

# Design Treatments to Transition from Trails to Roadways

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October 15, 2014



**Association of Pedestrian and Bicycle Professionals**  
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- Planners: APBP has applied to the AICP for 1.0 CM credits for this webinar



# More information on this topic...

***Best Practices in Traffic Operations and Safety: Phase II: Zig Zag Pavement Markings*** (Virginia Transportation Research Council; FHWA/VTRC 11-R9)

[http://www.virginiadot.org/vtrc/main/online\\_reports/pdf/11-r9.pdf](http://www.virginiadot.org/vtrc/main/online_reports/pdf/11-r9.pdf)

Results of the study assessing the effectiveness of zig zag pavement markings at crossing locations along the Washington & Old Dominion Trail

**San Jose Trail Program:** The Trail Network Reports page has links to helpful information on technical and project issues, including design guidance; specifications for reflective striping, bollards and trail signage; trail counts; fact sheets; and a variety of reports: <http://www.sanjoseca.gov/index.aspx?NID=2888>

**Rails-to-Trails Conservancy trail building resources:**

<http://www.railstotrails.org/ourWork/trailBuilding/index.html>

# Today's presenters

**Bill Schultheiss, P.E.**, Vice President and Senior Engineer, Toole Design Group

**Randy Dittberner, P.E., PTOE**, Regional Traffic Engineer, Virginia DOT Northern Region

**Yves Zsutty**, Trail Network Manager, City of San Jose



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# Today's presenters

**Bill Schultheiss, P.E.**, Vice President and Senior Engineer at Toole Design Group, is a national leader in the field of non-motorized transportation design, known for his ground-breaking work in complete streets design. Bill has pioneered new design strategies including cycle tracks, shared streets, arterial traffic calming, rapid-flashing beacons, bike signals, bike boxes, green bike lanes and buffered bike lanes. As the engineer-of-record on numerous projects, Bill has a thorough understanding of national design guidance as well as the research it is based upon. Over the past decade, Bill has personally overseen and designed over 250 miles of bikeways throughout the U.S. He is an active member of the Bicycle Technical Committee and the Pedestrian Task Force of the National Committee on Uniform Traffic Control Devices (NCUTCD).



# Today's presenters

**Randy Dittberner, P.E., PTOE**, is the Regional Traffic Engineer for the Virginia Department of Transportation's Northern Region, which has 2 million customers in suburban Washington, D.C. He has 22 years' experience in the traffic engineering field, in both public and private sectors, and has worked to bring a greater multi-modal perspective to VDOT, introducing several initiatives to enhance bicyclist and pedestrian accommodations. He holds bachelor's and master's degrees in civil engineering from Arizona State University.

As the City of San Jose's Trail Network Manager, **Yves Zsutty** oversees the development of a 100-mile trail network that serves recreational and commuting objectives. San Jose's 55-mile urban trail network is one of the nation's largest and has won many awards. Over the past 12 years, Yves led the development of 25 miles of that network. He has a background in traffic engineering, intelligent transportation systems and design, and holds a B.S. in Civil Engineering from San Jose State University.





# ***Getting to the Other Side: Perceived & Measureable Safety at Shared-Use Path Crossings***

**Bill Schultheiss, P.E.**

Vice President

October 15, 2014

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# Traditional Safety Analysis: Crash Based



- Crashes are infrequent
- Crash reports are inadequate
- Near-miss incidents not reported



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# Alternative Safety Analysis Methodology



- Perceived Safety
  - Trail-User Intercept Surveys
- Measureable Safety
  - Video Behavioral Analysis
    - Motorist Yield Rates
    - Trail User Compliance
    - Trail User Riskiness
  - Sight Distance Analysis
  - Speed Analysis
  - Delay Analysis

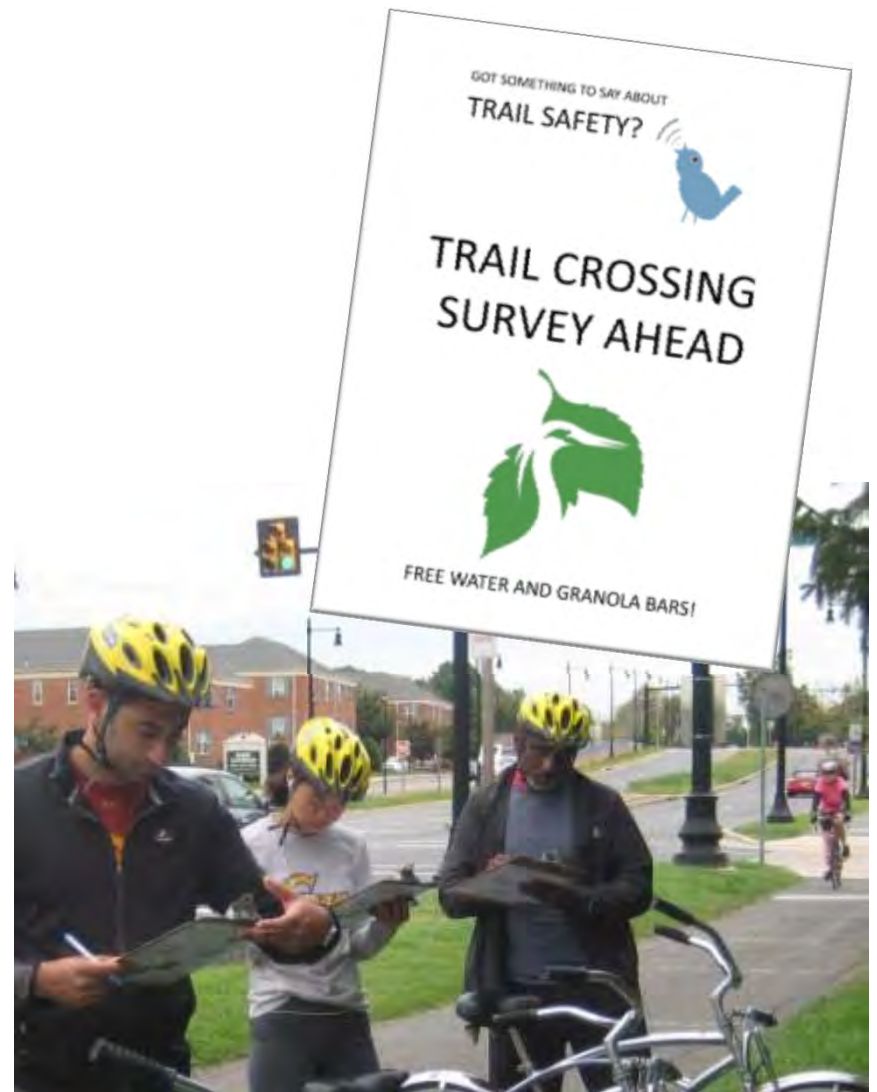



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# Perceived Safety: Trail-User Intercept Surveys



- How safe/comfortable do you feel at this crossing?
- How often do you have a conflict with motorists?
- How long do you typically wait to cross?




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# Measurable Safety: Video Behavioral Analysis



- Motorist behavior
  - Yield Rates
- Trail-user behavior
  - Compliance
  - Risky/Non-Risky
- Near-miss incidents/  
avoidance maneuvers




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# Measurable Safety: Motorist Yield Rate



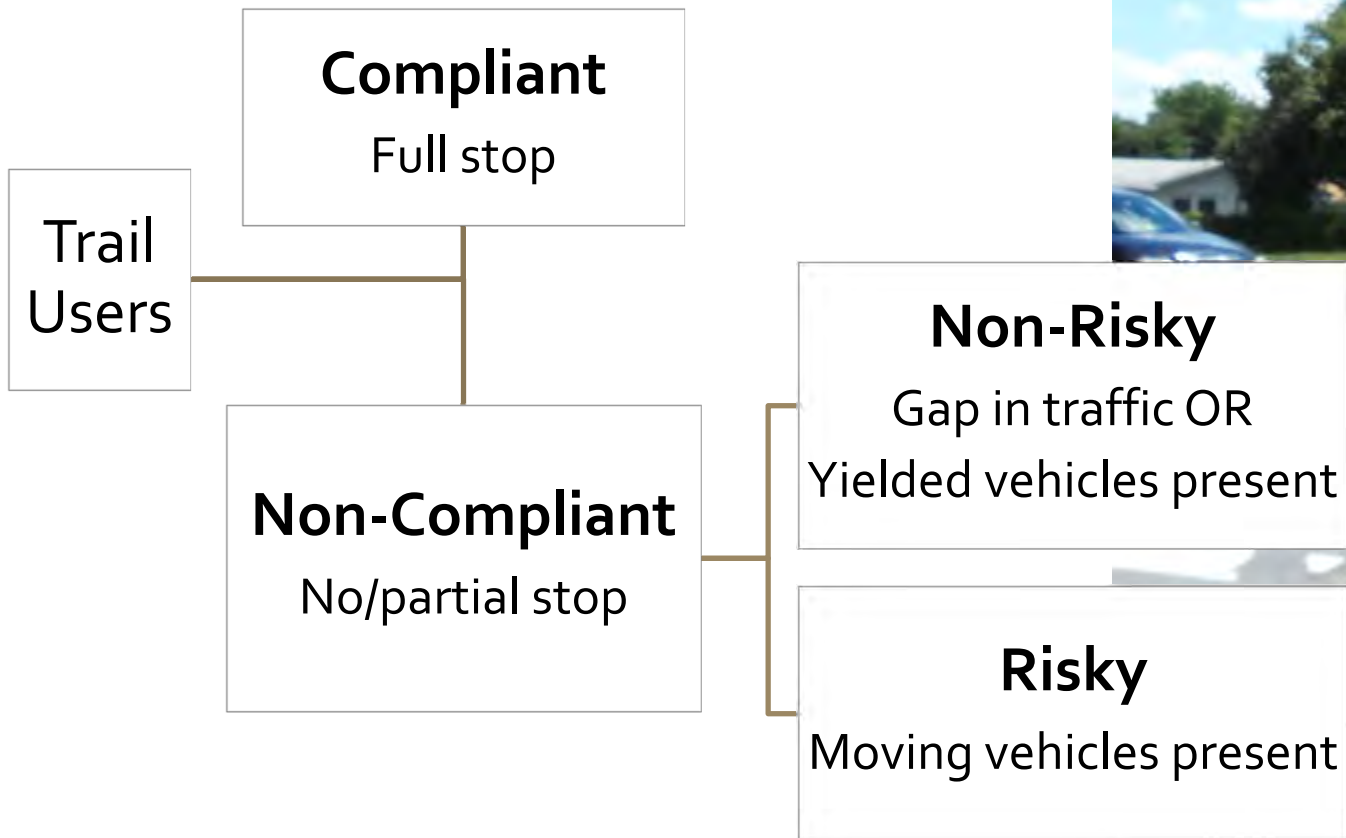
- Indicates likelihood of safe crossing opportunities
- Reveals issues with physical features of crossing


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# Measurable Safety: Trail-User Behavior, Unsignalized



## Stop Sign



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# W&OD Case Study Belmont Ridge Road Crossing



Zero reported bike/ped  
crashes...



...no safety problem?

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# W&OD Case Study Belmont Ridge Road Crossing



30% trail-users uncomfortable,  
40% moderately uncomfortable,  
only 7 % comfortable



...8 rear end vehicle  
crashes in 2011


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# W&OD Case Study Belmont Ridge Road Crossing



23% of motorists yielded  
57% of cyclists compliant  
95% of pedestrians compliant



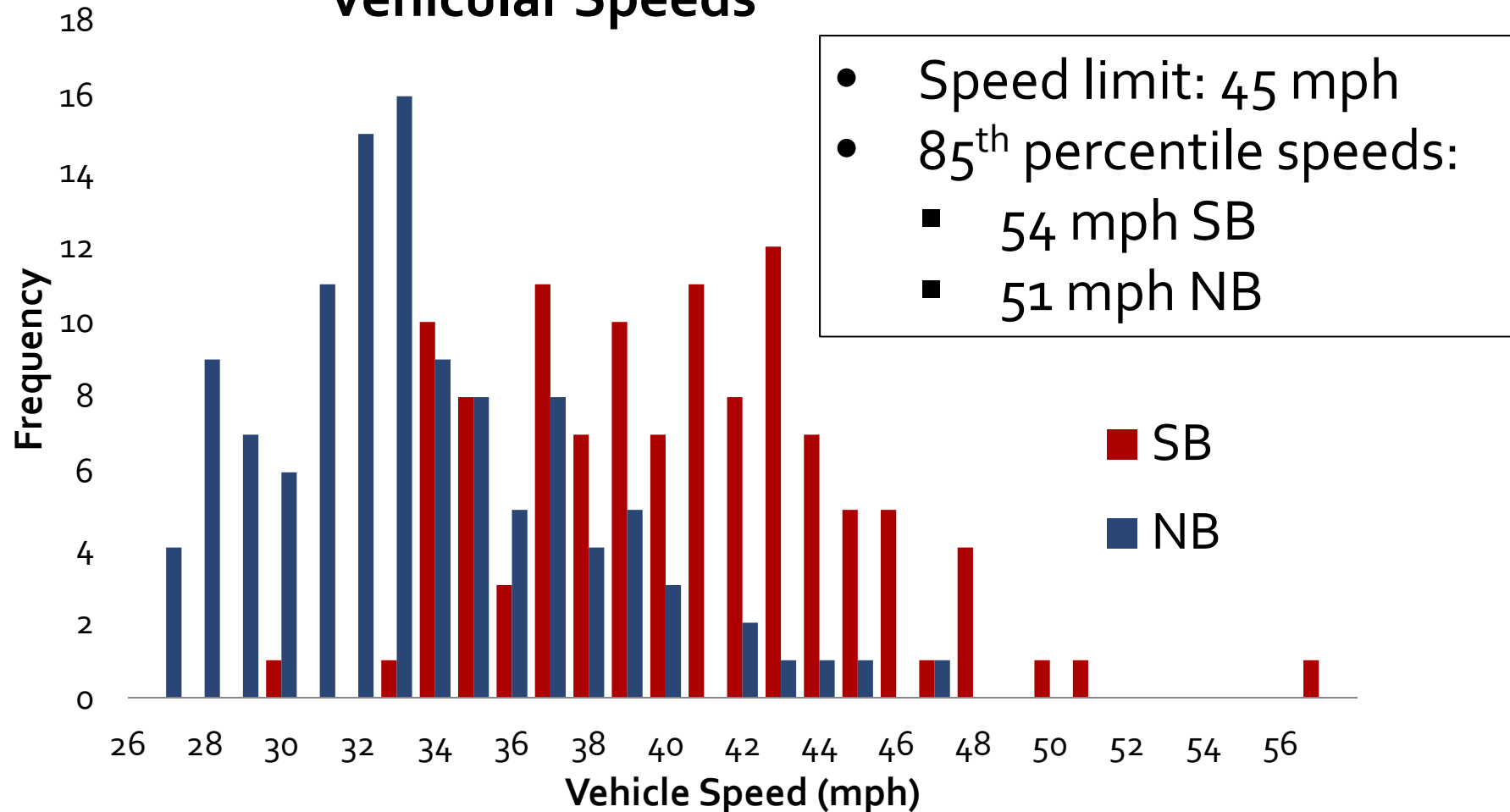
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# W&OD Case Study Belmont Ridge Road Crossing



## Vehicular Speeds




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# W&OD Case Study Belmont Ridge Road Crossing



Limited visibility due to vertical crest,  
car parking & vegetation

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# First Phase Recommendations for Belmont Ridge Road Crossing



RRFB


Vegetation  
cleared

Parking  
relocated

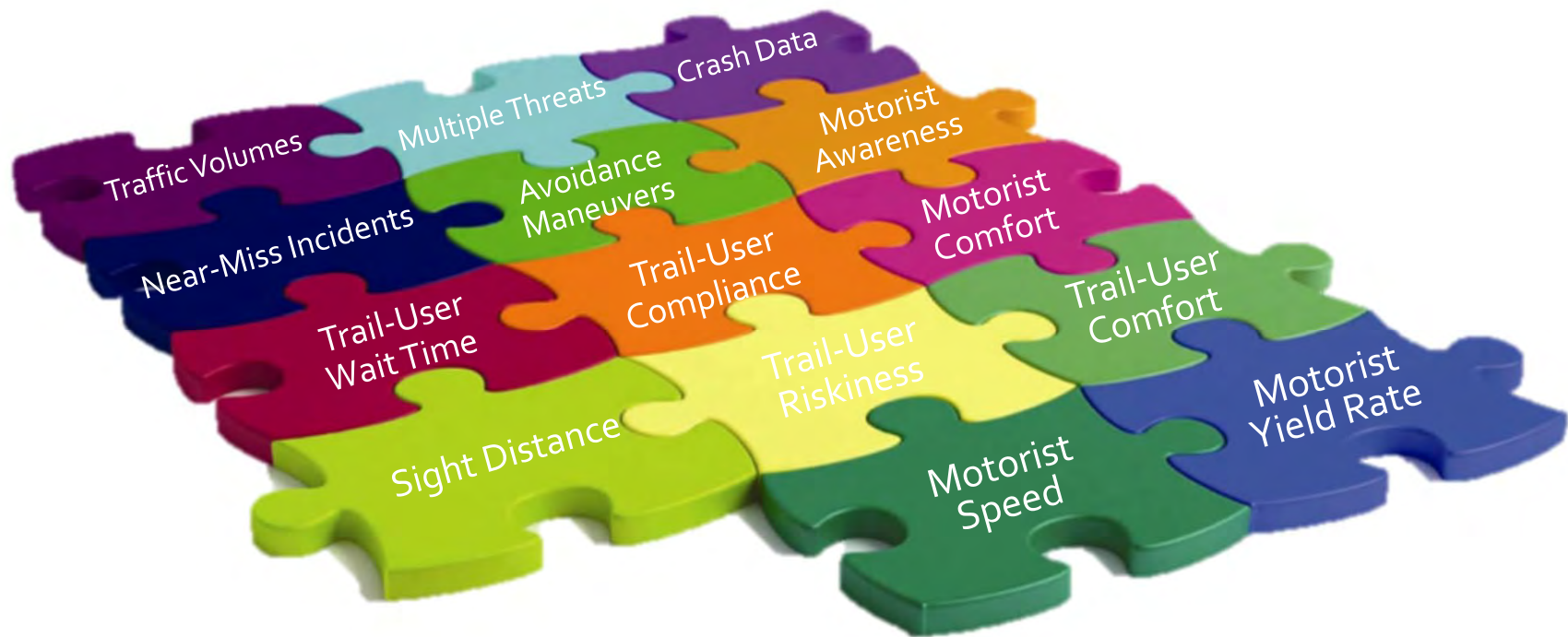
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# First Phase Recommendations for Belmont Ridge Road Crossing



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# Crash data is only one piece of the safety solutions puzzle



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# Thank You!




**Bill Schultheiss, PE**

Vice President

*wschultheiss@tooledesign.com*

**Toole**DesignGroup

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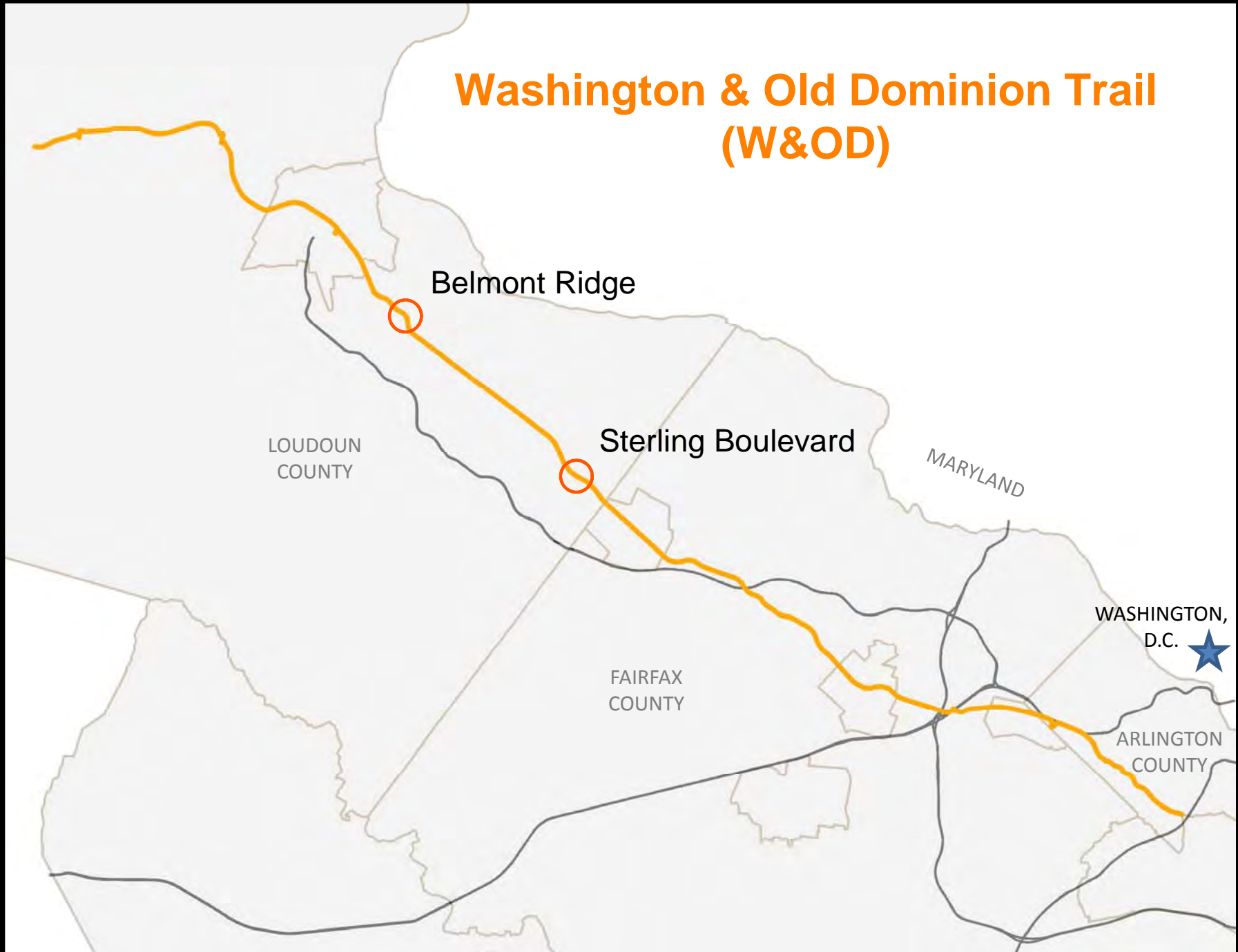
# High-Volume Trail Crossing Treatments

Randy Dittberner  
Regional Traffic Engineer





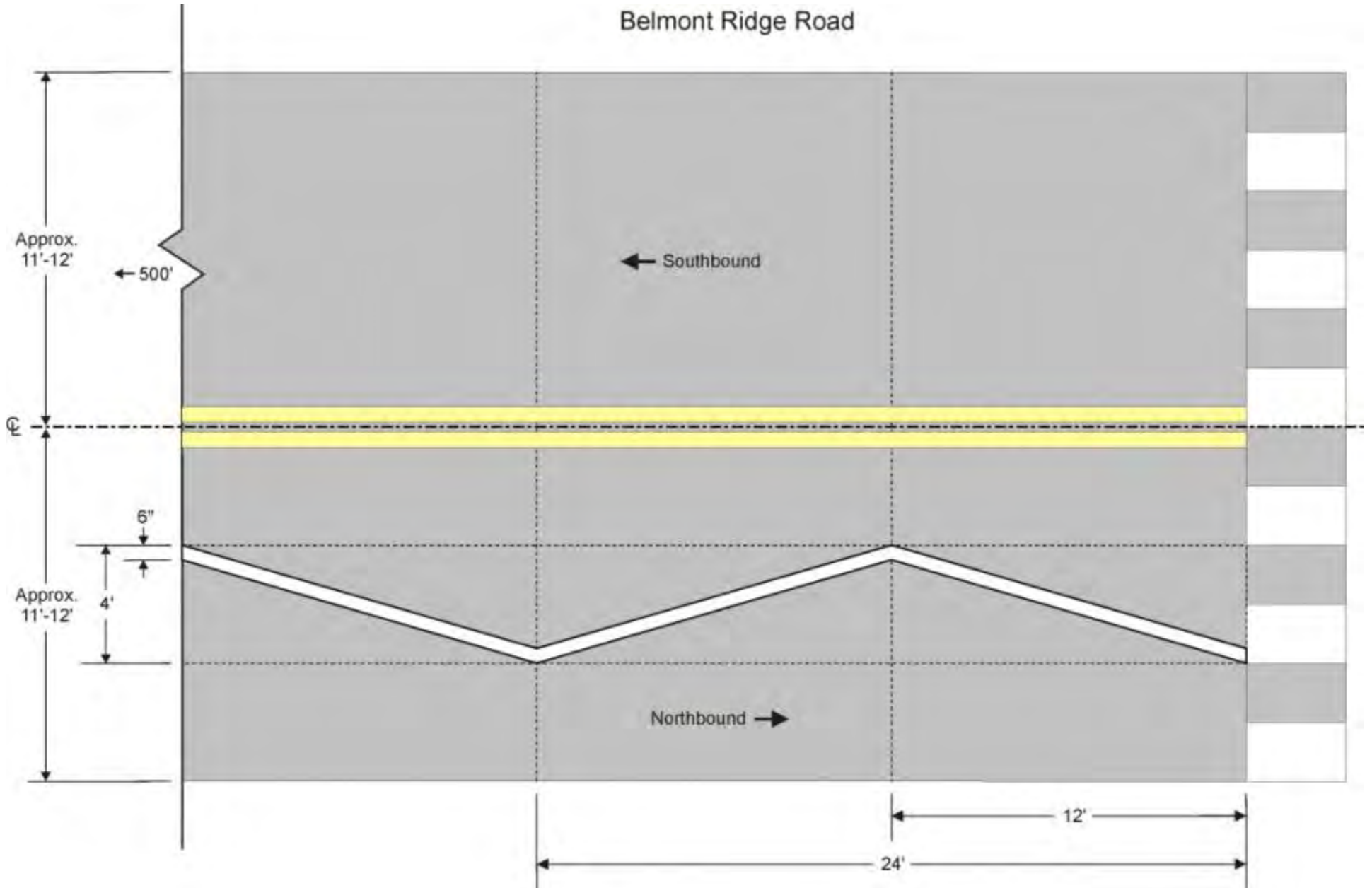
# Washington & Old Dominion Trail (W&OD)







# Belmont Ridge Road







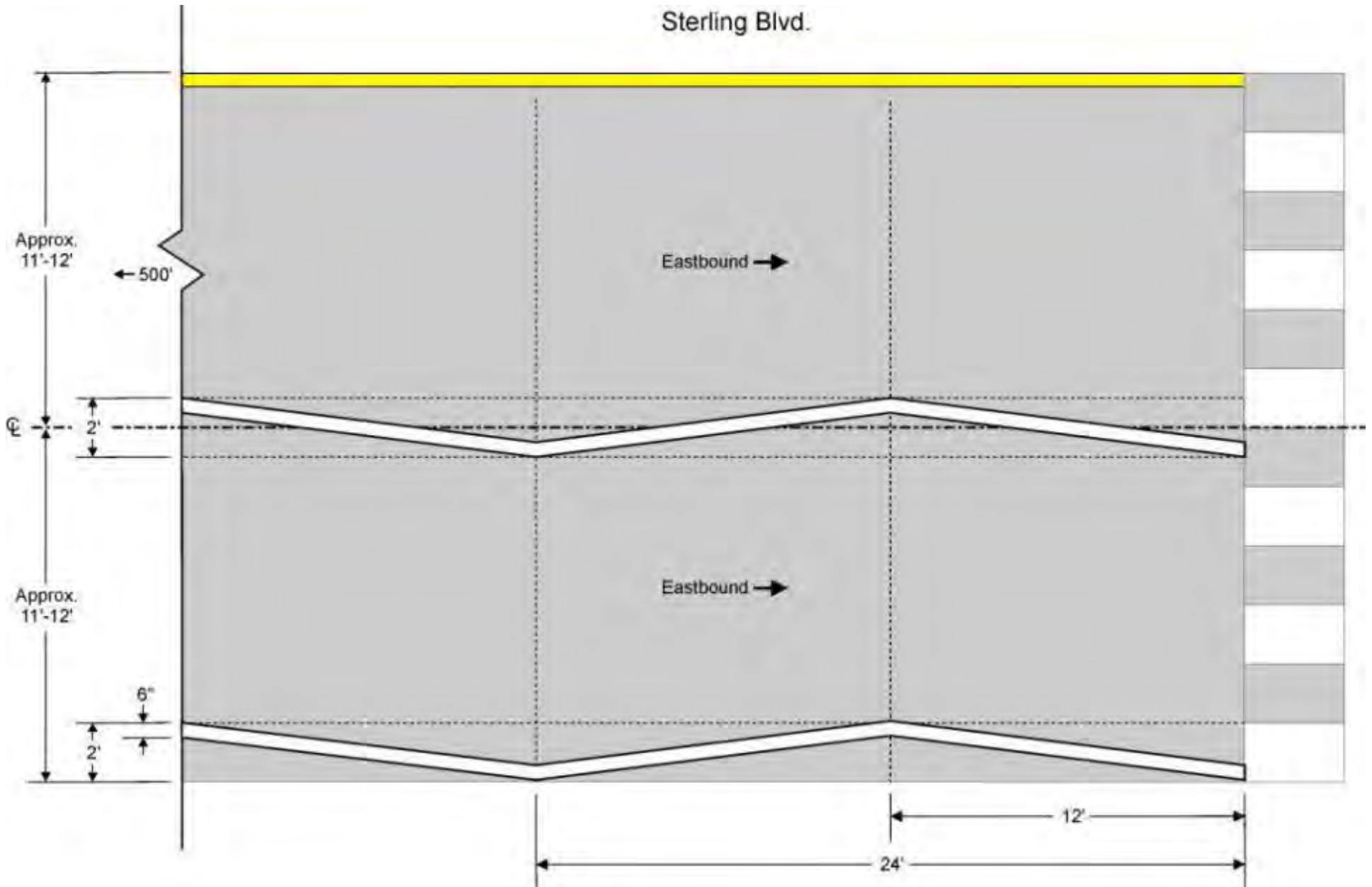








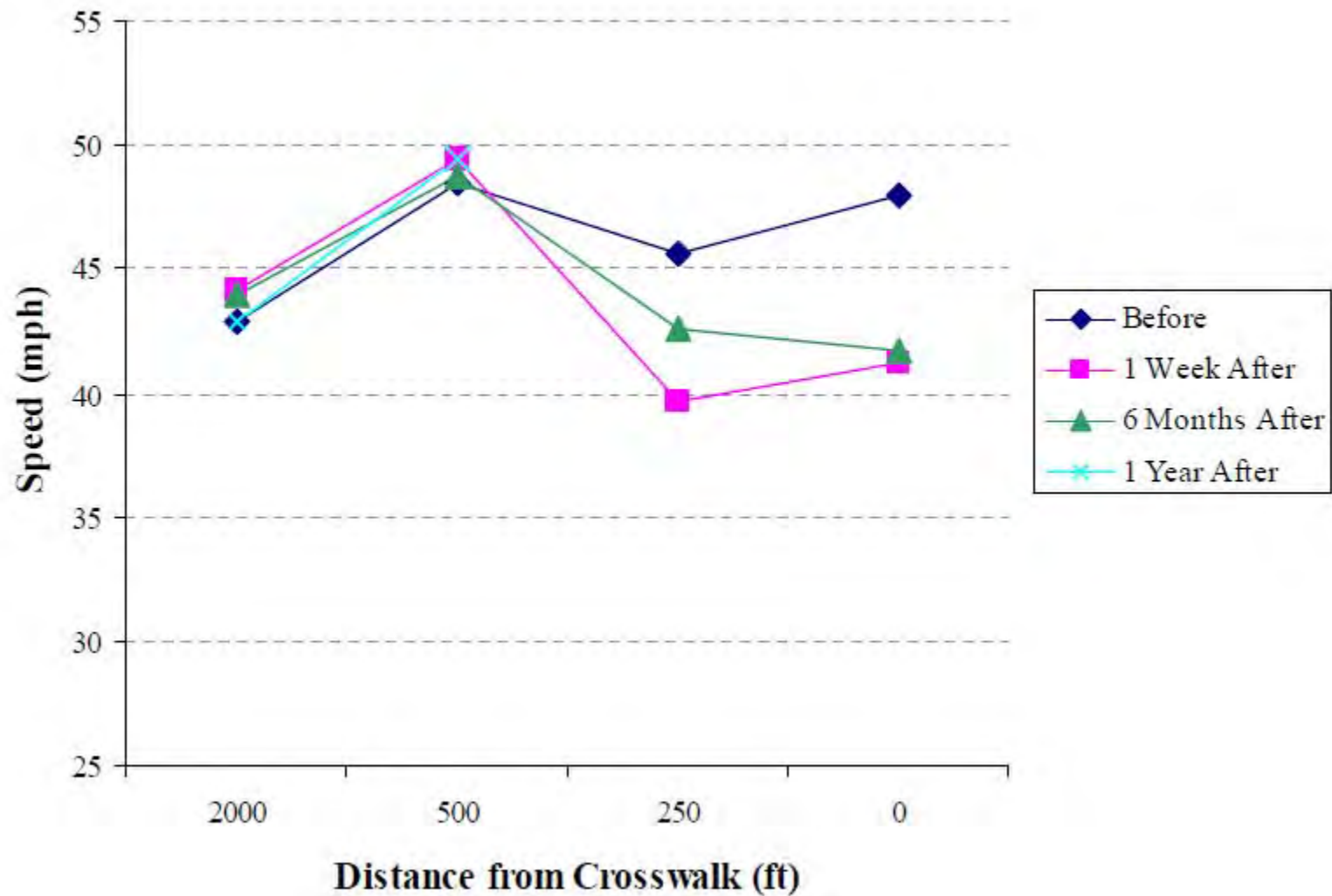
Sterling Blvd.



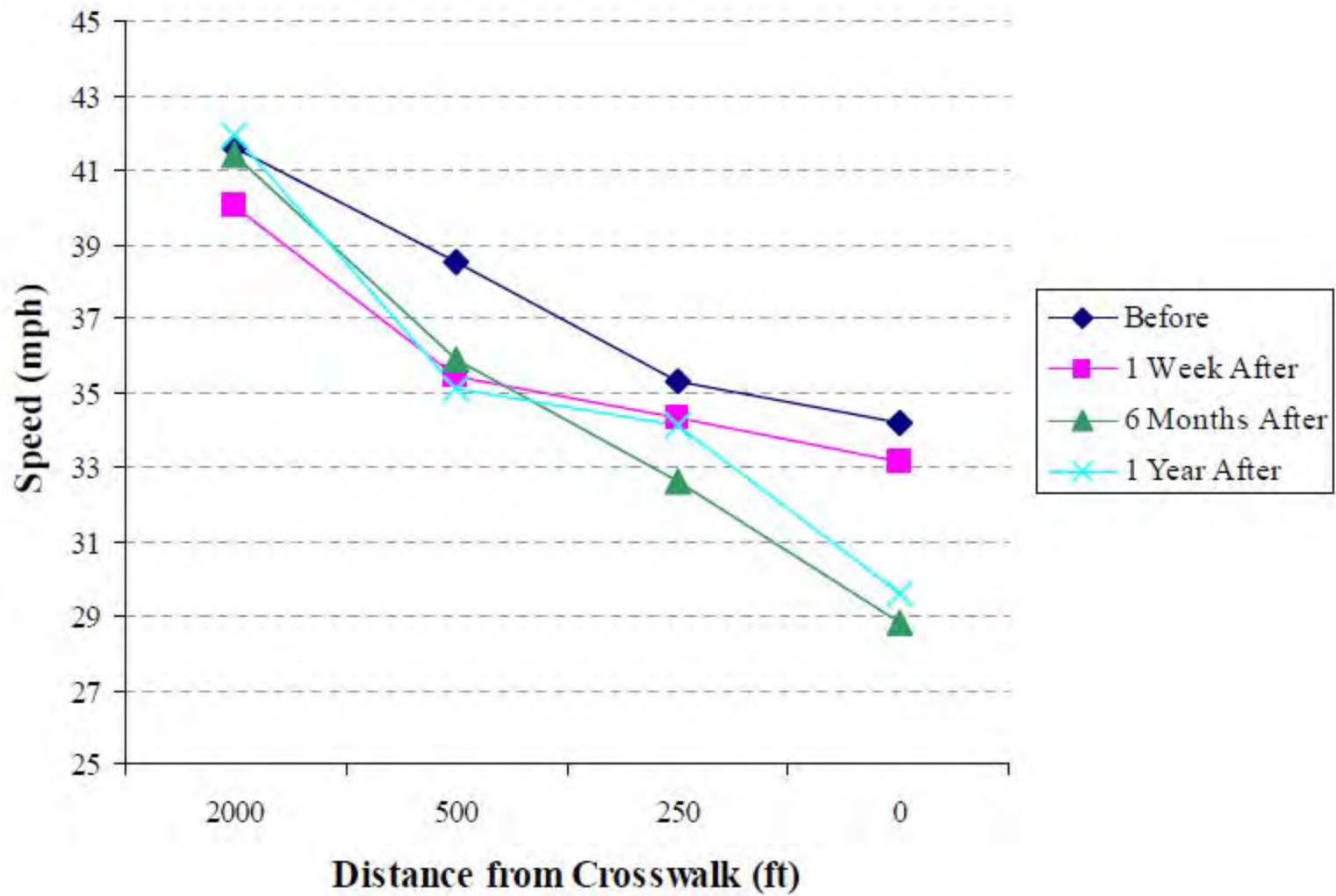




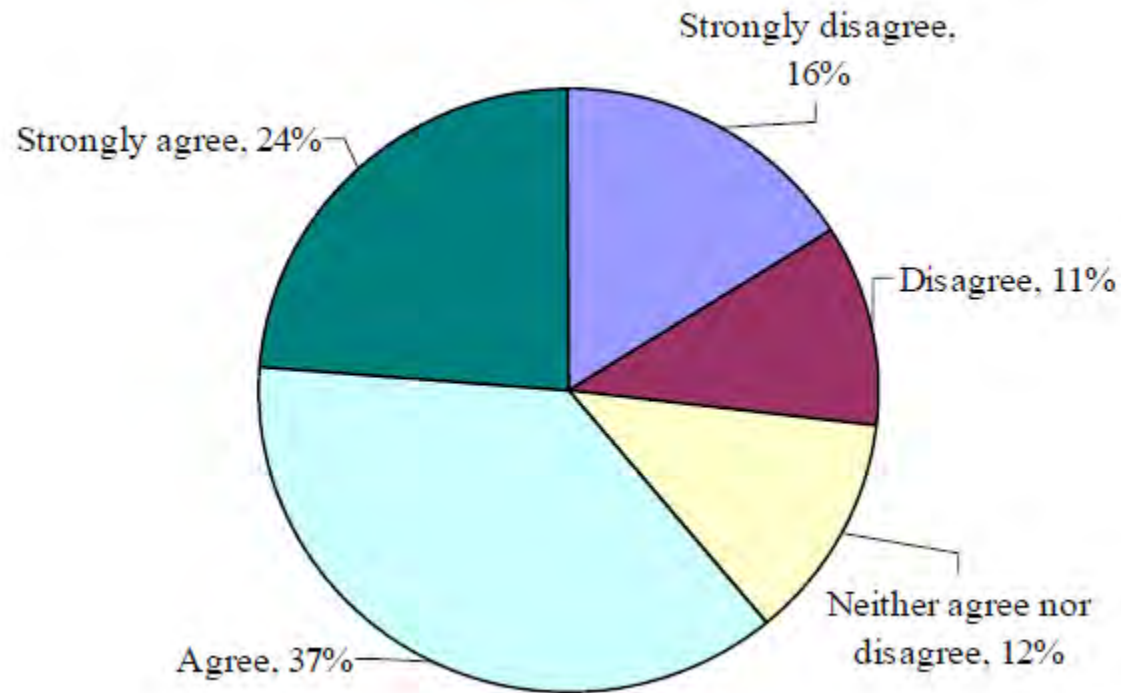
# Average Speeds, Southbound Belmont Ridge Rd.



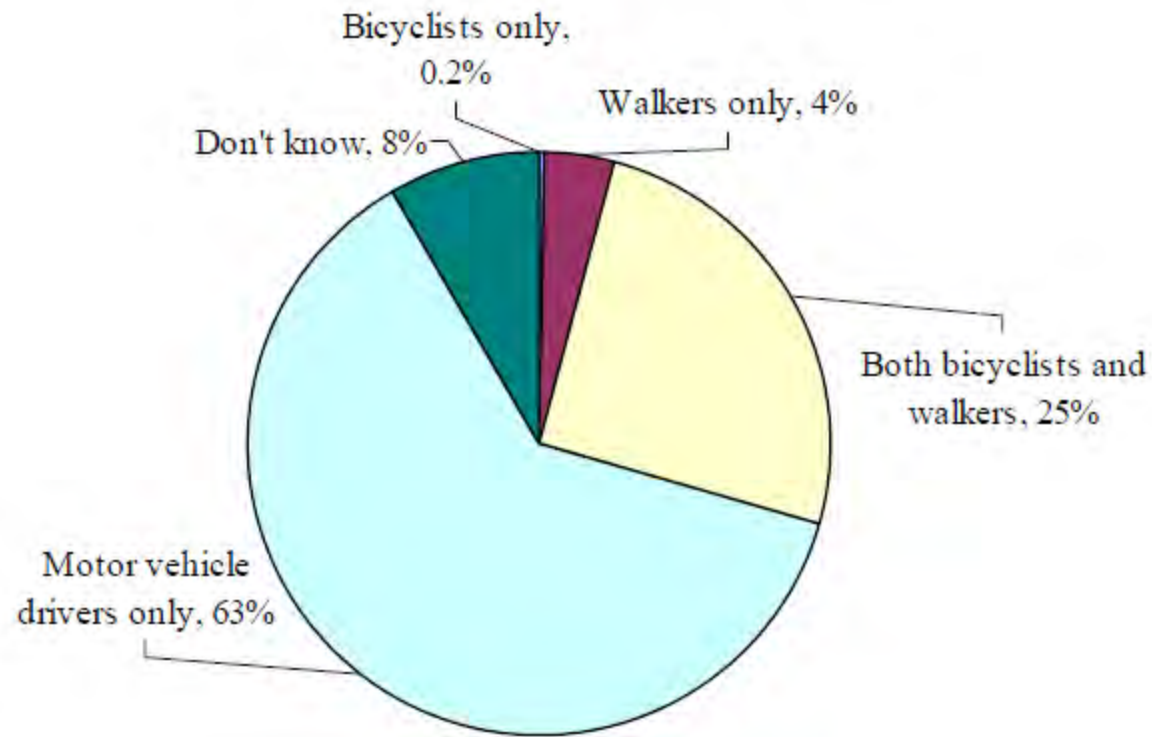
# Average Speeds, Eastbound Sterling Blvd.



# Survey: Do the zig-zags increase your driving attention?

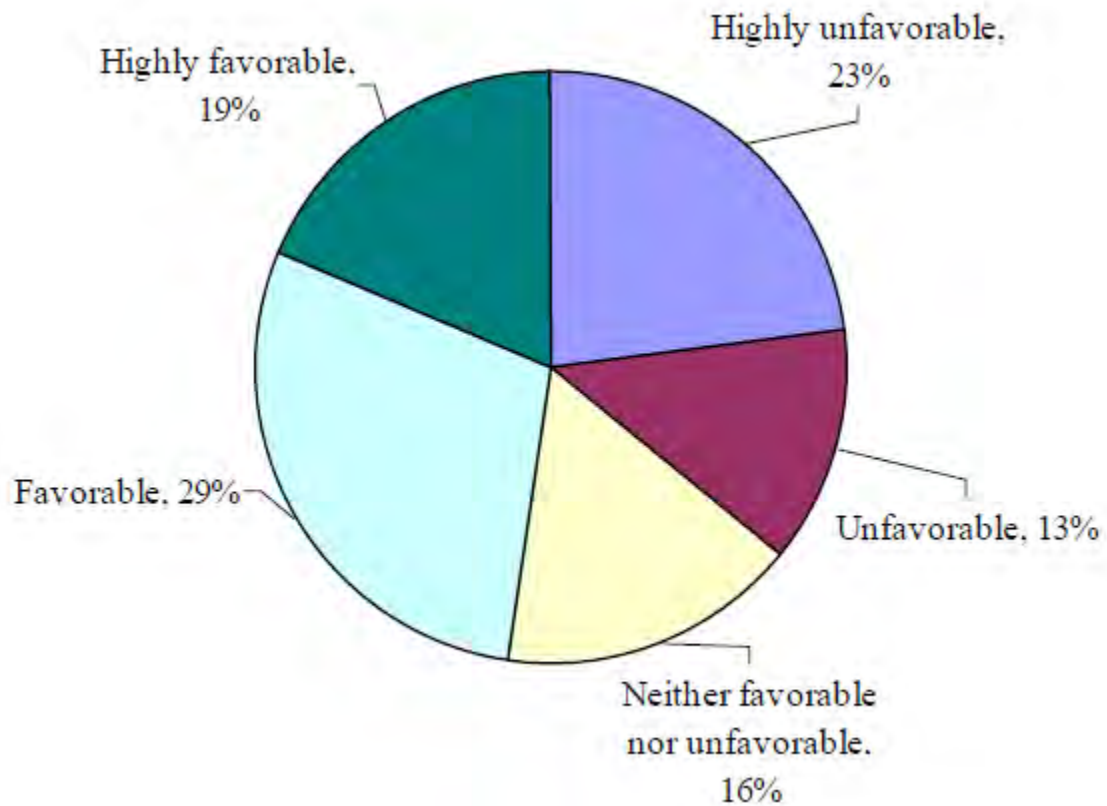


# Survey: Who has the right-of-way?





# Survey: Overall opinion of zig-zags



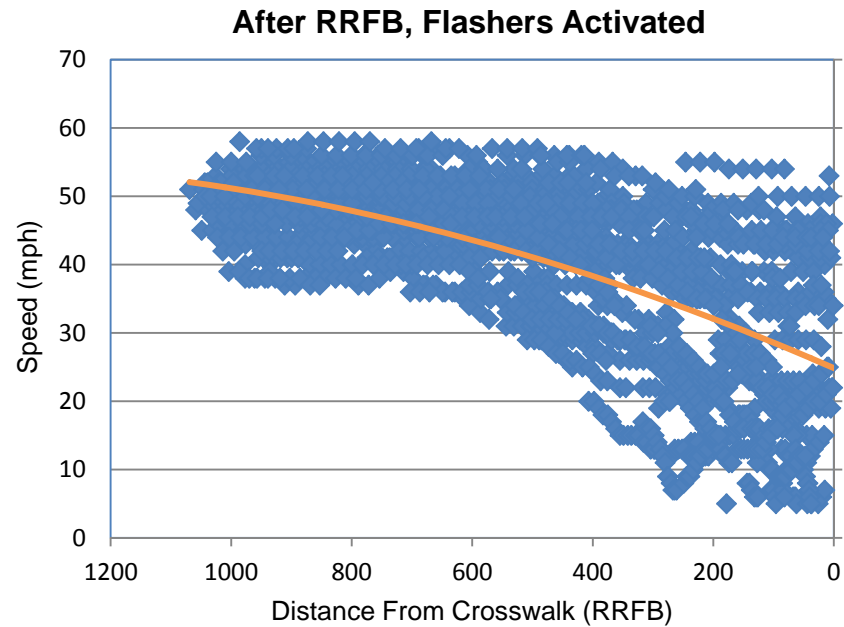
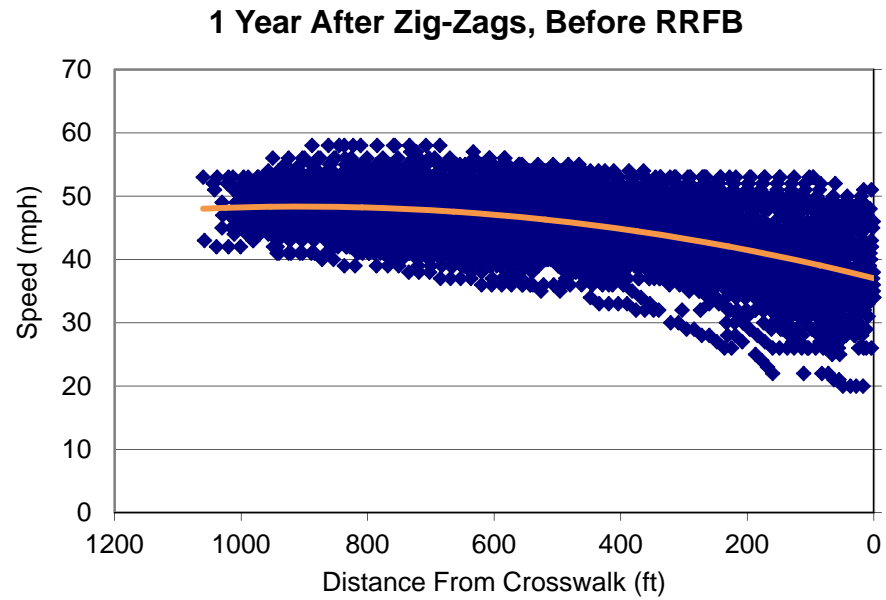




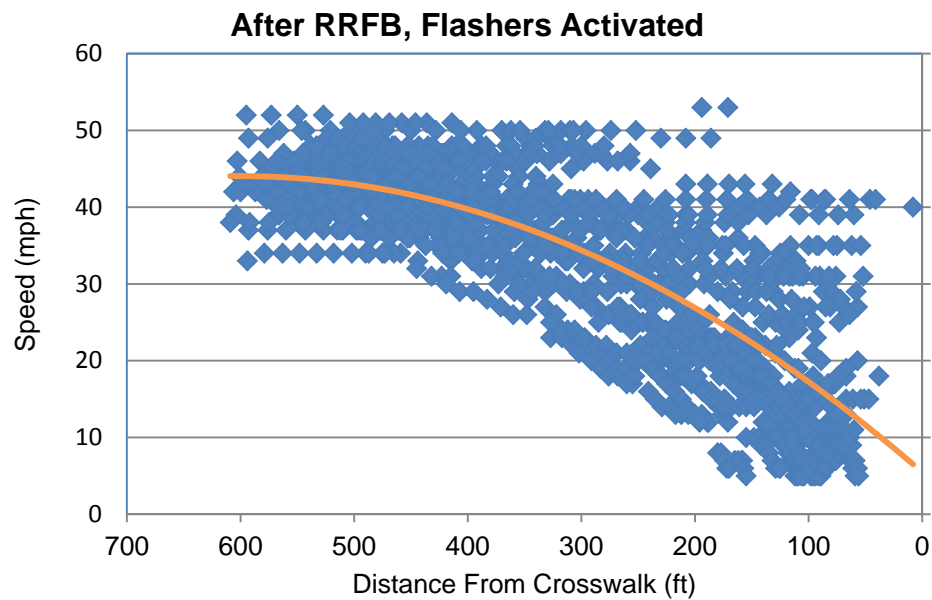
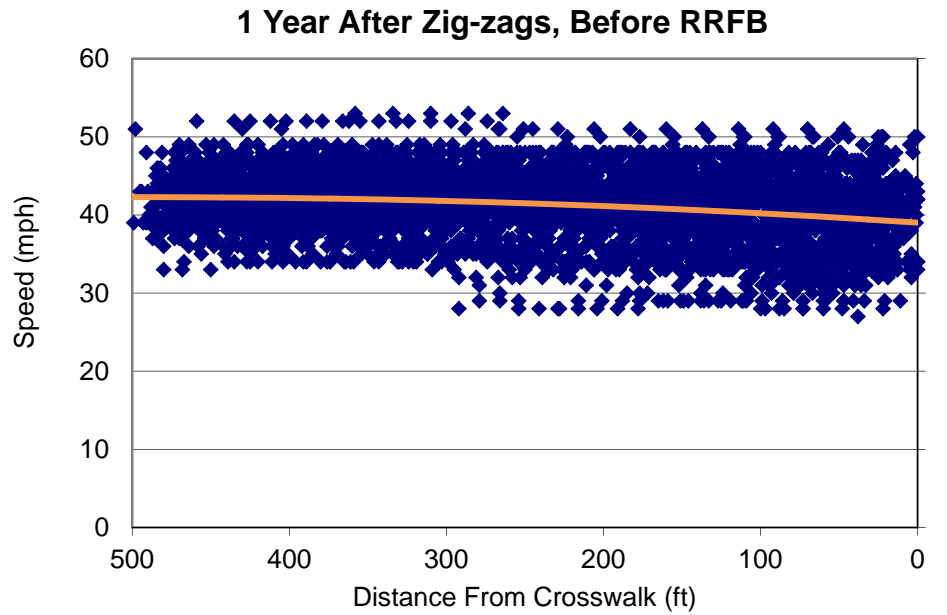
## RRFB Results

- **Increased visibility of the crossings**
- **Motorists slow and yield more when the flashers are activated**
- **Fewer near-miss rear-end crashes from leading vehicle yields and queues when the flashers are activated**

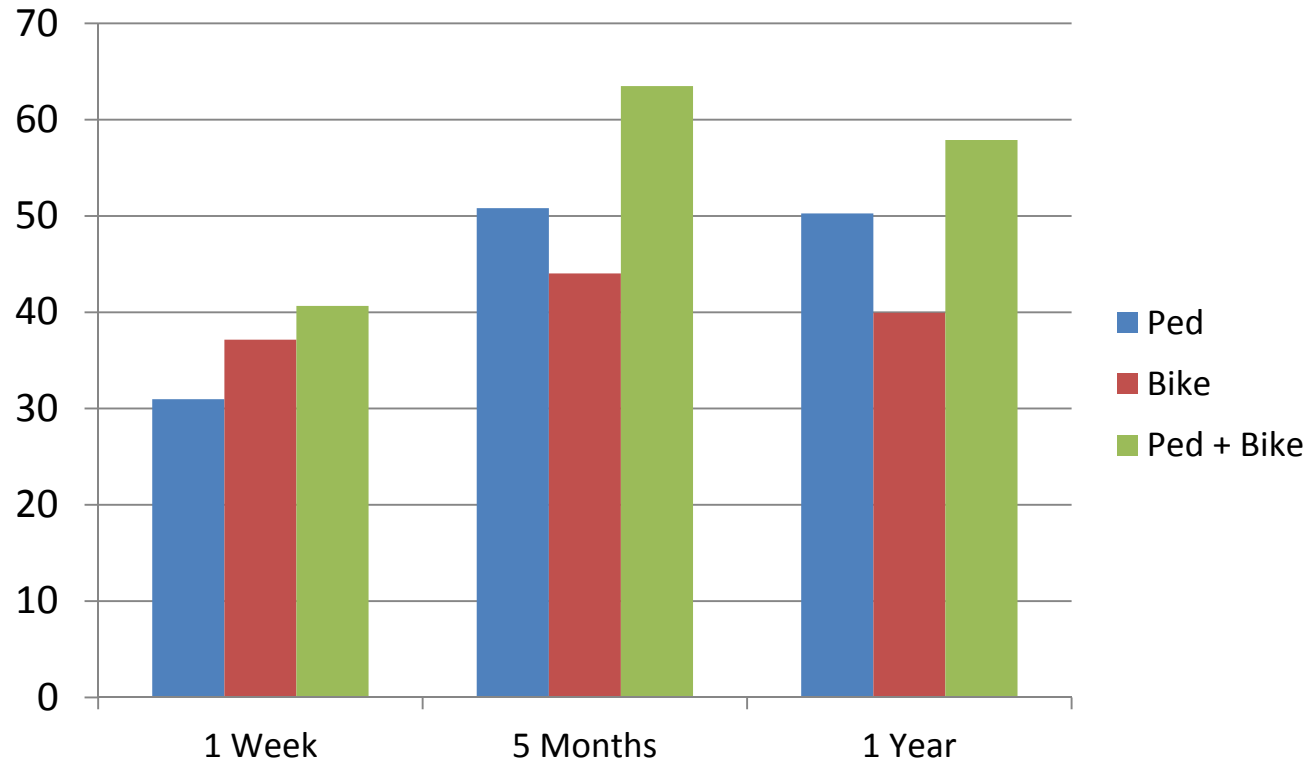
# RRFB Speed Impacts, Southbound



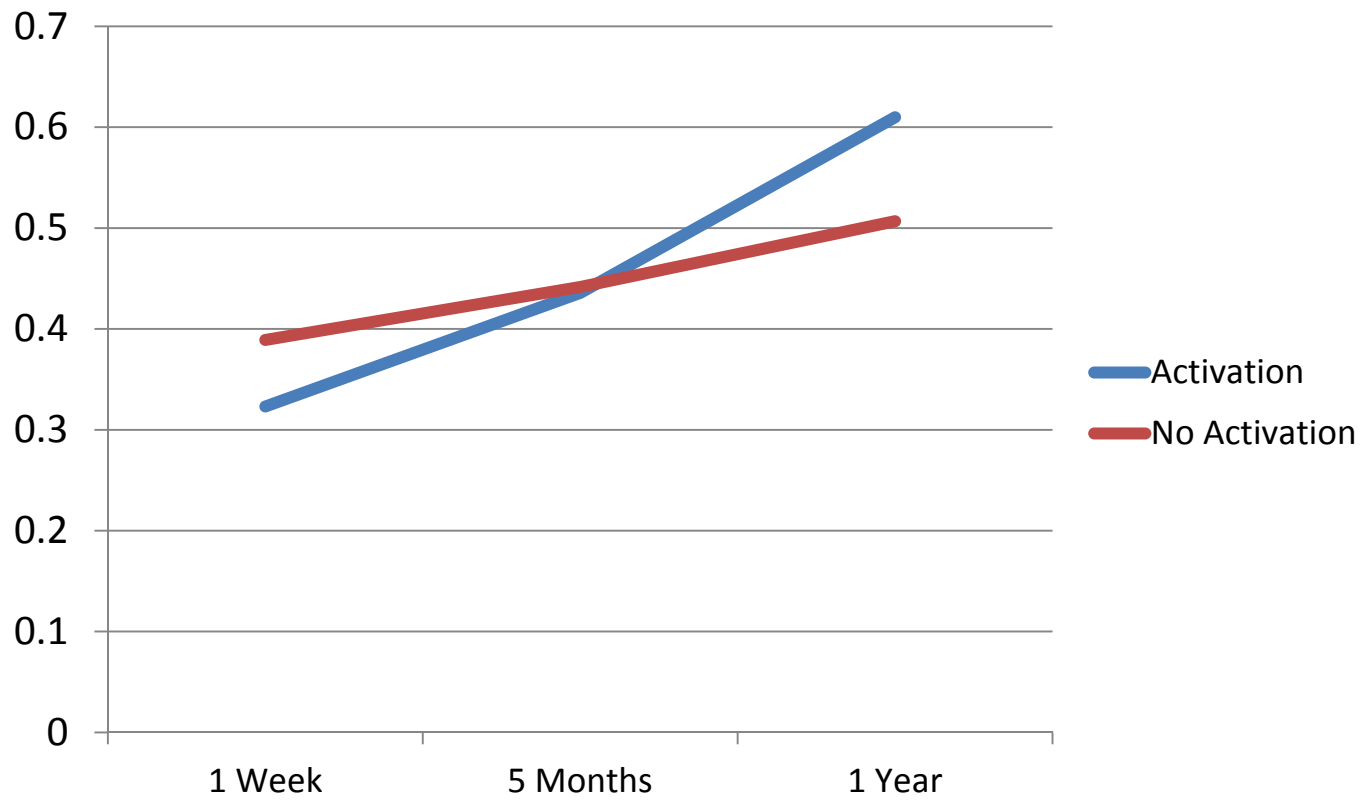
# RRFB Speed Impacts, Northbound



# RRFB Actuation Rate with traffic present



# Motorist Yielding Rate





# High-Volume Trail Crossing Treatments

Randy Dittberner  
Regional Traffic Engineer



# urban trail crossings

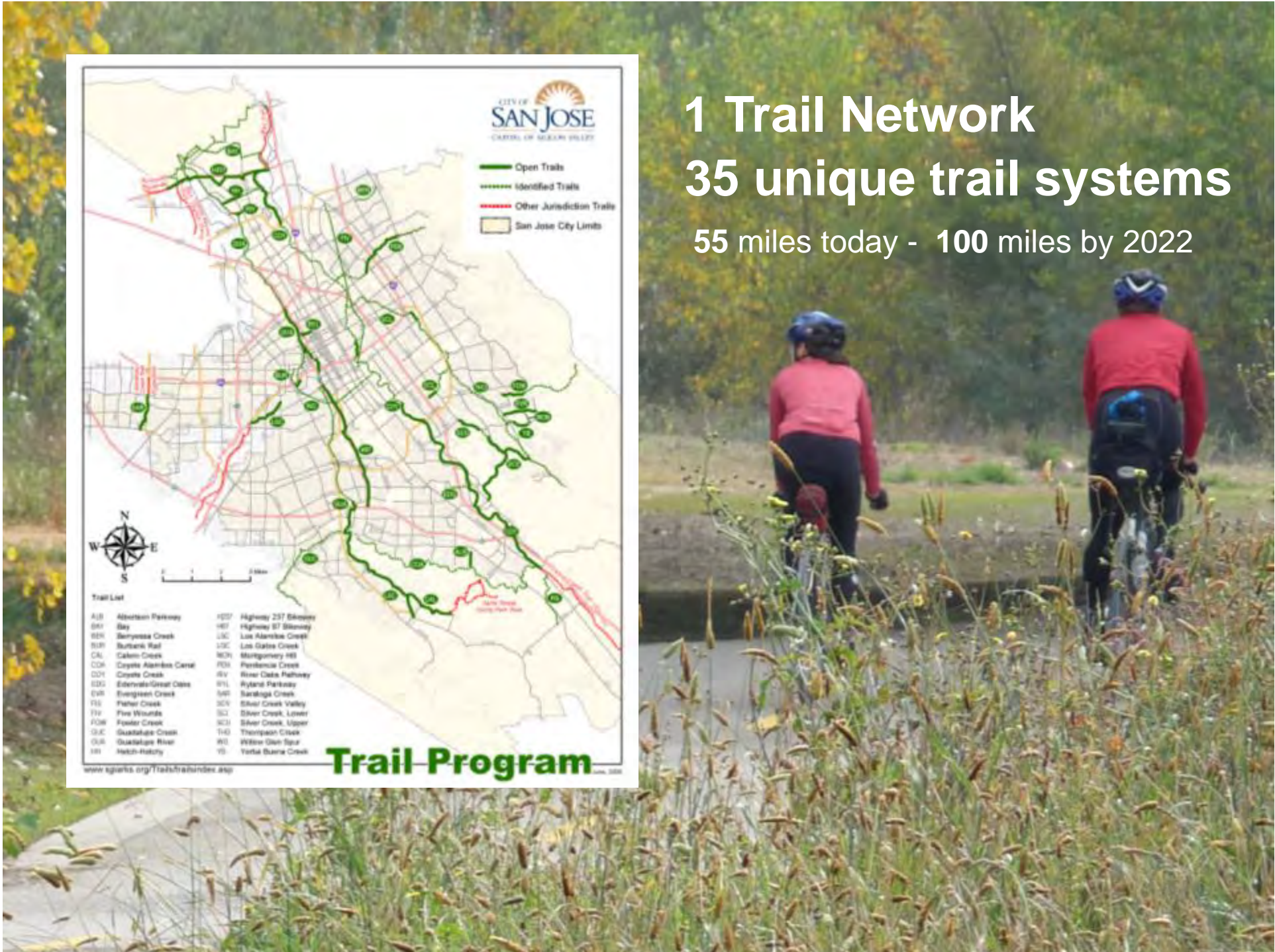


**Trails within 3 miles of all residents**

**One of nation's largest urban trail networks**

**55% commute share**





**1 Trail Network**  
**35 unique trail systems**  
 55 miles today - 100 miles by 2022



# Five types of trails

## Riparian



Paved trail within a natural and/or landscaped environment. Requires pruning of native environment and may include mitigation sites.

## Parkway-Utility



Paved trail within a landscaped corridor. Utilities and access requirements prevent highly planted areas.

## Highway



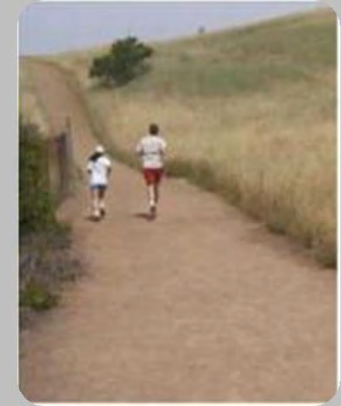
Paved trail within a highly urban and fenced environment. Landscaping is unlikely.

## Rail/Trail



Paved trail within a landscaped corridor. May include tall trees due to few development restrictions.

## Interim (short-term)



Gravel or dirt maintenance road suitable for public access. Site for future paved trail. No landscaping typically beyond the native environment.

# Crossings

- Mid-Block / Stop Control
- Traffic Signals
- Under-Crossings

# standard at-grade crossings





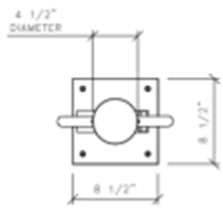




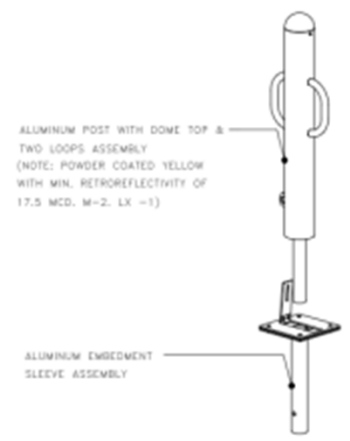




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	Telephone 503/223-1157 Facsimile 503/223-4530 E-mail <a href="mailto:HQ@timberform.com">HQ@timberform.com</a>	<table border="1"> <tr> <td>Drawn by:</td> <td>Date:</td> <td>Rev. by:</td> <td>Date:</td> <td>Scale:</td> </tr> <tr> <td>DG</td> <td>06-10-11</td> <td></td> <td></td> <td>None</td> </tr> <tr> <td colspan="4">Drawing No:</td> <td>Sheet:</td> </tr> <tr> <td colspan="4">P-11074-R</td> <td>2 of 2</td> </tr> </table>	Drawn by:	Date:	Rev. by:	Date:	Scale:	DG	06-10-11			None	Drawing No:				Sheet:	P-11074-R			
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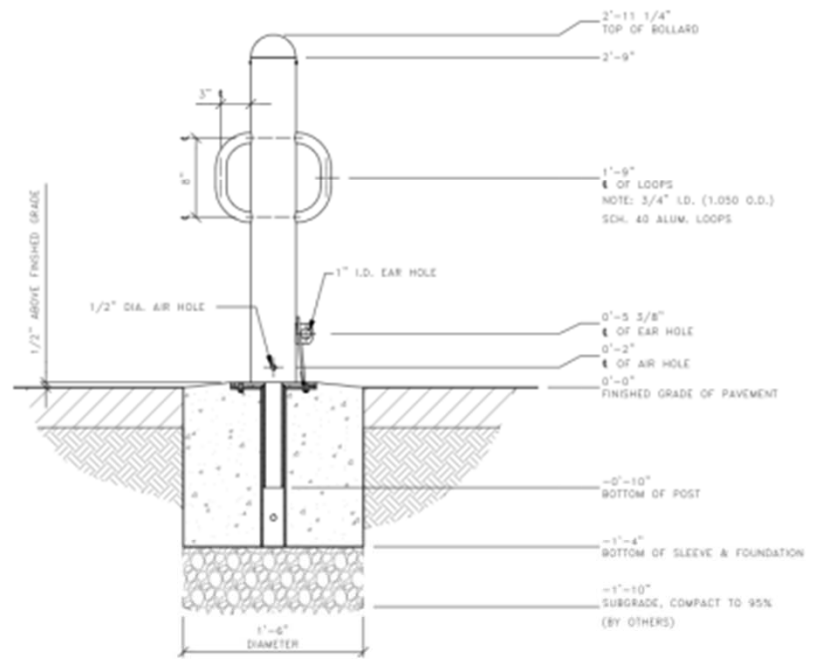
TOP VIEW  
SCALE 1 1/2"=1'-0"



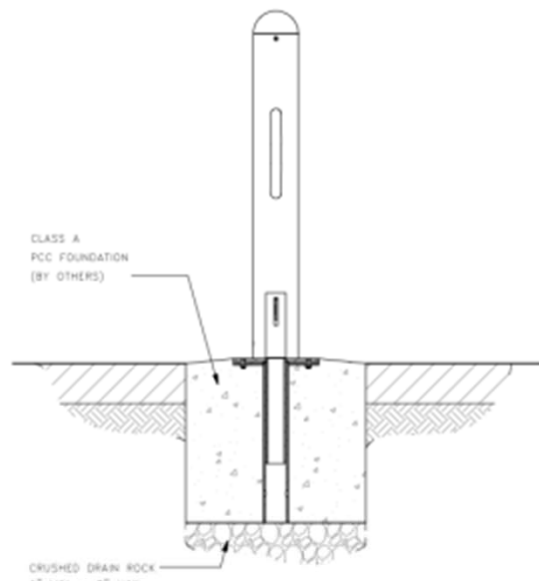
ALUMINUM POST WITH DOME TOP & TWO LOOPS ASSEMBLY  
(NOTE: POWDER COATED YELLOW WITH MIN. RETROREFLECTIVITY OF 17.5 MCD, M-2, LX -1)

ALUMINUM EMBEDMENT SLEEVE ASSEMBLY

ISOMETRIC VIEW  
SCALE NONE



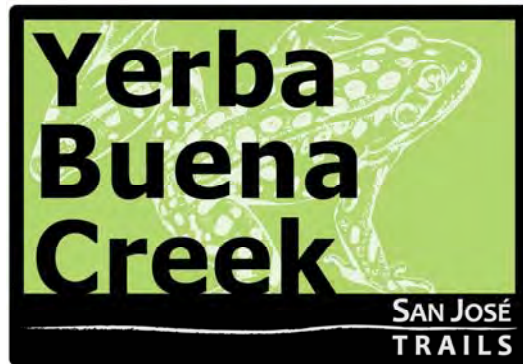
FRONT VIEW  
SCALE 1 1/2"=1'-0"



SIDE VIEW  
SCALE 1 1/2"=1'-0"

NOTE:  
CONCRETE FOOTING AND NO. 4 REBAR (BY OTHERS) PER LOCAL SOIL CONDITIONS. CONSULT PROJECT ENGINEER FOR EXACT REQUIREMENTS.

	<b>COLUMBIA CASCADE COMPANY</b> Division of Timberform® Products & Safety® Timberform®-2 and Cylings® Products 201 S.W. 20th Avenue, Suite 200, Gresham, OR 97030-1100 Phone: (503) 867-1000 Fax: (503) 867-1001		<b>TIMBERFORM METAL BOLLARD</b> MODEL NO. 2190-101-M REMOVABLE BOLLARD WITH HALF-HOLE COVER CITY OF SAN JOSE SAN JOSE, CA FMBKPC00C, INC. P-11074-B	
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	NOTED:	00-100-111 00-100-112		00-100-111 00-100-112
	1 of 2			



**TRAIL RULES**

**Hours**  

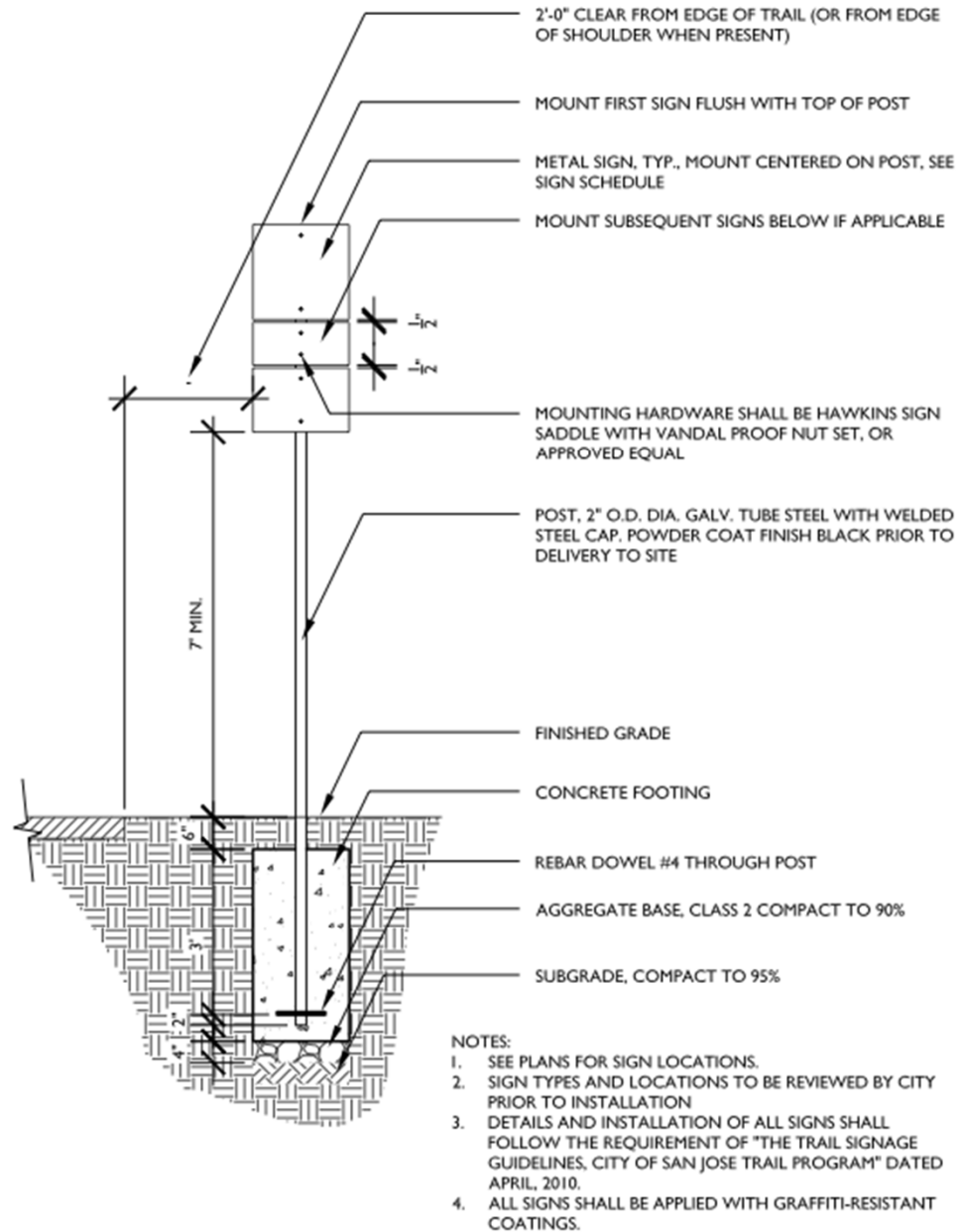
 one hour before sunrise  
 one hour after sunset

Maximum speed is 15 MPH (Muni Code Sec. 13.44.100)  
 Bicyclists yield to pedestrians  
 Bicyclists obey all traffic rules (Veh. Code Sec. 21201)  
 Picnic in designated areas only  
 Clean up after pets  
 Dogs on short 6' leash and under owner's control at all times  
 Dogs must be kept to right of trail's centerline

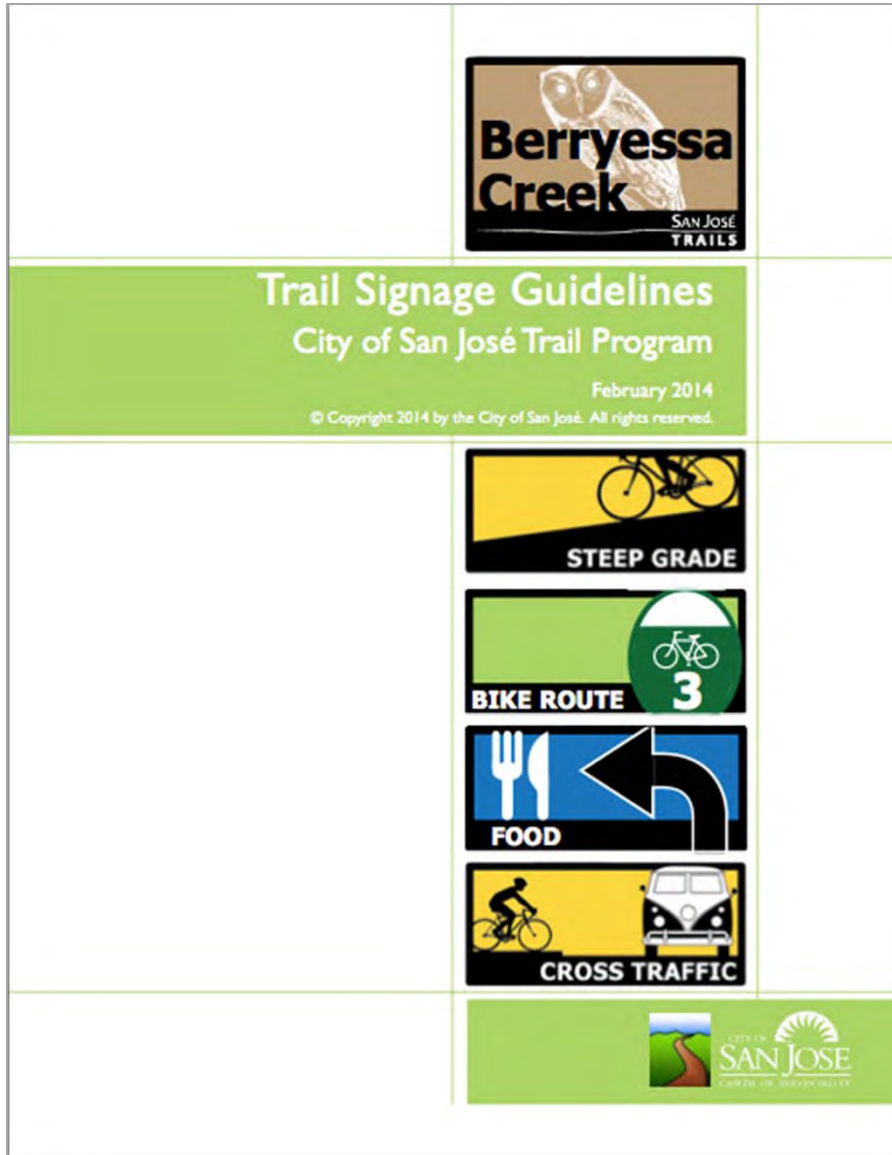
No fires, alcohol, or smoking  
 No motorized vehicles \*  
 No boating, fishing, or swimming  
 No camping  
 No trespassing on adjacent lands  
 When talking, headphones or similar devices may only cover one ear

**911** Call 911 for emergencies  
 San Jose Municipal Code Section 13.44.020, 7.00.590, 7.40.040, and all other codes and State laws are strictly enforced  
 \* Persons with mobility disabilities may use power-driven mobility devices in conformance with State and Federal laws and regulations





**TRAIL SIGN**  
**SCALE: 1/2"=1'-0"**



San Jose Trail Signage Guidelines

San Jose Trail Design Guidelines (DRAFT)

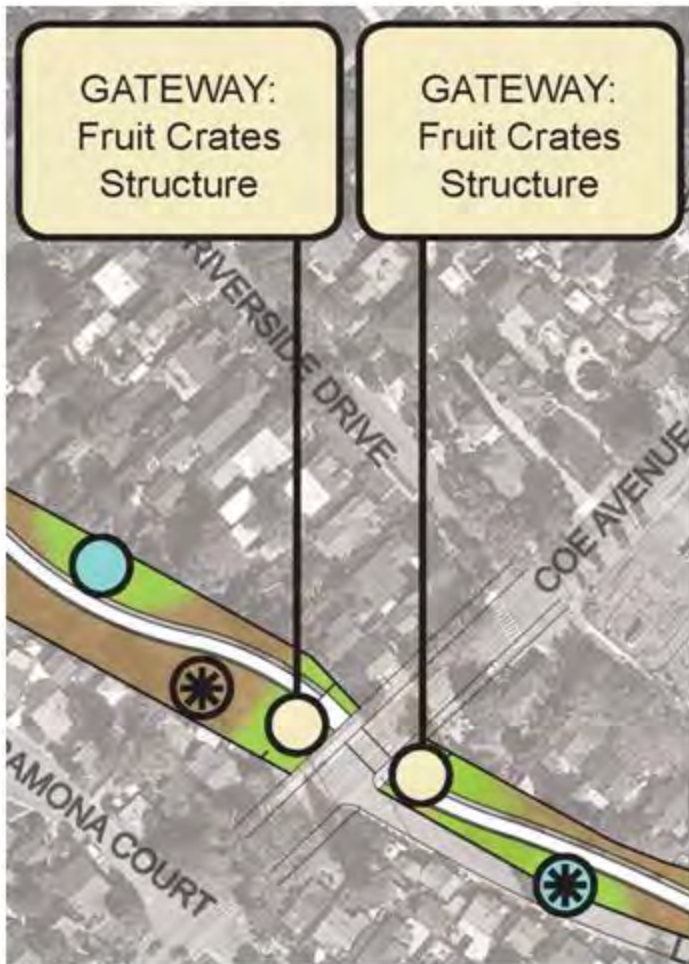
Caltrans Highway Design Manual

VTA Bicycle Technical Guidelines

Santa Clara County Design Guidelines



# enhanced at-grade crossings



# Gateways: Fruit Crates













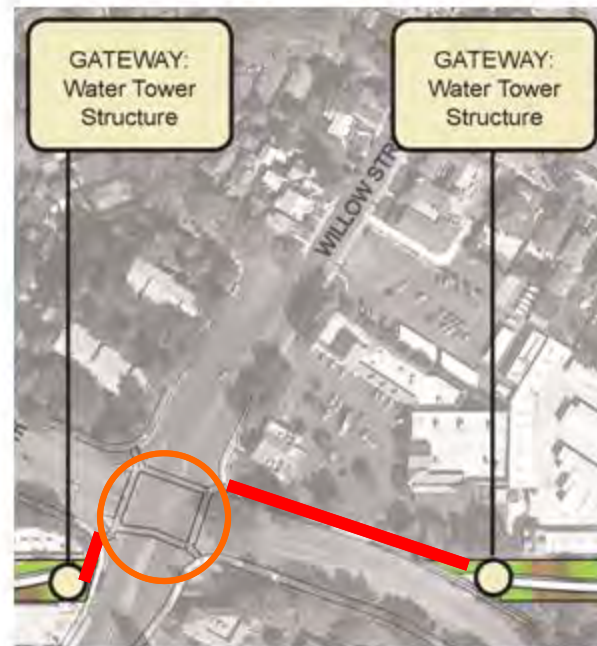




# Gateways: Willow Street and Bird Avenue



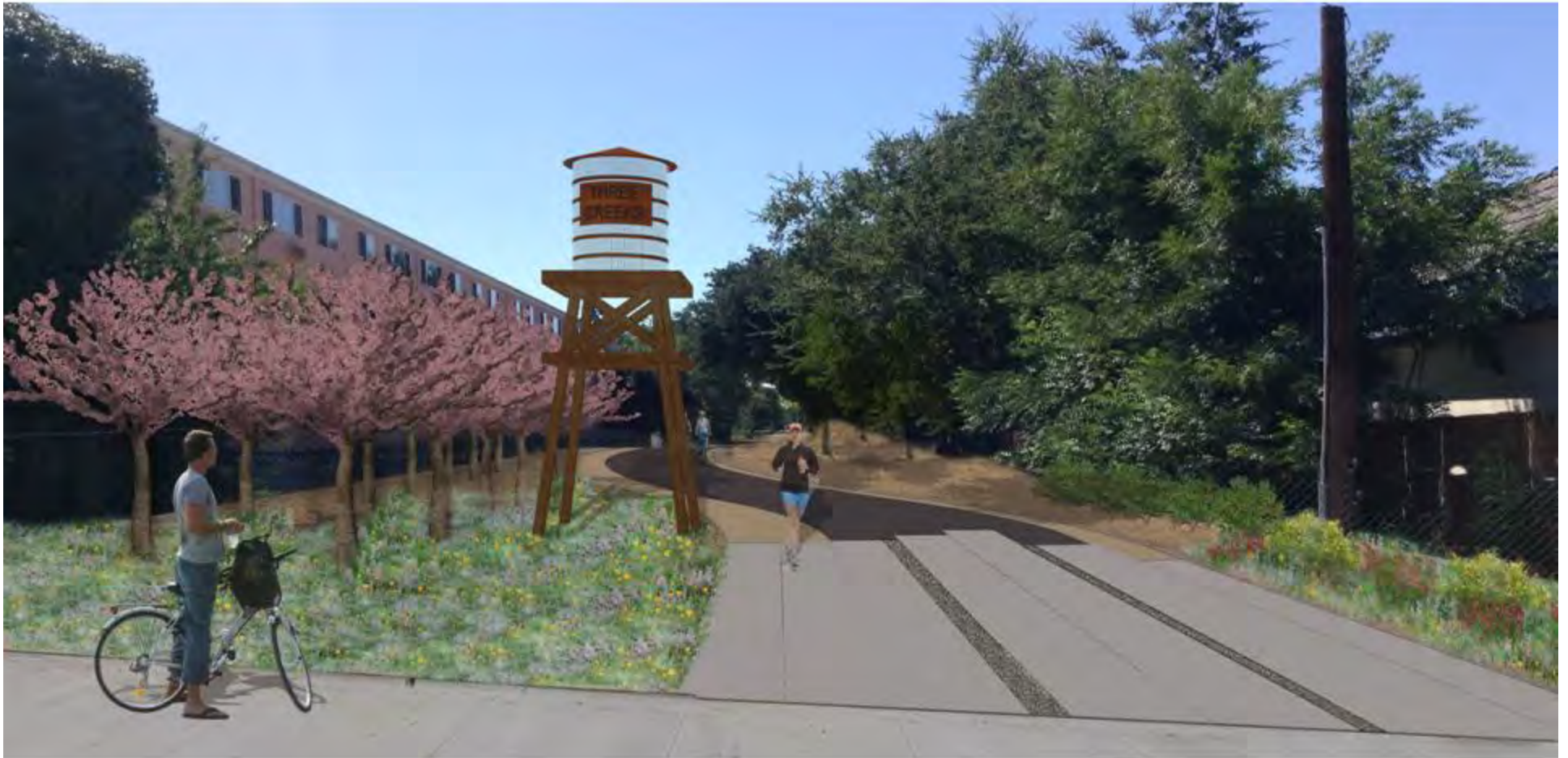
**Willow Street**



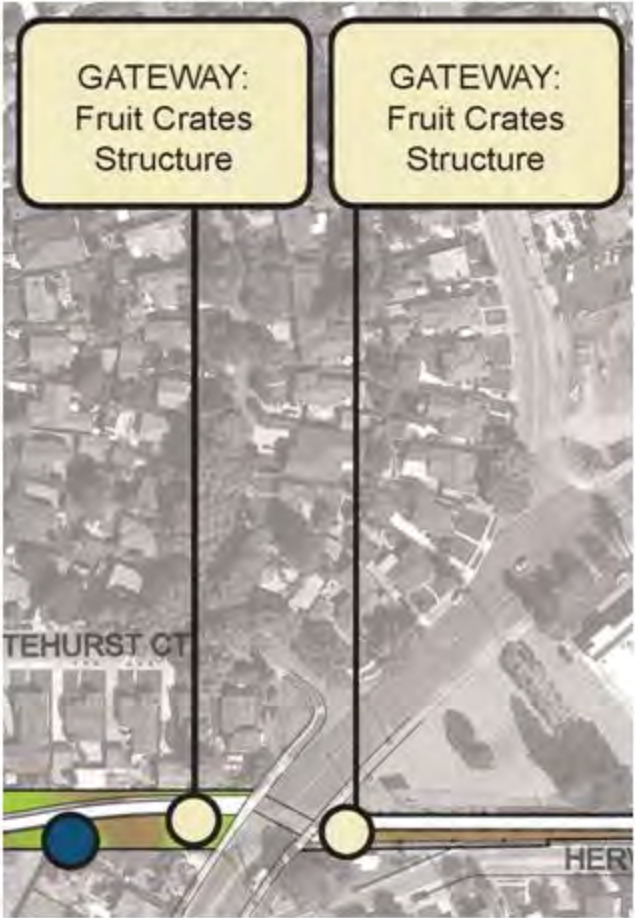
**Bird Avenue**



# Gateways: Water Tower



# Gateways: Minnesota Avenue





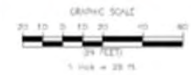
# HAWK Signal

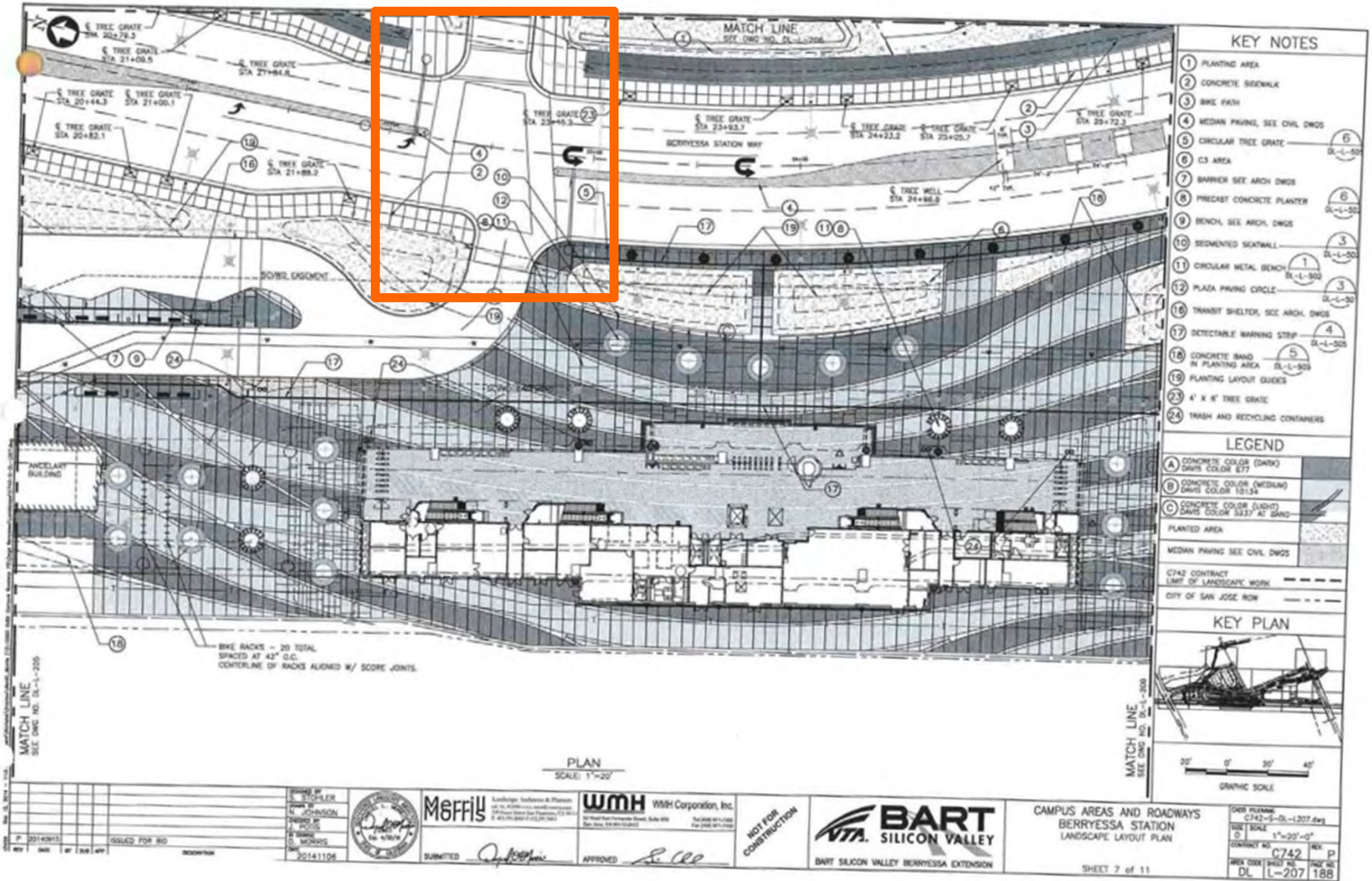


**Morrill**  
 Landscape Architecture & Planning

**UPPER PENITENCIA CREEK TRAIL CONNECTOR**

2 APRIL, 2014







**NOTES:**  
 SEE SHEET DL-C301 FOR ADDITIONAL NOTES.  
 SEE SHEET DL-C002 FOR LEGEND.  
 SEE SHEETS DL-C300 TO DL-C306 FOR ROADWAY PLAN AND PROFILE.  
 CNF - CONFORM  
 [C31] CONSTRUCT LONGITUDINAL CONSTRUCTION JOINT PER DETAIL 4, DWG DL-C330.

CHG FILENAME C742-S-IL-C315.dwg SIZE SCALE 1"=10' CONTRACT NO. C742 AREA CODE DL SHEET NO. C315 PAGE NO. 72		WMH Corporation, Inc. 20000 Redwood Drive, Suite 200 San Jose, CA 95131-2000 Tel: 408-971-7000 Fax: 408-971-7000				CAMPUS AREAS AND ROADWAYS BERRYESSA STATION PAVEMENT ELEVATION DETAIL MABURY ROAD SHEET 1 OF 2	
DESIGNER D. J. [Signature] CHECKED S. [Signature] DATE 01/14/10		APPROVED [Signature]		SLEMTED [Signature]		APPROVED [Signature]	



at-grade crossing not possible



~~Recreational Easement~~

Longitudinal Easement

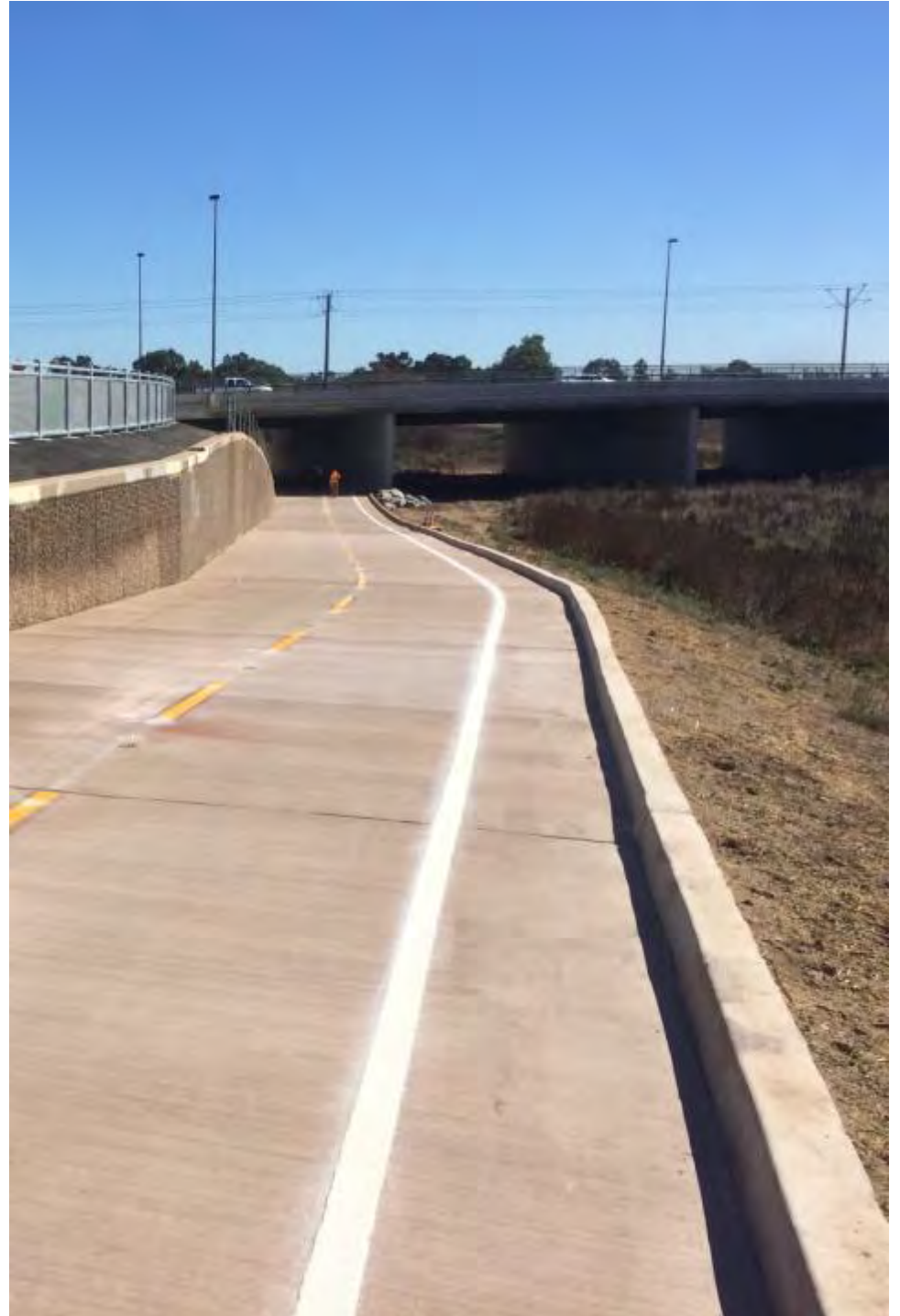
















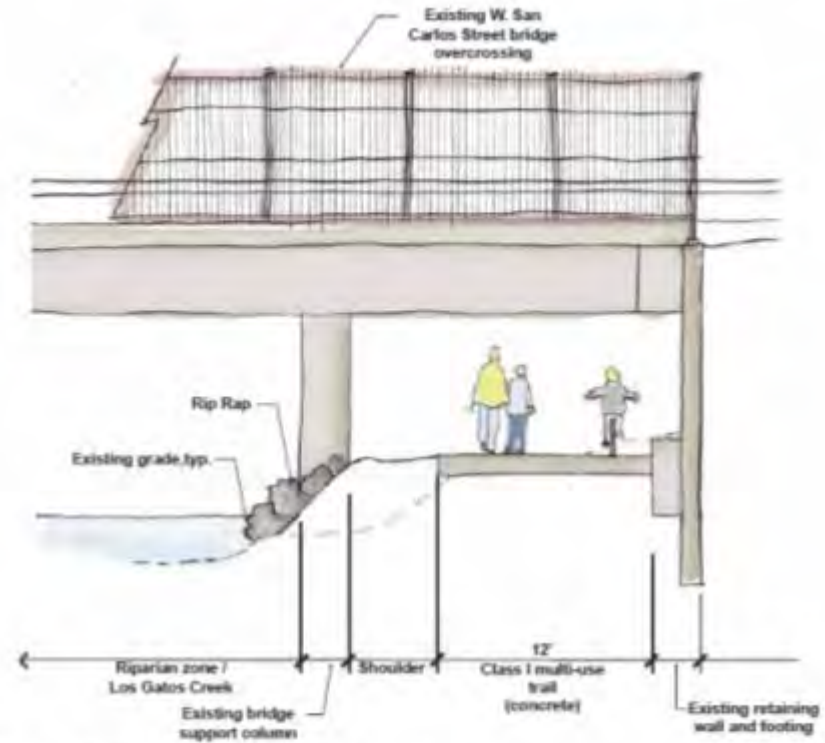
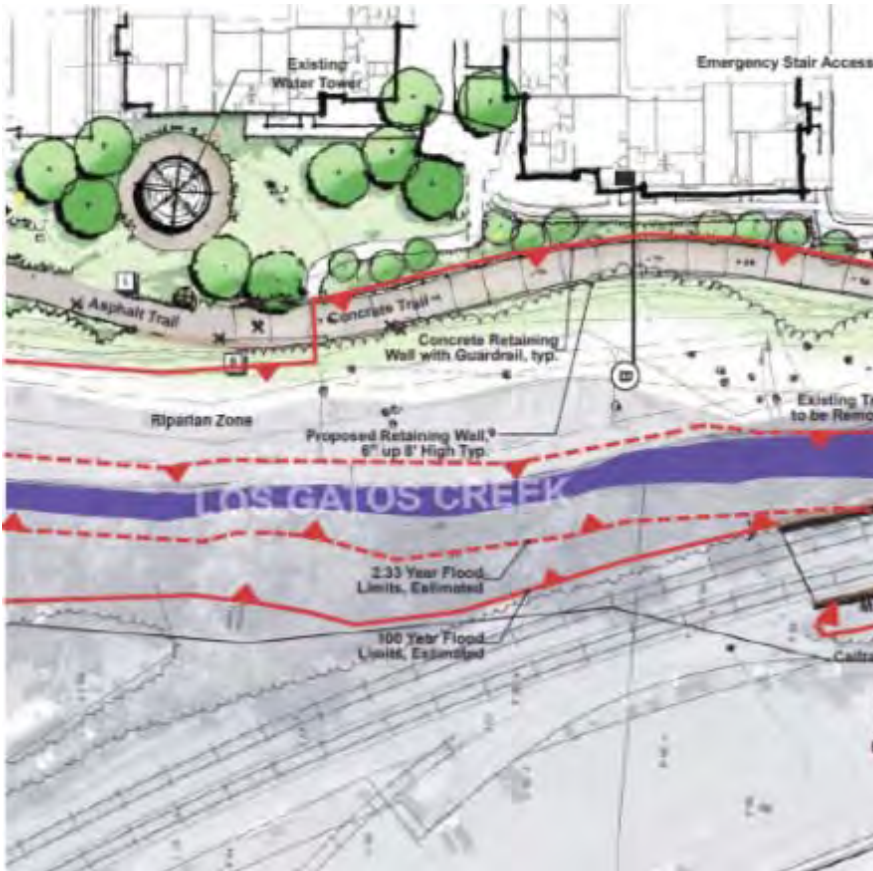


Figure 18: Section C: SPRR Under-crossing



Figure 19: View A: South from SPRR Under-crossing

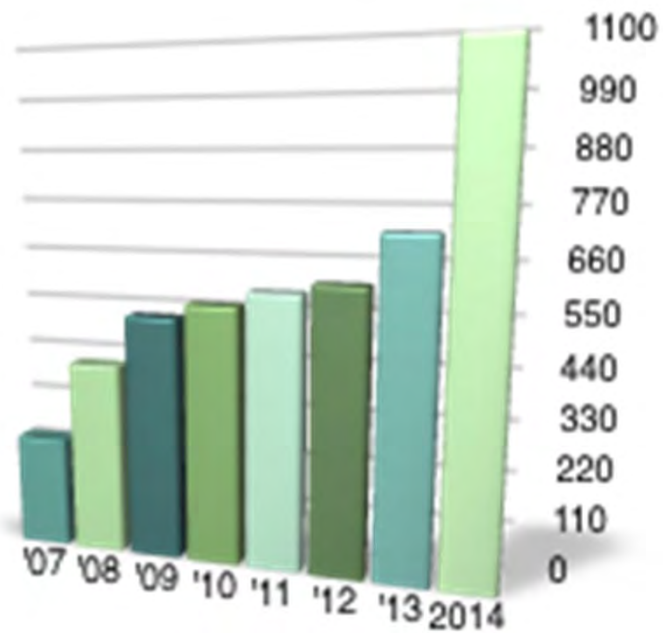


Figure 20: View B: East under West San Carlos Street





**TIP:** Collect Data



50% increase in 2014



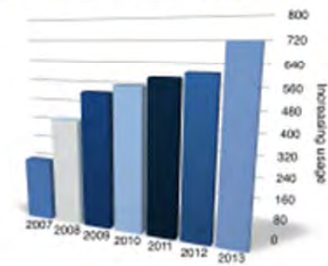
The Guadalupe River Trail is 9 miles long and extends from downtown San José to the San Francisco Bay. Nearly 7 miles of the trail system were recently paved from Interstate 880 to the Bay. The trail travels besides San José International Airport (SJC) and many of Silicon Valley's largest employers.

The newly paved trail is entirely "off street" and includes grade-separated under-crossings at two freeways, one County Expressway and four major City roadways.

The pavement project cost was approximately \$3.5M and was officially opened to the public on April 22, 2013. It represents a significant investment by the Federal Government through its SAFETEA-LU (Transportation Bill) program.

Usage data has been collected for the past 7 years and documents

over 1,000 trail users daily, with three count stations measuring between 700 and 1,100 users each. The table to the right shows the continuously increasing level of travel at the Coleman Avenue Count Station only.



The trail provides an all-weather surface that facilitates commuting by bicycle to the many Silicon Valley businesses along the riparian corridor. The trail also connects to the Guadalupe Gardens and Park (250 acres) and Downtown San José. The project's great location is seen as an economic development and recruitment tool and supports tourism with its proximity to the nearby convention center and downtown hotels. The trail supports healthy commuting.

and leads visitors and residents to great attractions.

**Design Challenges**

The paved trail project included technical and design challenges that were resolved by a comprehensive master plan before any design work got underway. The trail is constructed mostly along an existing gravel maintenance road on top of a levee under the US Army Corps of Engineers.



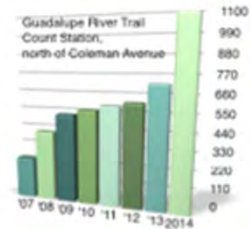


**DRAMATIC INCREASE IN TRAIL USAGE**

San José's annual count of trail users occurred at eight stations on September 24 - a large increase was documented at seven of those stations.



- Guadalupe River Trail at Coleman Avenue: 719 in 2013, 1,082 in 2014. A **50%** increase.
- Guadalupe River Trail at San Fernando Street: 899 in 2013, 1,256 in 2014. A **40%** increase.
- Guadalupe River Trail at River Oaks: This was first 12-hour count. There were **1,689** users passing along and the bridge that links the River Oaks light rail station to the Rivermark community.
- Los Gatos Creek at Hamilton Avenue: 1,217 in 2013, **1,397**



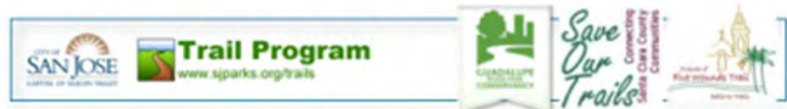
in 2014. A 15% increase.

- Los Gatos Creek at Auzerals Avenue: 157 in 2013, 169 in 2014. These counts occurred during the AM and PM Peak periods only. An 8% increase.
- Los Alamitos Creek Trail: 968 in 2013, 789 in 2014. A 18.5% decline.
- Three Creeks Trail at Willow Street: 45 in 2013, 54 in 2014. A 20% increase.
- Five Wounds (Trail - to be developed) at William Street: 369 in 2014. This is our first count at this location. The count was impressive for a corridor with no developed improvements and tracks remaining in place. Parents walking children to nearby school were observed to be a key user of this corridor.



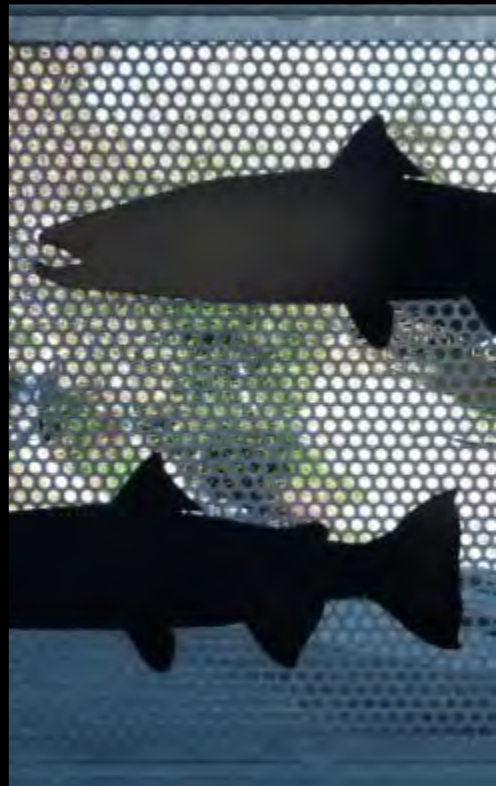
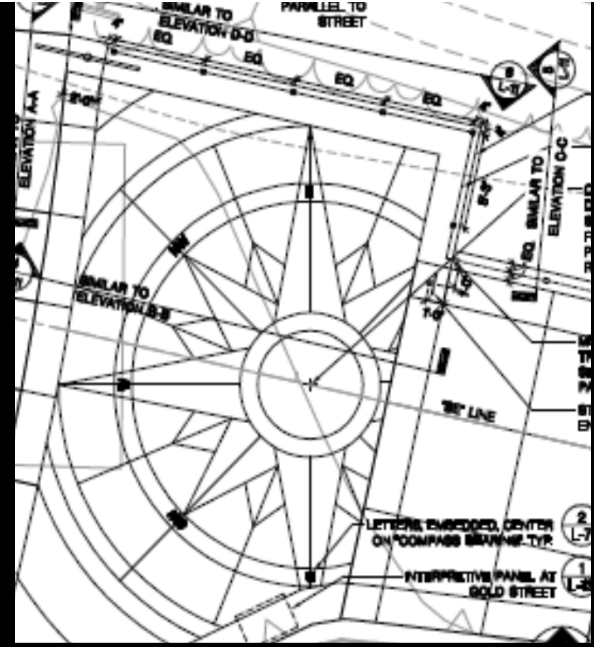
In partnership with:  
 Guadalupe Park Conservancy  
 Silicon Valley Bicycle Coalition  
 Five Wounds Neighborhood / Communiiversity

1





**TIP:** Quality & Gateways









# safety features



## FREQUENTLY ASKED QUESTIONS

### Why is safety and security important on trails?

Many of San Jose's trails are in remote locations or not easily viewed by neighboring roadways. The annual Trail Count survey indicates that only 25% of users are females and concern about public safety appears to be a discouraging factor. Providing a mechanism for 911 Center staff to quickly identify a precise location along a trail, and the best means to access it, can support quicker deployment of resources. Development of the marker system and companion signage and striping can help persons clearly identify their location, and better understand hazards, destinations and safety rules.

### How was the idea of marking and addressing trails initiated?

The San Jose Police Department is an active member of the Technical Advisory Committees (TAC) that are formed when master planning new trail systems. For the past 8 years, an officer has been specifically assigned to advise the TAC on issues pertaining to CPTED (Crime Prevention through Environmental Design). Staff from PRNS and the Police have discussed and partnered in data collection regarding a mechanism for addressing trails and having that knowledge known to our 911 Center, with the goal of speeding emergency response and permitting site-specific record keeping.

### Are markers necessary if Smart Phones can provide location data?

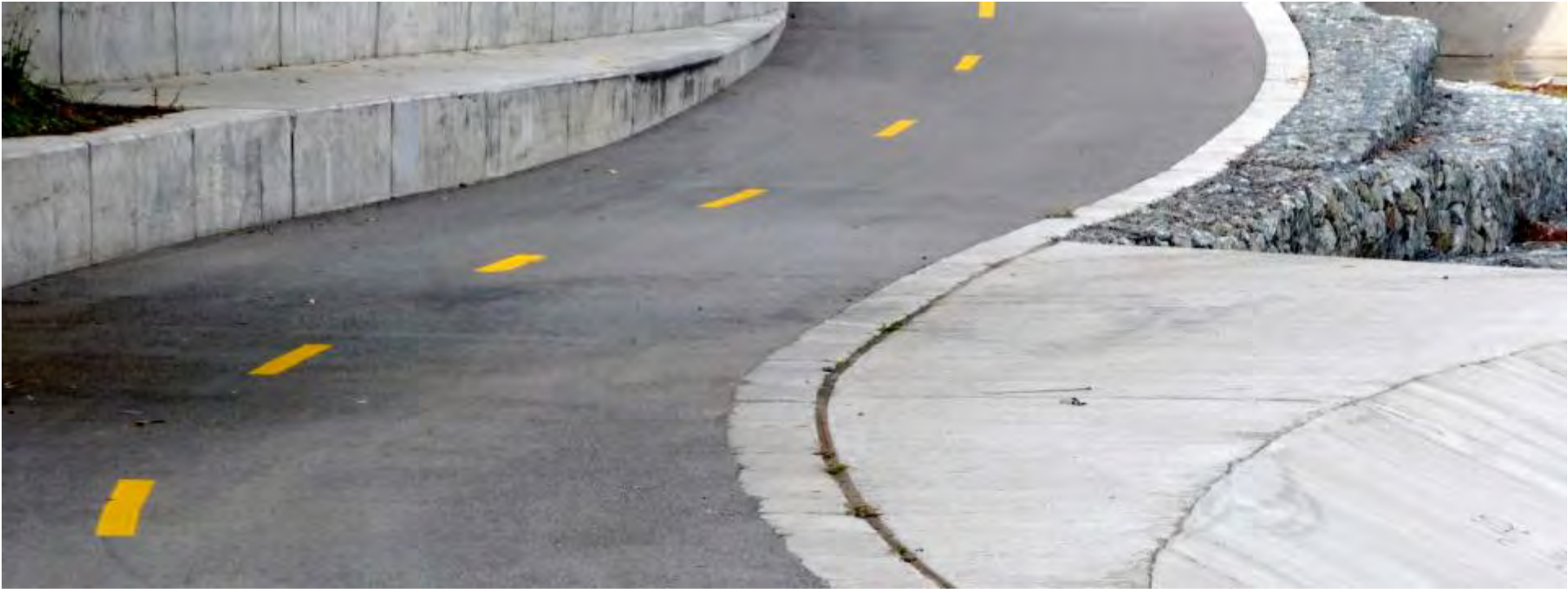
Smart phones do provide location data that can support 911 dispatching – but they do not resolve all issues:

1. Some users turn off location services due to battery usage, privacy or international calling plans (an issue for tourists).
2. Line of site is critical for accurate location by GPS-enabled smart phones. Trees prevent accurate signals to satellites and can create a ¼-mile error. This could lead to a misdirected dispatch.
3. Cellular phones depend on triangulation between towers. A three-tower signal does provide accuracy – but it is not uncommon for a phone to catch only two towers which yields error in location as well.



San José Trail Program  
[www.sjparks.org/trails](http://www.sjparks.org/trails)







# Engage



**@sanjosetrails**

- Project updates
- Trail Closures & Detours
- Trail Traffic
- Construction Updates
- Notice of high water events



# GUADALUPE RIVER TRAIL



**North**  
9 | 14.4  
mi | km  
Total  
Trail  
Length



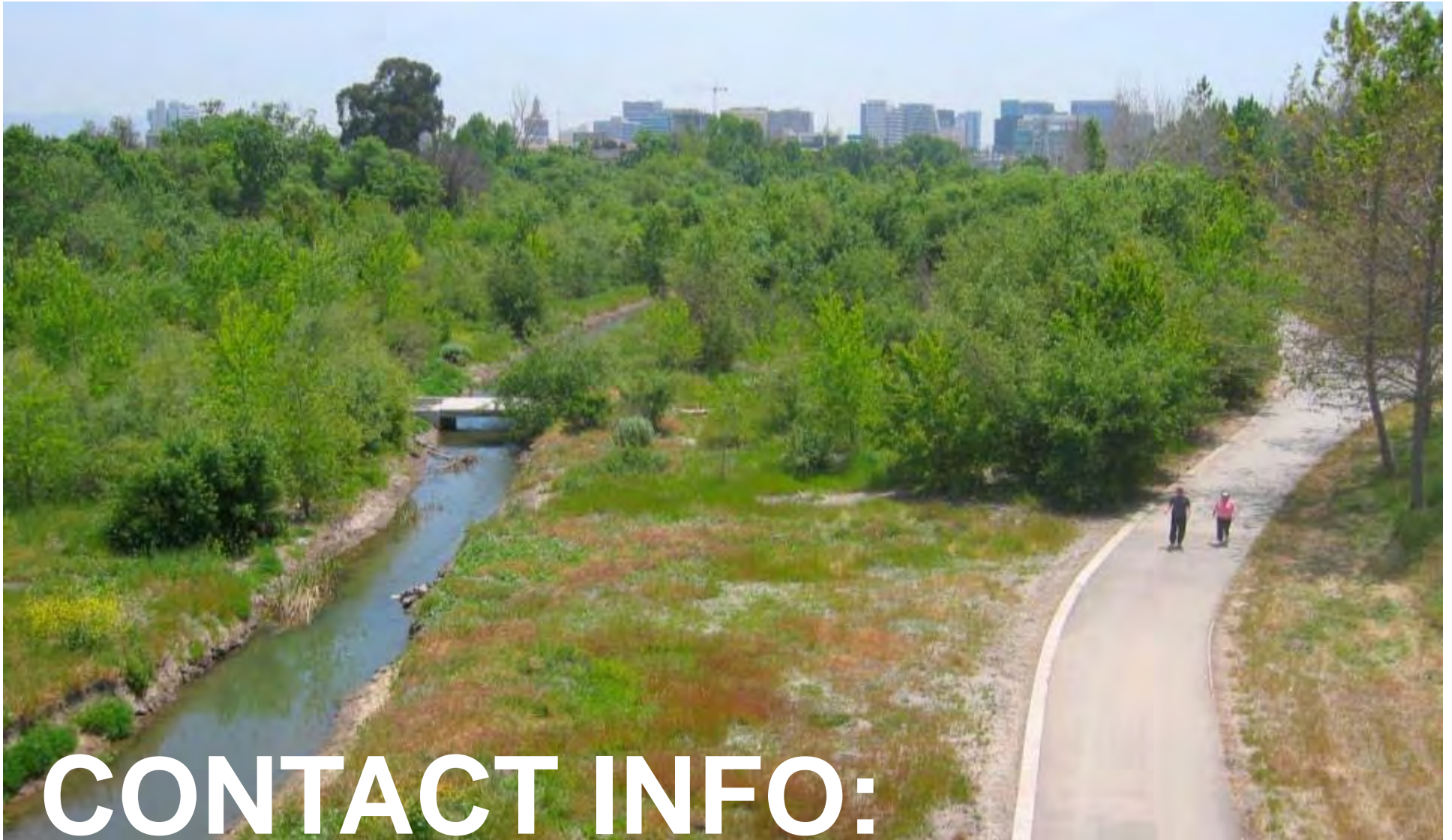
**BAY AREA BikeShare**

Available throughout  
Downtown San Jose



**VTA  
TRANSIT**

Current Route  
Information



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