disrupt efficient and timely rail operations throughout the entire 34,000-mile UP network. Because of the nature of interstate rail operations, this is not a practical, reasonable, or enforceable measure.

8.6.4 Source Noise Controls

Source noise control refers to reduction of noise at the source. In the case of freight trains, source noise controls apply to wheel/rail and diesel engine noise. Source noise controls could reduce the area of potential impact in regions where impact is not due to horn noise. However, since such potential impacts in Reno are limited, source noise controls would only have a minor benefit for this project. Controls of horn noise (duration, loudness, pitch, and direction) could affect noise levels favorably, but must be considered only in the additional context of public safety and FRA regulations.

8.6.5 Noise barriers

Noise barriers are effective for reducing wheel/rail noise that reaches the community. Because train horn noise is the dominant noise source associated with this merger, noise barriers would be useful only in those areas where horn noise is not present. The SEA study team performed an analysis using the GIS to determine whether noise barriers would be effective noise mitigation for freight trains in Reno, and the team determined that there are no areas in Reno that would substantially benefit from noise barriers.

8.6.6 Sound insulation

Installation of insulation on the post-merger receptors would create the anomalous situation that post-merger receptors would be the beneficiaries of a mitigation measure, while pre-merger receptors, which are closer to the track and who experience higher decibel levels, would not obtain such benefits. In addition, the retrofit of buildings with sound insulation would introduce adverse environmental effects typically associated with remodeling, including mainly potential noise and air impacts. Thus, sound insulation could only be a Tier 2 mitigation.

Section 9
FUNDING ANALYSIS

9.1 Introduction and Purpose

As outlined in Section 8, SEA has provided preliminary recommendations regarding Tier 1 mitigation measures, which would be funded and implemented entirely by UP. SEA also discusses Tier 2 mitigation options that would be a more "far reaching" solution for all concerned but which would not be imposed absent a voluntary agreement between the railroad and other parties. In its Decision No. 44, the Board directed that possible funding options for Tier 2 mitigation be studied in this mitigation study. In addition, in response to community requests, SEA agreed to review a range of funding sources and present that information in the study. This section sets out what SEA has learned.

As discussed above, the depressed railway is identified as a Tier 2 mitigation measure, which is estimated to cost around $183 million. UP has offered to pay $35 million of the cost, but the city has asked that UP pay $100 million. It may be that if adequate federal or state funding becomes available a voluntary agreement for the depressed railway could occur.

9.1.1 Scope of SEA's Analysis

In looking at potential funding sources for Tier 2 mitigation in Reno SEA had three principal objectives:

1. Defining the current framework, resources, and commitments of surface transportation funding programs.
2. Identifying potential funding strategies, including specific local funding sources, with a potential revenue yield sufficient to cover that share of cost of any suggested joint-funding mitigation measures not borne by the Union Pacific Railroad.
3. Providing technical information to assist and facilitate funding discussions among key stakeholders, including local and state government, downtown business interests, UP, and any other relevant local public or private interests.

SEA's work program consisted of four sequential tasks:

1. Defining Approach and Obtain Data.
2. Assessing Existing Funding Potential.
3. Identifying and Describe Potential New Revenue Sources and Mechanisms.
4. Defining and Assessing Potential Funding Strategies.

The results of the funding analysis are organized and presented in three sections below.

9.2 Existing Transportation Funding Structure - Structure, Resources, and Outlook

9.2.1 Overview

Transportation improvements are planned, funded, and implemented at four levels of government (Federal, state, regional, and local) and the private sector. Each level of government employs some version of a capital expenditure programming system to match project needs with available financial resources over the short term (annual capital program), near term (state or regional implementation program), and long term (state or regional transportation plan). Federal funds employed by state and local governments are controlled by an extensive body of Federal law and regulation, and the same often applies to state-generated funds utilized by local governments.

Principal sources of revenue for surface transportation projects are:

- Federal fuel taxes.
- State fuel taxes and other auto user charges.
- Regional/Local sales taxes and/or fuel taxes.

Other sources and mechanisms commonly employed include:

- State sales taxes.
- Local property taxes (general funds).
- Federal general revenue (largely for mass transit purposes).
- Development impact fees and other exactions.
- Special financing districts (e.g., special assessment districts).

Both state and local governments can and do employ general obligation, special obligation, or revenue bonds secured with one or more of the revenue streams listed above. Traditionally, Federal funds have not been available for debt repayment, but indications are that this prohibition may be significantly eased in the near future.

In general, transportation funding resources at all levels of government fall below what are deemed "minimum needs" by state and local transportation officials. A number of the revenue sources are insensitive to inflationary cost increases, while the public's resistance to tax increases--even to maintain purchasing parity--is now often prevalent. Thus, revenue yield in real, inflation-adjusted terms has declined over the past 25 years, and likely will continue to decline indefinitely under current policy.

As a result, transportation funding is keenly competitive. With forecasts of needs and resources now reaching out 20 years and more, inclusion of any heretofore unacknowledged project can only be accomplished by excluding another, already-recognized project, one that is sure to have its own throng of vigorous defenders. Railroad crossing improvements, in particular, have never been given a high priority in the context of all transportation needs. Typically, existing Federal

"safety" funds are used for the installation of warning devices and minor geometric improvements, not for grade separations or wholesale relocations.

In a response to this chronic funding shortfall, "creative," or "innovative" funding strategies involving new local government taxes or public-private initiatives have been routinely examined by planners since the mid-1970s. Generally, these approaches succeed only where there exists either (1) a widespread public perception of a serious, aggravating, and escalating problem, or (2) one or more well-capitalized private entities see a tangible benefit from participation in the funding of a public improvement.

Characteristics of those existing surface transportation funding programs and revenue sources applicable to highway, street, and bridge projects are summarized in Table 9.2.1-1, below. In particular, included programs and sources are those whose breadth of applicability potentially extends to railroad and highway traffic mitigation projects such as grade separations, street relocations, etc. Brief descriptions of the funding programs or sources are provided below.

9.2.2 Federal Programs

Current Structure and Funding Level

With the exception of small amounts of funding for mass transit, Federal surface transportation investment is funded through the Federal motor fuel tax. The current Federal surface transportation funding structure--the Intermodal Surface Transportation Efficiency Act of 1991 ("ISTEA")--includes two categorical programs that have potential applicability to the depressed railway, or other capital-intensive mitigation projects for Reno that might be developed. These are the Surface Transportation Program ("STP") and the Congestion Management and Air Quality Improvement Program ("CMAQ").

The STP has the broadest scope; under the STP, funds can be applied to any valid transportation project (any recognized mode) on any state or local system, excluding only minor arterials and collectors. Funds are apportioned to state, and to urban and rural areas within states. As shown in Table 9.2.1-1, 10 percent of each state's apportionment is earmarked for safety projects, including railroad grade crossing hazard elimination; another ten percent is earmarked for environmental and cultural "enhancements." The remainder is suballocated to specific large and small urban areas, and the remainder is retained by the state DOT for use throughout the state. By policy, the Nevada DOT earmarks its statewide STP funds for projects on the state highway system in the rural counties.

CMAQ program funds can be applied to projects on the state or local transportation systems within EPA-designated air quality "non-attainment" areas, of which Reno/Washoe County is one. Projects must have demonstrated emissions reduction potential. In practice, most projects that reduce congestion can utilize CMAQ funding.

TABLE 9.2.1-1

SUMMARY OF EXISTING TRANSPORTATION FUNDING PROGRAMS

Program/Revenue Sources	Applications	Relative Funding Level	Relative Availability
FEDERAL (Fuel Taxes; Motor Carrier Fees; General Revenue)			
Surface Transportation Program (STP) · Safety Projects/Statewide (10%) Rail Crossing Protective Devices Rail Crossing Hazard Elimination Intersection Hazard Elimination · Enhancement Activities/Statewide (TEA) (10%) · Urban Suballocation (>200,000 Pop.) (35%) · Other Urban Suballocations · State Discretionary Funds	[Program Title] [Program Title] [Program Title] Environmental/Cultural Most Projects Most Projects Most Projects	 LOW LOW LOW LOW MODERATE N.A. HIGH	 N.A. VERY LOW N.A. VERY LOW LOW N.A. MODERATE
Congestion Management and Air Quality Improvement (CMAQ)	Projects contributing to air quality improvement.	LOW	VERY LOW
Local Freight Rail Assistance	Minor "demo" projects.	MINIMAL	N.A.
National Highway System (NHS)	Improvements on NHS facilities; Can transfer to STP.	HIGH	LOW
STATE OF NEVADA			
Statewide Transportation Improvement Program/ Nevada Highway Special Revenue Fund (Fuel Tax; Vehicle Fees; Other Minor Fees) · Capacity Projects · Maintenance Projects · Other Projects	Federal-aid projects on the state highway system.	 LOW/MOD N.A. N.A.	 LOW/MOD N.A. N.A.
Statewide Transportation Improvement Program/ Non-Highway Funds (Other State Funds; State Bonds; FRA Funds; Federal Highway Demonstration Funds) · Capacity Projects · Maintenance Projects · Other Projects	Other projects on the regional roadway system--most types.	 MODERATE N.A. N.A.	 LOW/MOD N.A. N.A.
CITY OF RENO/WASHOE COUNTY			
Regional Street and Highway System (Local [RTC] Fuel Tax; Regional Road Impact Fees)	New construction, reconstruction, and overlays on the regional street system.	MODERATE	LOW/MOD