

# Railroad Safety Trail

## 2.1 Introduction & Project Setting

### 2.1 INTRODUCTION AND PROJECT SETTING

#### Introduction

This study is the result of a directed effort on the part of the City of San Luis Obispo to carry out previously established goals contained in the Bicycle Transportation Plan to develop an extensive framework of bikeways for expanded transportation and recreational trail purposes. The purpose of this Preliminary Alignment Plan is to establish the continuous alignment and set of design standards for the multi-use Railroad Safety Trail that will work within the context of existing physical and regulatory constraints along the existing railroad corridor, and address competing safety and operational concerns of the Union Pacific Railroad (UPRR) and the City of San Luis Obispo. The plan is intended to identify the planning issues associated with the trail's construction, and present feasible solutions for both its design and long-term operation and maintenance. The planning effort for the Railroad Safety Trail has been conducted within the framework of a public participation program designed to involve all those interested and affected by the proposed trail.

#### Project Study Area

The Railroad Safety Trail project study area discussed in this document is located within the City of San Luis Obispo, along a two-mile long section of the UPRR corridor between the Railroad Depot and Foothill Boulevard near California Polytechnic State University campus. Figure 1 illustrates the project study area.

The southern portion of the Railroad Safety Trail will provide a link to Phase II of the City's Railroad Bicycle Trail (construction pending) via the Jennifer Street Bridge and continue south to Orcutt Road through Phase I of the Bicycle Railroad Trail completed in 1998. North of this project, Cal Poly is currently studying the extension of the Railroad Safety Trail north of Foothill Boulevard along the campus' western edge as part of Cal Poly's master planning process. Eventually, the Railroad Safety Trail would directly link Cal Poly's campus bike trail system to the City's extensive bikeway system, providing an easily accessible alternative transportation network.

The Railroad Safety Trail extends approximately two miles and is divided into two segments described below and illustrated in the accompanying Project Study Area Map (Figure 1):

- Segment 1: Railroad Depot to Marsh Street
- Segment 2: Marsh Street to Foothill Boulevard

The topography of the trail corridor is relatively level, not exceeding a 2% gradient, and is currently used by the cyclists and pedestrians as a primary north / south commuting corridor. This corridor carries especially high volumes of student traffic between Cal Poly's campus and surrounding student neighborhoods. The trail generally follows the existing railroad tracks within the UPRR Right-of-Way, occasionally diverging onto City property to access adjacent streets. The trail corridor is severed in several locations by at-grade and grade-separated vehicular crossings and the San Luis Obispo Creek. The study area is surrounded by high-density residential, commercial, and office uses.

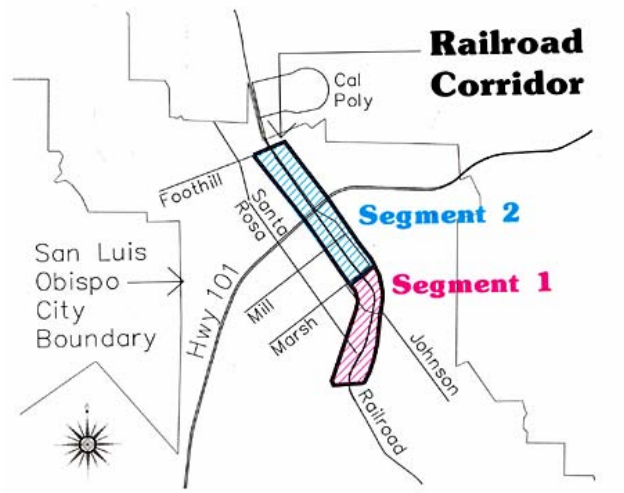


Figure 1. Railroad Safety Trail Project Study Area



Figure 2. Railroad Depot from Jennifer Street Bridge

# Railroad Safety Trail

## 2.1 Introduction & Project Setting

### Planning Process

#### Data Collection:

Parcel owner information, development proposals, environmental and planning documents, corridor mapping, and field visits formulated the set of working maps and corridor information used in design discussions. Data collected and reviewed include:

- City of San Luis Obispo's *Railroad District Plan*, dated June 16, 1998
- City of San Luis Obispo's *Zoning Regulations* and maps
- City of San Luis Obispo's *General Plan Circulation Element*
- City of San Luis Obispo's *Bicycle Transportation Plan* and existing Bicycle Route Maps
- Union Pacific Railroad *Operational Standards*
- Public Utilities Commission *At-Grade Crossing Standards*
- Caltrans *Highway Design Manual*, Chapter 1000- Bikeway Planning and Design
- AASHTO's *Guidelines for the Development of Bicycle Facilities*



Figure 3. Railroad Corridor Tour with Design Team

#### Trail Corridor Tour:

City staff, environmental consultants, and design team members walked the entire length of the Railroad Safety Trail corridor. Armed with survey equipment, cameras, and field maps, the tour yielded critical information for the understanding of the existing conditions and potential problem areas while clearly illustrating areas of the study area most suitable for trail placement. Use of the survey equipment was particularly valuable, providing precise locations for the most promising alignments found in the field. This information played a key role in evaluating alternative alignments relative to actual field conditions.

#### Key Person Interviews:

A series of personal discussions with UPRR officials, property owners, interest group representatives, and City staff took place as an initial step for the proposed trail alignments.



Figure 4. Presenting Preliminary Alignment Plans at the Public Workshop

#### Public Workshop:

A public workshop was held to present preliminary trail alignment alternatives, collect input on the trail alignment, and provide a forum for discussion. Public workshop notice letters were sent to UPRR officials and property owners adjacent to the proposed trail, and an announcement was placed in the local newspaper. The notice letter described the trail planning process along with a brief project description. Property owners, local bike enthusiasts, SLO Bike Committee members, environmental activists, City facility operators, and City staff from various departments attended the workshop.

#### Design Development:

Based on the review of all collected data, key person interviews, field tours, alternative path alignments, and connections to adjacent facilities were developed and evaluated. Trail evaluation included counting the average daily user population to quantify current corridor use in relation to adjacent land uses, access points, and observed circulation patterns along the railroad tracks.

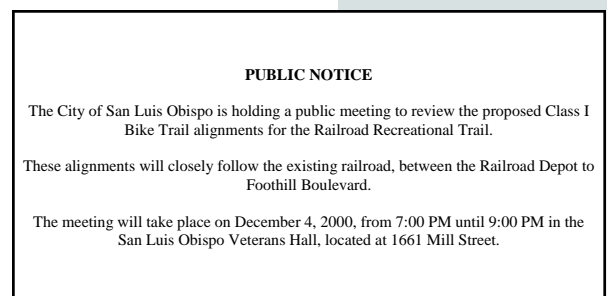


Figure 5. Public Workshop Notice

This process yielded a trail alignment that minimizes operational impacts to the adjacent railroad, improves trail user safety, reduces UPRR liability, and provides a valuable transportation link within the City. These alignments are discussed in further detail in Sections 2.3 and 2.5 of this document.

# Railroad Safety Trail

## 2.2 PROJECT GOALS

## 2.2 Project Goals

The Railroad Safety Trail Preliminary Alignment Plan is intended to become the framework for a phased implementation of a Class I bike trail, ultimately completing to a continuous bikeway that leads from the City's southern end at Orcutt Road into downtown and Cal Poly. The vision for the Railroad Safety Trail, as expressed in the Executive Summary, is further defined by a set of goals created as a result of the Planning Process. In response to the issue identification that occurred early on in the planning process, the following project goals were established:

- A. Implement the recently-established Council budget goal of constructing a bike path along the railroad from Santa Rosa Street to Marsh Street.
- B. Provide a functional facility that serves major and minor destinations, provides relatively direct connections in the City, and follows routes already identified in the *Bicycle Transportation Plan*.
- C. Locate the trail, wherever possible, within the railroad right-of-way to organize and manage non-motorized travel within the corridor and to provide an alternative to heavily traveled parallel roadways.
- D. Design and plan for a trail that will serve both commuter and recreational needs (a Class I bikeway).
- E. Design and plan for a trail that will be affordable to implement.
- F. Maximize user safety along the railroad through design and operation techniques.
- G. Establish an alignment that connects with existing Class II and planned Class I and II bikeway wherever possible.
- H. Minimize impacts to adjacent properties by appropriate design and operation of the facility, including fencing, landscaping, and other improvements.
- I. Develop alternative alignments where constraints cannot be overcome in either the short or long term.
- J. Design the facility to meet state and federal standards, where feasible, including the Americans with Disabilities Act.
- K. Design grade crossings at roadways to maximize trail user safety and convenience, while minimizing negative impacts to traffic operation.
- L. Locate the trail, wherever possible, along the railroad corridor and outside the track set-back areas.
- M. Integrate historical and educational elements into the trail design.
- N. Utilize existing roadway crossing as much as possible. Construct new grade-separated crossing where needed.

# Railroad Safety Trail

## 2.3 Existing Conditions/ Opportunities & Constraints

### 2.3 EXISTING CONDITIONS/ OPPORTUNITIES AND CONSTRAINTS

One of the first steps in assessing the feasibility of the trail's alignment and potential design character is to carefully review the existing physical characteristics of the trail corridor. Features such as track placement, signal and control equipment, maintenance access, topographical conditions, street and highway crossings, creek crossings, sensitive habitats, adjacent land use and property ownership are just some of the factors that influence the trail's location and design. These physical constraints help determine the area where the trail should be located, and areas to avoid completely. Once mapping of the corridor was complete, an in-depth field tour was conducted by the project team to accurately record existing physical conditions along the trail corridor. Field notes were transferred onto a set of trail segment maps that combined information relating to topography, parcel lines, ownership, land use, building locations, and other improvements. All significant 'tight spots' and public street and highway crossings were identified. These maps were then used by the design team to discuss and confirm the existence and/or severity of the conditions in the field, and how those factors translated into a set of design criteria for trail. The project's segment boundaries is illustrated in the accompanying Segment Map (Figure 6). A summary of the existing conditions along each segment of the Railroad Safety Trail corridor is provided in the following sections and detailed maps (Figures 7 thru 9).

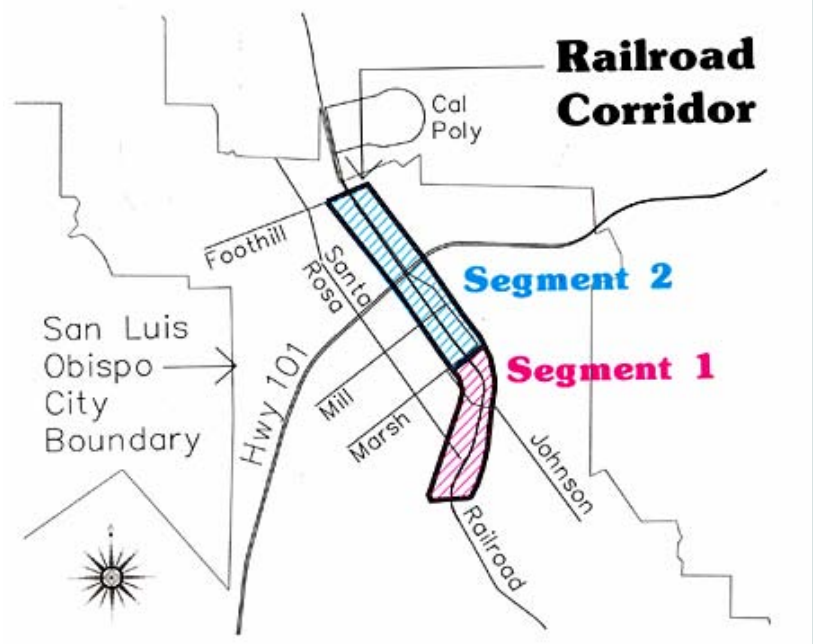


Figure 6. Railroad Safety Trail Segment Map

# Railroad Safety Trail

## 2.3 Existing Conditions/ Opportunities & Constraints

### Segment 1 -San Luis Obispo Train Depot to Marsh Street

#### Characterization:

This segment of the trail corridor begins at the Trail Depot continuing north to Marsh Street and is primarily adjacent to residential neighborhoods. Access to the trail corridor is gained from both the east and west with an established and well-worn trail along the west side of the railroad tracks.

The majority of the segment's eastern portion, outside the trail corridor, consists of rising and falling topography, while the western portion, outside the trail corridor, is generally level.

The following lists briefly summarize opportunities and constraints identified through field visits and data review. For more detailed analysis of Segment 1, see the Railroad Safety Trail Opportunities and Constraints Analysis map following the summaries. The map presents the existing conditions and opportunities in greater detail through both written and graphic content.

#### Summary of Opportunities:

- A. Historical railroad depot and water tower provide an opportunity for historical and educational themed interpretation and gateway setting.
- B. Opportunity to develop a staging area at northern end of depot's parking lot with ample space for visitors to park and ride. Architectural style and features could tie into Railroad-District Plan and the depot itself.
- C. Existing maintenance access from adjacent Toro Street to west side of tracks provide opportunity to reorganize alignment to allow dual use by cyclists and maintenance vehicles.
- D. Existing bridge supports at Penny Lane and Fairview Street could support new bicycle / pedestrian only bridge to connect eastern neighborhood to downtown.
- E. Unobstructed areas above the top-of-bank exist to install clear-span bicycle / pedestrian bridge over San Luis Obispo Creek, avoiding impacts to the creek corridor.
- F. A small City-owned parcel at the corner of Pacific and Pepper Streets and adjacent the UPRR Right-of-Way offers an interesting opportunity to create a small rest stop and trail access point under existing large canopy shade trees.
- G. Existing controlled intersection at railroad track and Marsh Street could be utilized with minor intersection modification to enhance trail crossing safety
- H. Ample setback distance from the railroad tracks centerline exists for trail placement for most of the segment's length.
- I. Access from downtown and existing bike travel lanes to west side of track is relatively unobstructed.

#### Summary of Constraints:

- A. Access from eastern neighborhood to trail corridor north of depot obstructed due to hilly terrain and disconnected street system.
- B. Corridor heading north from depot is narrow and immediately adjacent to a steep slope above private property. Retaining structure may be required to accommodate trail.
- C. Constrained rail corridor near Johnson Avenue requires placement of trail close to tracks.
- D. Existing railroad bridges at Johnson Avenue and San Luis Obispo Creek too narrow to accommodate additional trail. New bridges required to span roads and creek.
- E. Existing power poles and signal wire facilities obstruct trail corridor near Johnson Street.
- F. East side of the tracks constrained in some areas making trail placement difficult.



## Legend

- Good Viewing Opportunity
- City of SLO, January 2006, Existing Designation
- Approximate Top of Creek Bank
- Creek Center Line
- Plan Supported Trail Segment
- Existing Class 1 Bike Lane
- Class 1 Trail Under Construction
- Future Class 2 Bike Lane
- Existing Class 2 Bike Lane
- Trail Alignment - Option 1
- Trail Alignment - Option 2
- Trail Alignment - Option 3
- Trail Alignment - Option 4
- Future Bike Route/Connector Link
- Potential Trail Road/Signaling Facility
- Potential Class 1 to Class 2 or R3 Bike Path Transition
- Potential Signalized/Controlled Bike Crossing
- Photo Correlation
- Existing Union Pacific Railroad Tracks

## Key Map



# Railroad Safety Trail: Opportunities and Constraints Analysis

## Segment 1

# Railroad Safety Trail

## 2.3 Existing Conditions/ Opportunities & Constraints

### Segment 2 -Marsh Street to Foothill Boulevard

#### Characterization:

This segment of the trail corridor begins at Marsh Street and continues north to Foothill Boulevard through residential neighborhoods. Cal Poly anchors the corridor's northern terminus.

Access to the trail corridor between Marsh Street and Highway 101 is gained primarily from the west with an established and well-worn trail along the west side of the railroad tracks. Between the Highway 101 bridge and Foothill Boulevard, access to the corridor is gained almost equally from both the east and west sides of the railroad tracks. Students walking or riding into Cal Poly's campus from adjacent neighborhoods primarily use the established trails along this portion of the corridor.

The segment's eastern edge between Marsh Street and Highway 101, outside the trail corridor, consists of rising and falling topography, while the western edge, outside the trail corridor, is generally level and perched slightly below the railroad corridor's average elevation. The segment's eastern and western edges between Highway 101 and Foothill Boulevard, outside the trail corridor, are comprised of gently sloping to level terrain.

The following lists briefly summarize opportunities and constraints identified through field visits and data review. For more detailed analysis of Segment 2, see the Railroad Safety Trail Opportunities and Constraints Analysis maps following the summaries. The maps present the existing conditions and opportunities in greater detail through both written and graphic content.

#### Summary of Opportunities:

- A. Wide railroad track bed throughout majority of corridor provides opportunity to maintain recommended trail setback distances from tracks.
- B. Tracks passing under the Mill Street Bridge are offset to the east allowing for trail placement to the west of the tracks. Potential for dual use by UPRR maintenance vehicles.
- C. Existing bridge supports at Phillips Lane could support new bicycle / pedestrian only bridge to connect eastern neighborhood to downtown.
- D. Lack of a safe east / west railroad crossing for UPRR maintenance vehicles at the southern end of the Highway 101 bridge and regular observed cyclists and pedestrians crossings at this point, provide a unique opportunity to create either an at-grade or grade-separated crossing for cyclists and UPRR maintenance vehicles only. The crossing could take advantage of the existing maintenance access road at the northern terminus of Johnson Avenue.
- E. Tracks across the existing Highway 101 bridge are offset to the west providing an opportunity to cross over Highway 101 utilizing the existing bridge.
- F. Existing established palm trees along California Boulevard provide a mature landscape framework for trail improvements through this section of the Railroad Safety Trail.
- G. City right-of-way along California Boulevard adjacent UPRR Right-of-Way provides an excellent opportunity for trail placement within the rail corridor while avoiding property acquisition issues with UPRR.
- H. Opportunity to organize traffic flow from corridor, across California Boulevard to Hathway, through controlled trail access points along California Boulevard.

#### Summary of Constraints:

- A. Marsh Street at the UPRR corridor is currently an unsignalized crossing with a high traffic volume. A big constraint along the trail is Marsh and Pepper Street intersection, a busy area that currently has no traffic signals.

# Railroad Safety Trail

## 2.3 Existing Conditions/ Opportunities & Constraints

- B. Northern and southern approaches to the existing Monterey Street bridge adjacent to the tracks are too narrow to accommodate a bike trail.
- C. The Monterey Street bridge is only wide enough to accommodate the width of a train. New bridge required to span street.
- D. Billboards adjacent the west side of the Monterey Street bridge may have to be purchased and removed to provide clearance required for any new bridge structures.
- E. Rail corridor passing under Mill Street bridge is extremely narrow requiring modification to standard trail width and clearances.
- F. New at-grade or grade-separated crossing at northern terminus of Johnson Avenue requires review and approval by Public Utilities Commission and UPRR.
- G. Existing grade variations at the northern terminus of Johnson Avenue and Highway 101 bridge require extensive earthwork to construct an at-grade or grade-separated crossing.
- H. Existing Highway 101 bridge may be unavailable for trail replacement requiring a new and separate bicycle / pedestrian bridge over the highway. Vehicles travel at relatively high speeds along California increasing making crossing from the rail corridor to the east side of California difficult.





### Legend

- Good Viewing Opportunity
- City of Santa Barbara, Santa Barbara
- Approximate Top of Creek Bank
- Creek Center Line
- Foothill Trail Segment
- Existing Class 1 Bike Lane
- Future Class 1 Bike Lane
- Existing Class 2 Bike Lane
- Trail Alignment - Option 1
- Trail Alignment - Option 2
- Trail Alignment - Option 3
- Trail Alignment - Option 4
- Future Bike Route/Connector Link
- Potential Trail Head/Waiting Facility
- Potential Class 1 to Class 2 or 3 Bike Path Transition
- Potential Signalized/Controlled Bike Crossing
- Photo Corridor
- Existing Union Pacific Railroad Tracks

### Key Map



## Railroad Safety Trail: Opportunities and Constraints Analysis

### Railroad Corridor Segment 2b

Maple, Santa Barbara, CA 93106

Scale: 1" = 100' North



# Railroad Safety Trail

## 2.4 TRAIL ALIGNMENT AND DESIGN OBJECTIVES

## 2.4 Trail Alignment & Design Objectives

To further focus and aid in the design of the Railroad Safety Trail and its preliminary alignment, a set of planning objectives were established. The following Trail Alignment and Design Objectives resulted from a blending of the project goals with the opportunities and constraints identified within the project study area, and the need to resolve identified project issues to the greatest extent possible. Acting as a set of refined project goals, the Trail Alignment and Design Objectives are what have guided the outcome of the proposed trail design and its location along railroad corridor.

### Trail Alignment Objectives

- A. Look for opportunities to support and enhance commuter trail use.
- B. Maintain consistency with the *Bicycle Transportation Plan*.
- C. Look for important connections -- align trail with other bike routes, urban uses, and residential areas.
- D. Look for logical street and highway crossings.
- E. Avoid vehicle and pedestrian conflicts to the greatest extent possible.
- F. Minimize creek and drainage crossings.
- G. Look for good connections for law enforcement and maintenance access.
- H. Utilize signalized intersections at street crossings where possible.
- I. Alignment of trail allows for logical placement of staging areas.
- J. Avoid areas of extreme topography.
- K. Maintain consistency with UPRR minimum track setback distances where possible.
- L. Minimize train track crossings for cost and safety purposes.
- M. Alternative alignments, if considered, must preserve and enhance the commuter aspect of the trail.

### Trail Design Objectives

- A. Maintain consistency with the *Railroad Historic Plan*, where applicable.
- B. Maintain consistency with historical structure guidelines, where applicable.
- C. Provide separation of trail users from active railroad tracks.
- D. Provide secured, controlled access for:
  - 1. Police and Fire Access
  - 2. Trail Maintenance
- E. Reduce potential for vandalism, theft and trespass.
- F. Provide for directional and safety signage.
- G. Provide security lighting at staging areas and road crossings.
- H. Locate staging areas at appropriate locations along trail that provide restrooms, telephone, drinking water, bike racks and lockers, trash receptacles, shelter / seating, and information kiosks.
- I. Provide Informational Kiosks at major staging areas for:
  - 1. Rules of trail use and hours of operation, directional signing ("you are here").
  - 2. Location map for nearby services, significant information references, and mapping.
- J. Provide interpretive exhibits at appropriate locations along the trail corridor for:
  - 1. Environmental and historical information.

# Railroad Safety Trail

## 2.4 Trail Alignment & Design Objectives

- K. Incorporate consistent design character for all areas of the trail corridor.
- L. Choose appropriate landscape materials, such as local native plants.
- M. Provide for physical buffers between trail and adjacent uses or habitats.
- N. Use fences and/or other barriers:
  - 1. As a separation between the trail and train tracks
  - 2. As a separation from other sensitive adjacent land uses

# Railroad Safety Trail

## 2.5 PRELIMINARY TRAIL ALIGNMENT

## 2.5 Preliminary Trail Alignment

The Preliminary Alignment Plans represent the preferred trail placement in the context of the Project Goals and the Trail Alignment and Design Objectives that were established through the Design Development.

To establish a preferred alignment, a trail evaluation matrix was developed to evaluate each alternative trail alignment against the same criteria. Each matrix criteria was assigned a value, and the trail alternative obtaining the highest cumulative total was identified as the most promising, or preferred, trail alignment. Below is the Railroad Safety Trail Alternatives Evaluation Matrix.

<b>Railroad Safety Trail</b> <b>Trail Alternatives Evaluation Matrix</b> Rating Values: 0=Low 1=Moderate 2=High										
TRAIL CORRIDOR	Potential to Minimize Environmental Permit Requirements	Potential to Minimize Construction Cost	Potential to Minimize Maintenance Cost	Potential for Near-Term Construction	Potential for Recreational Value	Potential for Increased Trail User Safety and Security	Potential to Avoid New Trail Crossing at Railroad Tracks	Potential for Direct and Consistent Route	Potential for On-Street Bike Lane Connections	TOTAL
<b>SEGMENT 1 Railroad Depot to Marsh Street</b>										
Option 1- West Side (Yellow Alignment)	1	2	1	2	1	2	2	2	2	15
Option 2- East Side (Orange Alignment)	0	1	1	1	2	1	2	1	1	10
<b>SEGMENT 2 Marsh Street to Foothill Boulevard</b>										
Marsh Street to US Hwy 101										
Option 1- West Side (Yellow Alignment)	1	1	1	1	2	2	0	2	2	12
Option 3- East Side (Pink Alignment)	1	0	0	0	2	2	2	2	1	10
Pepper Street Bypass (Class II Alignment)	2	2	2	2	0	0	2	0	1	11
US Hwy 101 to Foothill										
Option 1- East Side (Yellow Alignment)	1	2	1	2	2	2	2	2	2	16
Option 3- East Side (Pink Alignment)	1	0	1	0	2	2	2	2	2	12
Option 4- West Side (Blue Alignment)	1	0	1	0	1	2	1	2	0	8

Note: Ratings Based on the Opportunities and Constraints Maps

Figure 10. Railroad Safety Trail Alternatives Evaluation Matrix

# Railroad Safety Trail

## 2.5 Preliminary Trail Alignment

### Preliminary Alignment Overview

The Railroad Safety Trail Preliminary Alignment Plan has been divided into two segments presented on eight alignment plan sheets to better describe and manage the trail alignment data. The general alignment is shown below in the Railroad Safety Trail Preliminary Alignment Plans and described in the following narrative.

At its southernmost point, the Class I trail begins at a primary staging area located at the northern end of the Railroad Depot parking lot. The trail continues north, within the current UPRR Right-of-Way, along the west side of the railroad tracks to Marsh Street crossing over Johnson Avenue and San Luis Obispo Creek. Connections to adjacent surface streets along this portion of the trail occur at Toro Street, Johnson Avenue, and Buchon, Pismo, Pacific, and Marsh Streets. At Marsh Street, an enhanced crossing signal system will facilitate controlled at-grade crossing to the north side of the Street.

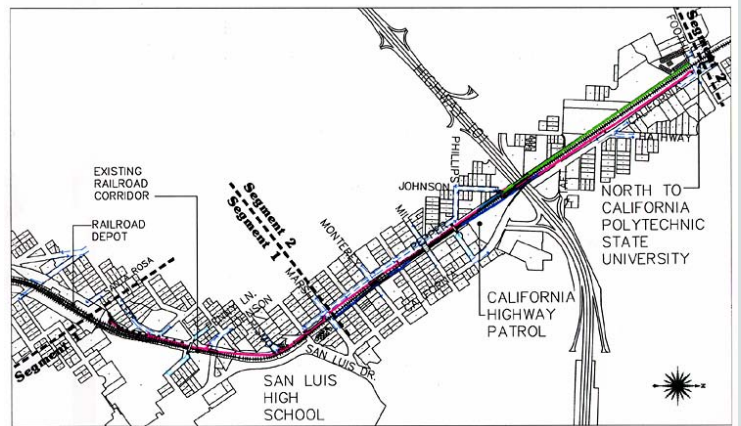


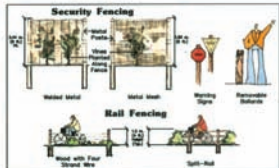
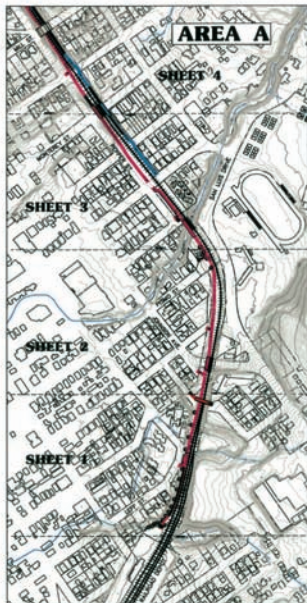
Figure 11. Preliminary Alignment Overview Map

From Marsh Street, the most promising trail alignment continues north within the current UPRR Right-of-Way, along the west side of the tracks to the northern terminus of Johnson Avenue just south of the existing Highway 101 railroad bridge, crossing over Monterey Street and under Mill Street. The trail crosses to the east side of the tracks via an at-grade or grade-separated crossing to continue north over the existing Highway 101 railroad bridge. Connections to adjacent surface streets along this portion of the trail occur at Higuera Street, Palm Street, and Johnson Avenue.

Once over Highway 101, the trail continues north following the easternmost edge of UPRR Right-of-Way with a portion of the trail on City-owned property adjacent the existing row of California Boulevard palm trees. Following the palm trees north, the trail then terminates at the intersection of Foothill and California Boulevards. Connections to adjacent surface streets along this portion of the trail occur at the intersections of California Boulevard and Hathway Street, and Foothill and California Boulevard.

### Preliminary Alignment Plans

The 2.3 kilometer (1.4 mile) length of the Railroad Safety Trail Preliminary Alignment Plans have been divided into two segments and presented on eight plan sheets to better describe and manage the trail alignment data. Each segment is illustrated and detailed in the following plans.

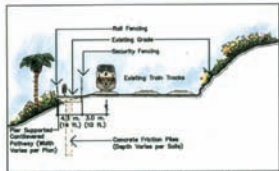
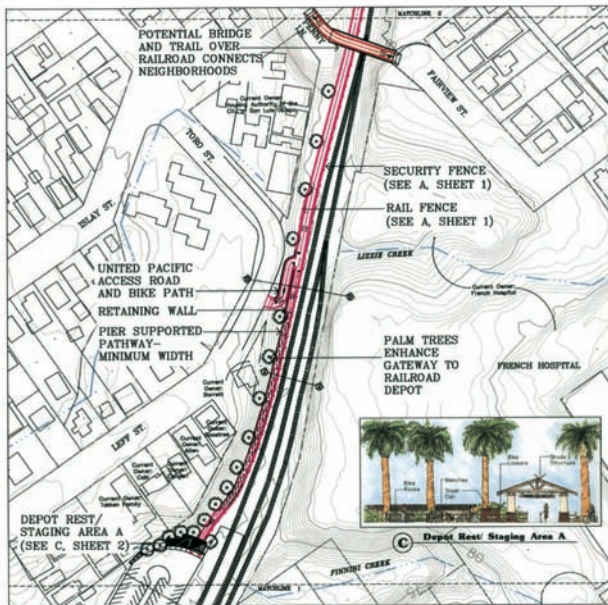


**(A) Typical Trail Safety Amenities**

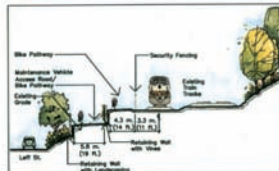


**(B) Typical Trail Recreational Amenities**





**Typical Pier Supported Pathway - Section A**



**Left Street Access - Section B**



Depot Rest/ Staging Area A



NOTE: PLACEMENT AND DESIGN OF ANY TRAFFIC CONTROLS (E.G. SIGNALS, CHANGELIGHTS, PAVEMENT MARKINGS, STOP SIGNS, ETC.) SHALL BE TO THE SATISFACTION OF THE LOCAL AGENCY.

city of  
san luis obispo

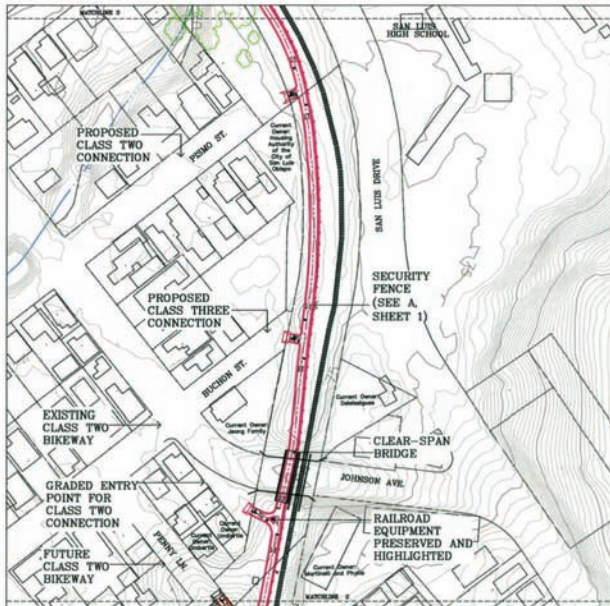
# Railroad Safety Trail - Preliminary Alignment

Copyright Clearance Center, Inc.

### Graphic Studio



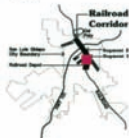
**Author's address:**  
Department of Psychology  
University of California, San Diego  
La Jolla, CA 92037  
USA  
[terry@psych.ucsd.edu](mailto:terry@psych.ucsd.edu)



**A Johnson Avenue Bridge Perspective**



**Key Map**



NOTE: PLACEMENT AND DESIGN OF ANY TRAIL OR BRIDGE IS THE RESPONSIBILITY OF THE USER. THE CITY OF SAN LUIS OBISPO IS NOT RESPONSIBLE FOR ANY DAMAGE TO OR LOSS OF PROPERTY OR PERSONAL INJURY OR DEATH RESULTING FROM THE USE OF ANY TRAIL OR BRIDGE.



# **Railroad Safety Trail - Preliminary Alignment** **Sheet 3**

Custom Interval: 10 ft.

Graphic Scale  
 1" = 100'



**San Luis Obispo County**



**city of  
 san luis obispo**

**Alta**

**Alta**

EXISTING CLASS TWO BIKEWAY

EXISTING CLASS TWO BIKEWAY

Current Airport Gate Facility

**PIER SUPPORTED PATHWAY**

### PROPOSED — CLASS THREE CONNECTION

EXISTING  
CLASS TWO  
CONNECTION

PROPOSED—  
CLASS TWO  
CONNECTION

PEPPER STREET  
REST AREA  
(SEE C,  
SHEET 4)

### CLEAR-SPAN BRIDGE

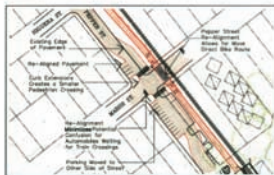
OPTION 2 PATH  
CROSSES TO  
OTHER SIDE  
OF TRACKS

## POTENTIAL FOR PEDESTRIAN ACTIVATED CROSSING

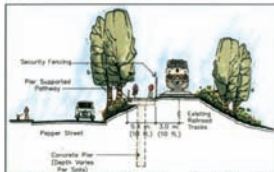
REMOVAL OF  
PARKING  
SPACES  
RELOCATION OF  
SOME RAILROAD  
SIGNAL POLES



**(C) Pepper Street Rest Area  
Perspective View**



**A Marsh/ Pepper Intersection**  
**Potential Alternative**



**B Monterey Street Bridge Approach - Section C**



WITH PLACEMENT AND DESIGN OF ANY TRAFFIC CONTROLS (E.G. SIGNALS, CROSSINGS, FOOTWAY LIGHTS, STOP SIGNS, ETC.) SHALL BE TO THE APPROVAL OF THE CITY TRAFFIC ENGINEER.

city of  
san luis obispo



# Railroad Safety Trail - Preliminary Alignment

Copyright Clearance Center, Inc.

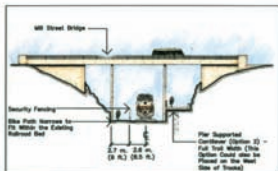
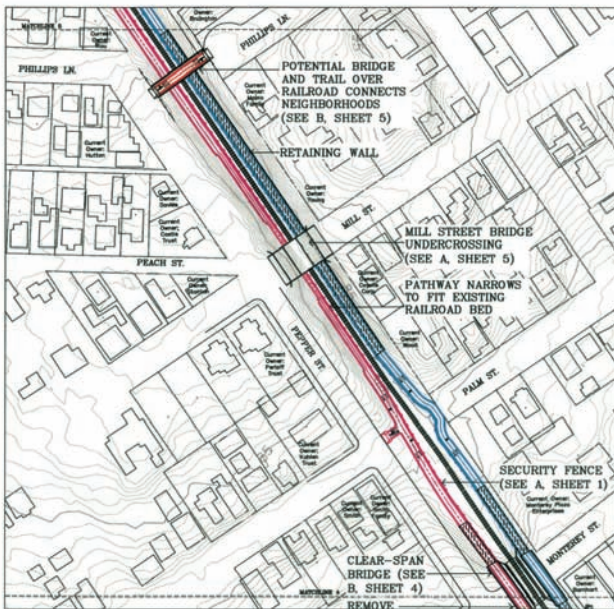
**Flexible Goals**



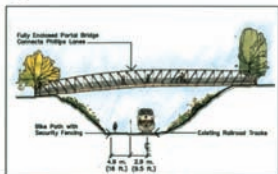
**Alta**



Source: U.S. Census Bureau, *Marriage, Divorce, Remarriage in the 1990s*, Washington, D.C., 1993.



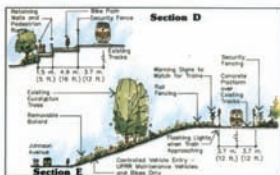
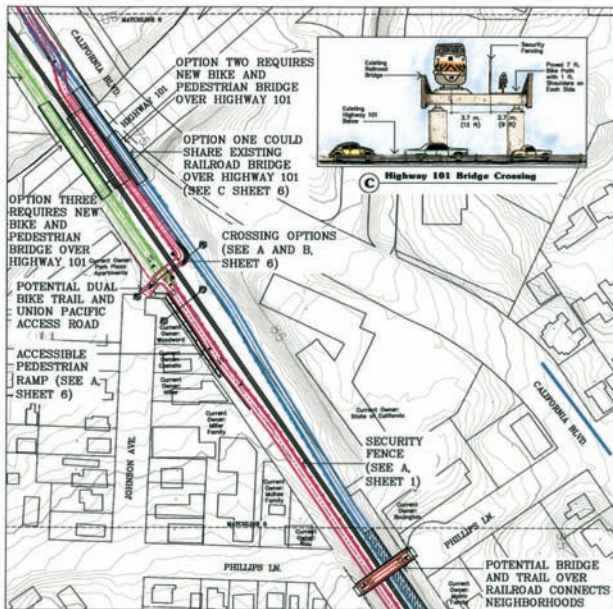
**A** Mill Street Bridge Under Crossing



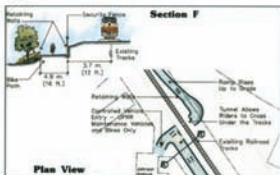
**B** Phillips Lane Future Railroad Crossing



NOTE: Proposals and Station of work shown on this map are preliminary. Construction of the trail, bridge, and other facilities will be subject to the approval of the City of San Luis Obispo.



**(A) At Grade Crossing (Option 1)**



**(B) Tunnel Under Crossing (Option 4)**



NOTES: All proposed work shall be in accordance with the City of San Luis Obispo's General Ordinance No. 100,000, which requires that all proposed work be in accordance with the City of San Luis Obispo's General Ordinance No. 100,000.

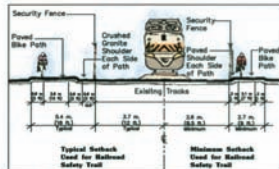
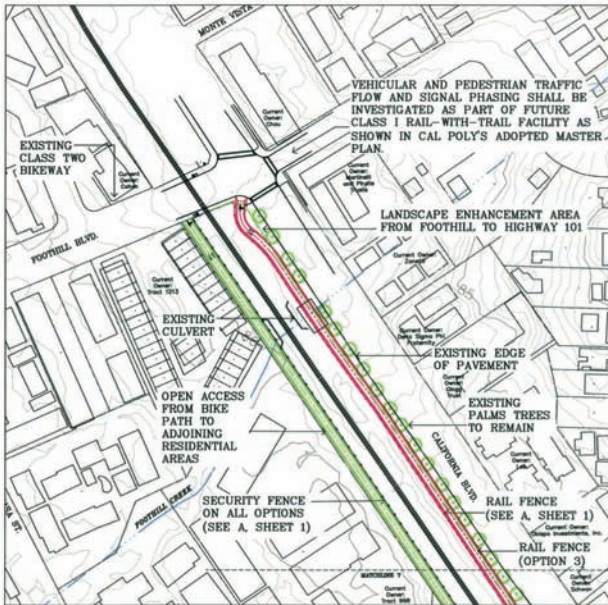


# **Railroad Safety Trail - Preliminary Alignment** **Sheet 6**

Graphic Scale  
 1" = 100'







### **Typical Trail to Railroad Track Relationship**



**Bike Path along California Looking South-East**



## Railroad Safety Trail - Preliminary Alignment

**Sheet 8**

Graphic: Source

Environ Biol Fish (2015) 98:419–434



# Railroad Safety Trail

## 2.6 TRAIL DESIGN STANDARDS

### Trail Relation to Railroad Setback

Union Pacific Railroad sets as a minimum standard a clear distance of 2.6 meters (8.5 feet) from the edge of any proposed trail to the centerline of the existing railroad tracks. This clear distance will be referred to throughout this project description as the *minimum setback*. The typical setback used for the alignment of the Railroad Safety Trail described in this document is 3.6 meters (12 feet) or further from the existing railroad tracks centerline. In three locations along the trail, where it is not possible to maintain this typical setback due to physical constraints, the minimum 2.6 meters (8.5 feet) setback is used.

### Typical Bike Trail Construction

The Railroad Safety Trail has been designed to be attractive to both the regular commuter and casual bicyclist. The proposed trail will be constructed with a paved surface wide enough to accommodate multiple uses. The following lists describe typical trail construction materials and design standards.

#### Class I Bike Trail:

- A. Where space allows, paved portion of trail will be 3.7 meters (12-foot) wide, 0.12 meter (4-inch) thick asphalt path constructed over 0.15 meter (6-inch) aggregate base.
- B. Where space is constrained between the depot and Toro Street maintenance road, under the Mill Street Bridge, and over the existing Highway 101 railroad bridge, approximately 0.4 kilometers (0.3 miles) of the 2.3 kilometers (1.4 miles) trail will have a paved section as narrow as 2.13 meters (7-feet), 0.12 meter (4-inch) thick asphalt path constructed over 0.15 meter (6-inch) aggregate base.
- C. 0.6 meter (2-foot) wide, 0.15 meter (6-inch) thick, aggregate base shoulders on each side of the paved trail.
- D. Caltrans minimum turn radii.
- E. Appropriately designed “knuckles” may be used to attain desired alignment.
- F. Trail access to roads aligned to create a right angle with the road.
- G. Removable bollards at all trail and road intersections to bar unauthorized vehicle entry.
- H. Fencing as necessary to direct or limit trail access.
- I. 0.12 meter (4-inch) wide painted yellow centerline to create two lanes of travel.
- J. 0.12 meter (4-inch) wide painted white edge lines delineating edge of pathway.
- K. Low landscaping at intersections and roadway entrances to maintain proper site distances.

### Signing and Marking

Uniform sign design with the Railroad Safety Trail logo are provided along the trail. Signing and marking will unify the trail design and provide functional information. Elements such as bollards to prevent unauthorized trail access, traffic control signs, directional signs, and trail entrance information at bus stops and other strategic locations within the City will help guide and control use along the trail. Informational kiosks located at the major staging areas and parks will provide updated trail and event information to trail users.

## 2.6 Trail Design Standards

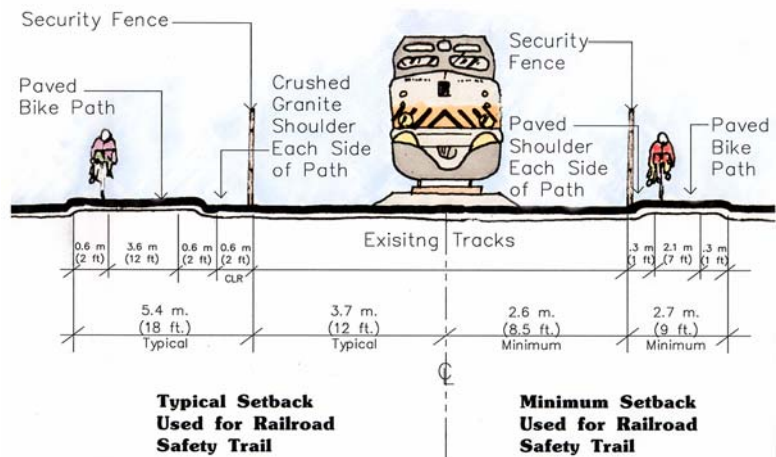


Figure 20. Typical and Minimum Trail Setbacks from Railroad Tracks

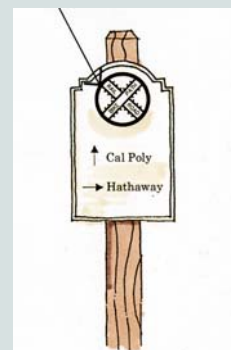


Figure 21. Example of Directional Signage

# Railroad Safety Trail

## 2.6 Trail Design Standards

Signs along the trail should be designed to meet all of the required and recommended signing and marking standards developed by Caltrans in Chapter 1000 of the *Highway Design Manual*. In addition, all signs and markings should conform to the standards developed in the *Manual of Uniform Traffic Control Devices (MUTCD)*. In general, all signs should be located at least 0.9 meter (3-feet) from the edge of the paved surface. The signs should have a minimum vertical clearance of 2.6 meters (8.5-feet) when located above the trail, and be a minimum of 1.2 meters (4-feet) above the trail surface when located on the side of the trail. All signs should be oriented so as not to confuse motorists. The design (though not the size) of signs and markings should be the same as used for motor vehicles.

Directional signing will be useful for trail users and motorists alike. For motorists, a sign reading “Railroad Safety Trail Crossing” along with a trail logo helps to both warn and promote use of the trail itself. For trail users, directional signs and street names at crossings help direct people to their destinations.

Whenever possible, existing crosswalks and traffic signals should be used to allow trail users to travel across vehicle travel lanes, and additional or enhanced crossing controls should be included at modified crossings.

A 0.12 meter (4-inch) wide yellow centerline stripe will be used to separate opposite directions of travel. This stripe will be broken where adequate passing site distance occurs, and solid in other areas where bicycle passing is discouraged. White trail edging will also be installed to clearly define the trail’s boundary.

Other barrier types between the trail and private property may be used, such as ditches, berms and/or vegetation. Recommended vegetation types should survive on low water and maintenance. Ditch and berm gradients should not exceed 2:1 slopes or be greater than 3.0 meters (10-feet) in depth or height.

### Staging and Rest Areas

Staging areas and trailside rest areas will offer expanded recreational opportunities along the trail.

#### Depot Staging Area:

At this major entry point to the bikeway, a larger rest area and pocket park were incorporated as a staging area. In addition to the amenities on the rest area list, the staging areas contains:

- A. Drinking fountain
- B. Bike racks and lockers
- C. Picnic tables
- D. Public restrooms
- E. Telephones
- F. Informational kiosk
- G. Evening lighting
- H. Automobile parking areas.

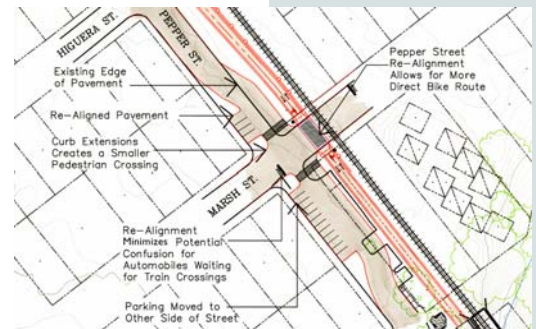


Figure 22. Potential Crosswalk and Intersection Realignment at Marsh and Pepper Streets

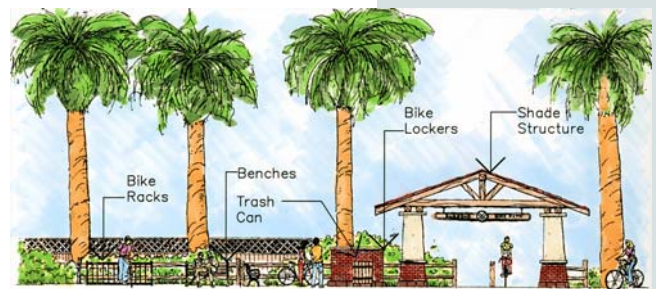


Figure 23. Staging Area at Railroad Depot.

# Railroad Safety Trail

## 2.6 Trail Design Standards

### Pepper Street Trail Side Rest Area:

- A. Benches
- B. Trash receptacles
- C. Interpretive signs
- D. Landscape fencing
- E. Native plantings

### **Trail Fencing**

Safety fencing between the trail and active railroad tracks will be placed along the entire length of the Railroad Safety Trail to discourage access to and across the tracks. Other types of fencing will be placed along the corridor in strategic locations depending on proximity to private property and adjacent land uses.

### Railroad Safety Fencing for Minimum Setback:

Where the trail setback is less than 3.6 meters (12 feet) from the existing railroad tracks centerline, the fencing will consist of the following:

- A. 2.4 meters (8-foot) high metal mesh fence
- B. Metal posts placed 2.4 meters (8-foot) on center
- C. Baffling material in fence to catch train-thrown debris

### Railroad Safety Fencing for Typical Setback:

Where the trail can be setback 3.6 meters (12 feet) to 7.6 meters (25 feet), from the existing railroad tracks centerline, the fencing will consist of the following:

- A. 1.8 meters (6-foot) high metal mesh fence
- B. Metal posts placed 2.4 meters (8-foot) on center
- C. Baffling material in fence to catch train-thrown debris when located closer than 4.6 meters (15 feet) to the existing railroad tracks centerline
- D. Flowering vines

### Railroad Safety Fencing Beyond 7.6 Meters (25 foot) Setback:

Where the trail setback is greater than 7.6 meters (25 feet) from the existing railroad tracks centerline, the fencing will consist of the following:

- A. 1.2 meters (4-foot) high wood posts placed 2.4 meters (8-foot) on center
- B. 4 wire strands
- C. Flowering vines

### Staging and Rest Area Fencing:

Perimeter fencing in these areas should consist of the following:

- A. 1.2 meters (4-foot) high wood posts placed 1.8 meters (6-foot) on center
- B. Split rails



Figure 24. Pepper Street Trail Side Rest Area

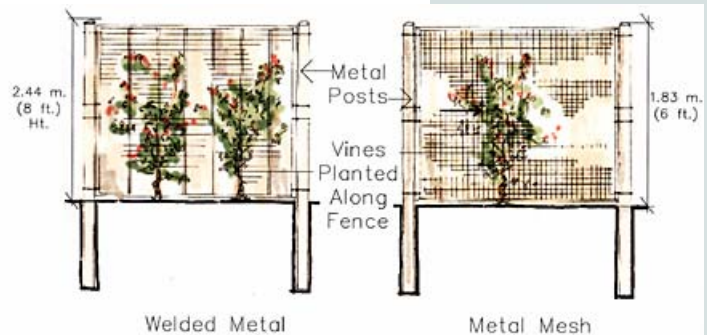


Figure 25. Railroad Safety Fencing Between Trail and Tracks.



Figure 26. Typical Split Rail Fencing

# Railroad Safety Trail

## 2.6 Trail Design Standards

### Trail Access Fence:

In locations where the Railroad Safety Trail intersects vehicle travel lanes, unauthorized vehicular access must be controlled. Fencing along the trail and connecting to the street right-of-way, in conjunction with removable bollards placed in the trail at these intersections, would serve to limit access. Fencing for this condition should consist of the following:

- A. Large diameter, 1.2 meters (4-foot) high wood posts placed 1.8 meters (6-foot) on center
- B. Split rails

### **Trail Bridges and Pile Supported Decks**

All bridges and supported decks should include structural design that is able to support pedestrian live loading and maintenance and emergency vehicles.

### Creek Crossings:

To minimize or avoid potential impacts to the creeks, pre-engineered clear span bridges should be used to cross all creeks and drainage ways. At minimum, the pre-engineered bridges should include the following:

- A. Low maintenance weathering steel finish
- B. Asphalt deck
- C. 1.4 meters (54-inch) high bicycle railing
- D. Horizontal toe plates

### Road Crossings:

Grade separated crossings over Johnson Avenue, Monterey Street, Penny Lane, and Phillips Lane should be a pre-engineered portal bridge. At minimum, the pre-engineered bridges should include the following:

- A. Low maintenance weathering steel finish
- B. Asphalt deck
- C. 1.4 meters (54-inch) high bicycle railing
- D. Horizontal toe plates
- E. Fully enclosed portal
- F. Attached security fence

### Highway Crossings:

Any grade-separated crossing over Highway 101 must be engineered to meet all Caltrans and City requirements and standards. At minimum, the bridge design should include the following:

- A. Low maintenance weathering steel finish
- B. Concrete deck
- C. 1.4 meters (54-inch) high bicycle railing
- D. Fully enclosed portal
- E. Attached security fence



Figure 27. Pedestrian and Bicycle Bridge Over Johnson Avenue

# Railroad Safety Trail

## 2.6 Trail Design Standards

### Pile Supported Deck:

Pile supported decks will be utilized to carry the trail over constrained corridor sections too narrow to accommodate the width of a trail while maintaining the minimum setback. Pile supported decks design must take into consideration bearing material, size of piles, depth of embedment, size of beams, etc. relative to anticipated loading. At minimum, the pile supported decks should include the following:

- A. Large diameter concrete friction pile
- B. Concrete beams on piles
- C. Concrete sub-deck planks spanning concrete beams
- D. Asphalt deck
- E. 1.4 meters (54-inch) high bicycle railing
- F. Integral railroad safety fence

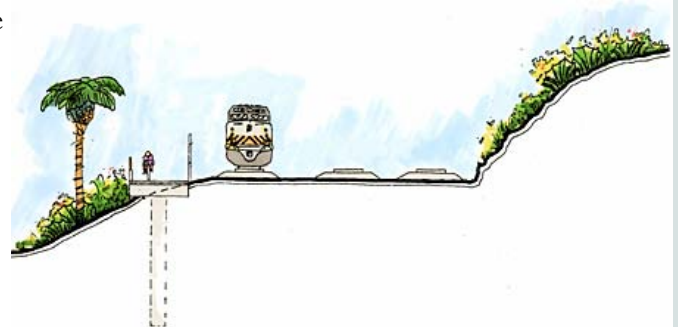


Figure 28. Pile Supported Deck Near Railroad Depot

### **Trail Lighting**

The Railroad Safety Trail is not proposed to have continuous lighting. Where the trail crosses public roads at grade, supplemental lighting should be incorporated into existing street lighting. Limited lighting may be incorporated into the proposed staging areas.

### **Historic and Educational Themes**

The trail offers a unique opportunity to develop historic and educational themes. Interpretive exhibits should be placed at strategic locations along the trail offering a variety of information. For example, information regarding the history of the rail corridor and its role in the development of the City of San Luis Obispo could be explained. Other possible interpretive topics along the railroad corridor including:

- A. History of the bicycle
- B. Rail trails in other cities and countries
- C. Historical development of railroad transportation
- D. Air quality improvements through bicycle commuting



Figure 29. Trailside Interpretive Exhibit



Figure 30. Staging Area Informational / Interpretive Kiosk

# Railroad Safety Trail

## 2.7 Implementation

### 2.7 IMPLEMENTATION

The City intends to implement the Railroad Safety Trail over time through the construction of individual segments. The City further recognizes that the preferred trail alignment in segments 1 and 2 is entirely within the privately held Union Pacific Railroad right-of-way, with the exception of a City-owned strip along California Boulevard.

Given these ownership issues, the following outlines the most likely process of implementing the trail over time.

#### Securing Approvals and ROW

- A. Work with UPRR to gain acceptance and buy-in for the trail alignment within their corridor.
- B. Submit an application for a new at-grade crossing to the PUC for consideration.
- C. Negotiate terms of right-of-way acquisition with UPRR for the entire RST route from the Rail Depot to Foothill Boulevard.
- D. Encourage Cal Poly to plan for the trail alignment and acquire UPRR ROW between Foothill Boulevard and the Recreation Sports Complex north of Highland Drive.

#### Trail Construction

- A. Phase I should focus on Segment 1 of the RST between the Rail Depot and Marsh Street.
- B. Phase II should focus on the segment along California Boulevard between Taft Street and Foothill Boulevard.
- C. Phase III should focus on the segment between Marsh Street and Taft serving as a “gap closure” project.
- D. Cal Poly should immediately pursue extending the Trail north of Foothill Boulevard to connect with the Recreation Sports Complex.
- E. The City will pursue extending the Trail south from Orcutt Avenue adjacent to the Orcutt Area Specific Plan Area to the Edna-Islay Neighborhood.

# Railroad Safety Trail

## 2.7 Implementation

### Cost Analysis

The following Opinion of Probable Construction Cost is based on the elements identified in the Preliminary Alignment Plan. The cost opinion parallels the two Railroad Safety Trail segments discussed in the project Study Area (Section 3.1). The estimate isolates the core Class I trail costs from other proposed trail amenities. The cost opinion is a key tool in estimating the project's overall budget and provides the information necessary to develop trail phasing and funding allocation.

Overall Railroad Safety Trail construction costs are presented in the following summary. For detailed cost analysis for each trail segment, see Appendix C.

OPINION OF PROBABLE CONSTRUCTION COST SUMMARY	
Class I Bike Trail and Bridges	Subtotal
Segment 1 (Magenta alignment)	\$ 2,122,693.60
Segment 2 (Magenta alignment)	\$ 3,212,476.74
Class 1 Bike Trail and Bridges Total=	\$ 5,335,170.34
Trail Amenities and Crossing Improvements	Subtotal
Segment 1	\$ 311,360.40
Segment 2	\$ 324,539.32
Trail Amenities and Crossing Improvements Total=	\$ 635,899.72
RAILROAD SAFETY TRAIL - PROJECT TOTAL= \$ 5,971,070.06	

Figure 31. Railroad Safety Trail Opinion of Probable Construction Cost Summary