

Ventura County Resource Management Agency

Santa Rosa Valley Trail Master Plan



December 2014





Santa Rosa Valley Trail Master Plan

December 2014

Prepared For
The County of Ventura

Prepared By
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Final Santa Rosa Valley Trail Master Plan

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Executive Summary

Over the last several decades, the Santa Rosa Valley has developed into a rural residential community with a significant equestrian component. During this time, a network of informal and formal equestrian trails has been established and developed. In addition, many of the residential properties in the valley include facilities such as barns and arenas to support horse ownership. And in 2012 the County opened the long-planned Santa Rosa Valley Park, which features equestrian riding facilities, including a training area.

Many of the early residential subdivisions included dedicated trails easements that have created a large portion of the current trail system in the Santa Rosa Valley. In addition, there are a number of informal equestrian trails that are used by riders, who also utilize public and private street surfaces and shoulders to travel throughout the valley. While this system of trails currently serves the residents and visitors well, the system is somewhat disconnected and inconsistent, and there is no long-range plan for its future development, operation and maintenance. To preserve existing multi-use trails in the face of new development and to establish new trail connections in the Santa Rosa Valley, local residents collaborated in 2004 to form a nonprofit organization, Santa Rosa Valley Trails, Inc. (SRVTI). In 2013, the SRVTI began working in cooperation with the County of Ventura to prepare this Trail Master Plan to establish a valley-wide trail system, adopt design and operating guidelines, and establish maintenance and funding policies.

This Trail Master Plan includes an assessment of existing conditions in the Santa Rosa Valley's trail system, guidelines for the design of trail improvements, a preliminary/conceptual development plan and cost estimates for trail improvements, and operation and maintenance guidelines. This trail system is herein defined as inclusive of both equestrian routes and bikeways, and both off-street and on-street facilities. The Trail Master Plan, as shown in Figure 14, has been designed for consistency with the Ventura County General Plan and the Ventura Countywide Bicycle Master Plan.

This Trail Master Plan incorporates the County's long-standing policy that new trails and facilities will not be developed unless funding for their proper construction and long-term maintenance has been identified. The trail system within the Santa Rosa Valley is unique in that a non-governmental entity, SRVTI, exists for the sole purpose of supporting, developing and maintaining trail facilities. Thus, while the County does not currently have the funding set-aside for the development and maintenance of new trail facilities, the facilities outlined in this Trail Master Plan may potentially be realized under the auspices of SRVTI. Regardless of the entity that may be responsible for the development and maintenance of trail segments, the Trail Master Plan is intended to ensure that future trails are developed and managed in a consistent manner and in keeping with established County design guidelines.

Introduction

Background

As a rural residential community of approximately 6,000 acres in unincorporated Ventura County, the Santa Rosa Valley has developed with a significant equestrian component. During the last two decades, a network of informal and formal equestrian trails has taken shape. In addition, many of the residential properties in the valley include facilities such as barns and arenas to support horse ownership.

In 1982 the County adopted an Equestrian Trails Policy for the Santa Rosa Valley, which calls for the provision of equestrian easements and trails in all subdivisions. However, this policy was adopted without a companion Trail Master Plan, and as such the County was unable to require the dedication of specific trail easements as part of subdivision approvals.

Many of the earlier subdivisions did include dedicated trails easements that have created the current trail system in the Santa Rosa Valley. But in later years, as the valley has been more fully developed, the trail system has become disconnected or even disappeared in some areas. Additionally, the County has generally been unable to accept or maintain trails in areas that are not covered by a homeowners association.

To preserve existing multi-use trails in the face of new development and to establish new trail connections in the Santa Rosa Valley, local residents collaborated in 2004 to form a nonprofit organization, Santa Rosa Valley Trails, Inc. (SRVTI). In 2008, Rincon Consultants generated a map of existing and proposed trail facilities for SRVTI.



Residential equestrian facilities in the Santa Rosa Valley.

Purpose

With the support of SRVTI, the Ventura County Board of Supervisors recently directed its Resource Management Agency, in cooperation with the Public Works Transportation Department and the General Services Agency, to develop a comprehensive Santa Rosa Valley Trail Master Plan, which would recognize and formalize the existing trail system while setting guidelines for future improvements. As such, this Trail Master Plan does not establish funding nor does it commit the County or SRVTI to the future development of new trails or the improvement of existing trails. The trail system is herein defined as inclusive of both equestrian routes and bikeways. The Trail Master Plan has been designed for consistency with the Ventura County General Plan and the Ventura Countywide Bicycle Master Plan.

The following **Trail Master Plan** is organized into four parts:

1. An assessment of existing conditions in the Santa Rosa Valley's trail system;
2. Guidelines for the design of trail improvements;
3. A development plan and cost estimates for trail improvements; and
4. Operation and maintenance guidelines.

Public Involvement

The Resource Management Agency has sought public input on the Trail Master Plan at several points in its development, primarily through the venue of the Santa Rosa Valley Municipal Advisory Council (MAC). The MAC was formed by the County Board of Supervisors and meets on the third Thursday of the month at the Rancho Santa Rosa Property Owners Association Clubhouse. On November 21, 2013, an assessment of the existing trail system was presented to the MAC. Two months later, on January 16, 2014, the draft Design and Operating Guidelines for the trail system were discussed. Finally, the conceptual Trail Master Plan was presented on April 17, 2014.

Beyond engaging community members in person at MAC meetings, a review of historical MAC meeting minutes was conducted to ascertain topics of concern with regard to the Santa Rosa Valley's trail system. These issues

are excerpted in Appendix A (Data Review) and range from motorized vehicles on trails to the Conejo Canyons Management Plan, equestrian trails in Wildwood Preserve, the Read Road bicycle connector, widening on Norwegian Grade, rumble strips on Santa Rosa Road, Ventura County trails policy in Santa Rosa Valley and the issue of nitrates.

In addition, stakeholders representing open space management agencies and cycling, mountain biking, and hiking groups were contacted for input on the Trail Master Plan. These stakeholder groups include:

- COSCA
- Conejo Recreation and Park District
- PVRPD
- Conejo Valley Cyclists
- Channel Islands Bicycle Club
- Concerned Off-Road Bicyclists Association (CORBA)
- Sierra Club, Los Padres chapter

COSCA provided an up-to-date GIS layer with existing and proposed trail facilities in Wildwood Regional Park and the Hill Canyon area. Finally, in addition to publication of a notice in the newspaper, all owners of property adjacent to off-road segments of the conceptual trail system were sent notices inviting them to review and comment on the Draft Trail Master Plan and associated Mitigated Negative Declaration.

Assessment Report

Existing Conditions

Jurisdictional Boundaries Relevant to the Study Area

The Santa Rosa Valley is a rural, residential and equestrian community in unincorporated Ventura County, California, covering 6,000 acres between the cities of Thousand Oaks, Moorpark, and Camarillo. Roughly bounded on the west by Rosita Road, the east by Moorpark Road, the north by the City of Moorpark and the south by the Mount Clef Ridge Open Space acreage, the Santa Rosa Valley sits at an elevation of 433 feet (132 m). The Pleasant Valley Recreation and Park District (PVRPD) manages open space adjacent and to the southwest of the study area, while the Conejo Open Space Conservation Agency (COSCA) manages trails and open space directly to the south, within the City of Thousand Oaks.

Demographics and User Profile

Overall Population

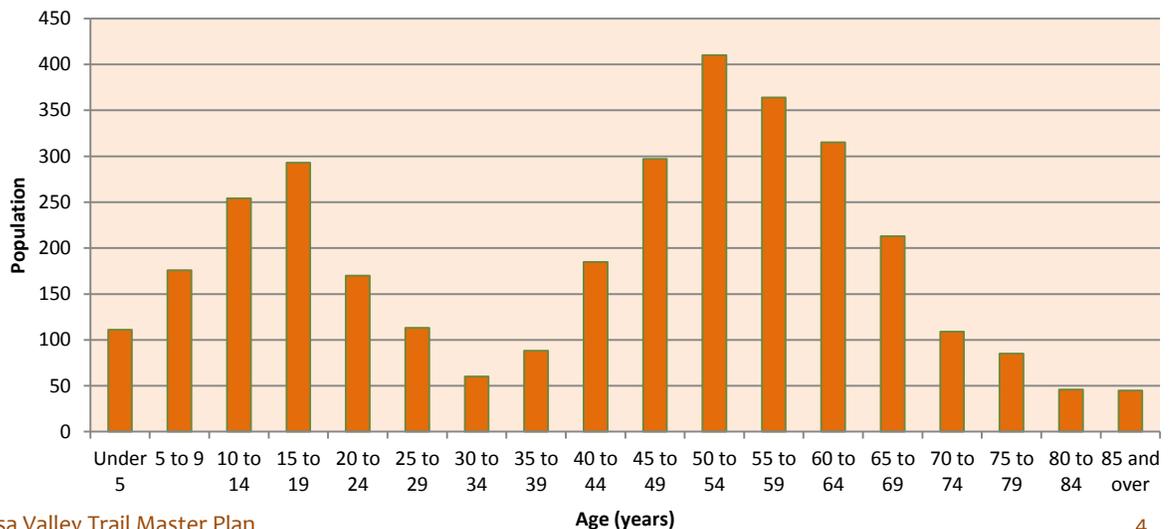
The Santa Rosa Valley has a population of 3,334, according to the 2010 U.S. Census. This population includes 1,113 households, with an

average household size of 3.00 people. It is not possible to quantify trends in population, since historical population numbers specific to the Santa Rosa Valley are not available from the U.S. Census Bureau, nor are growth forecasts available from the Ventura Council of Governments. Nevertheless, substantial growth is not expected in future decades: the majority of the Santa Rosa Valley is already built out with rural residential uses. Future residential projects on remaining undeveloped sites could modestly increase the local population. For example, the approved Wildwood Stable Estates project would allow for future construction of 18 residences to the south of Santa Rosa Road, while a pending project would subdivide five lots into 15 lots for future residential construction at the terminus of Yucca Drive.

Age Distribution

The median age in the Santa Rosa Valley is 48.9 years, which is approximately 13 years older than that of Ventura County as a whole. As shown in the histogram below (Table 1), the age distribution skews primarily toward middle-aged persons and senior citizens and secondarily to teenagers. Households with seniors aged 65 and older comprise 31.0 percent of total households in the Santa Rosa Valley. Similarly, families with children under 18 years old represent 31.5 percent of all families. The

Table 1
Age Distribution in Santa Rosa Valley



distribution of age in the Santa Rosa Valley has implications for the demand for recreational facilities. According to the California State Parks 2008 Outdoor Recreation Plan, researchers predict that the Baby Boom generation (currently between 40 and 60 years of age) will be active senior citizens and will stay active for longer than previous generations. Improvements that have been known to improve senior access to outdoor recreation include disabled access, paved off-road multipurpose trails, highly visible “wayfinding” signage, inexpensive or free access, and parking that is easy to maneuver. Trails should be designed in accordance with the proposed Federal Americans with Disabilities Act Guidelines for Federal Outdoor Developed Areas and Trails.¹ Although the guidelines will apply to Federal properties when adopted, they are applicable to improving senior access within the planning area for the Santa Rosa Valley. Sections T203.1 and T303.2 of the guidelines specifically address trails through forested parks, shared use paths, and back country trails. Guidelines are also in place for accessibility in California State Parks.²

Young residents of the Santa Rosa Valley have different recreational needs. According to the 2009 California Survey on Public Opinions and Attitudes on Outdoor Recreation, youth value recreational opportunities close to residential neighborhoods. According to the survey, “Youth continue to enjoy opportunities for walking, bicycling, and swimming at safe recreation venues. Prioritize providing easy access to safe, local opportunities for popular

youth activities.”³ A cost-effective means of addressing this preference would be through improving and providing linkages from neighborhoods to existing trails and outdoor recreation resources.

Commuting

The vast majority of employed residents in the Santa Rosa Valley (an estimated 83.0 percent) commute to work by driving alone, as shown in Table 2. This percentage is six-percent greater than in Ventura County as a whole, where an estimated 77.0 percent of residents drive alone to work. Although approximately 12.8 percent of employed people in Ventura County carpool to work, only 1.4 percent do so in the Santa Rosa Valley. Finally, a much larger share of people work from home (an estimated 14.9 percent versus 5.3 percent). In general, those in the Santa Rosa Valley who commute to work disproportionately drive alone. The mean travel time for commutes also is approximately 30 minutes, which is nearly five minutes longer than the countywide average.

Table 2
Commuting to Work: Santa Rosa Valley and Countywide

Mode of Commuting	Santa Rosa Valley	Ventura County
Driving alone	83.0%	77.0%
Carpooling	1.4%	12.8%
Public transportation	0%	1.2%
Walking	0.6%	2.0%
Other means	0%	1.8%
Work at home	14.9%	5.3%

Source: U.S. Census Bureau, 2007-2011 American Community Survey 5-Year Estimates, Table DP-03.

The data on commuting suggest room for improvement in alternative transportation.

³ Summary of Findings Survey on Public Opinions and Attitudes on Outdoor Recreation in California 2009, pg. 9. http://www.parks.ca.gov/pages/795/files/2009_SPOA_Summary_Findings.pdf

¹ 36 CFR Part 1195, Architectural Barriers Act (ABA) Accessibility Guidelines for Outdoor Developed Areas; Proposed Rule <http://www.access-board.gov/outdoor/nprm.pdf>

² California State Parks Accessibility Guidelines, 2009 http://www.parks.ca.gov/pages/21944/files/ca_stateparks_accessguiderev_titlepagewithdisclaimer.pdf

Indeed, studies have found that the provision of bicycle facilities correlates with higher ridership. According to a March 2012 study published in the journal *Transportation*, “cities with a greater supply of bike paths and lanes have significantly higher bike commute rates – even when controlling for land use, climate, socioeconomic factors, gasoline prices, public transport supply, and cycling safety.”⁴ Although the Santa Rosa Valley is a rural residential community that is geographically removed from urban job centers, bicycle lanes would encourage additional ridership.

Profile of Trail Users

The Santa Rosa Valley has historically included a strong equestrian community. Mark Burley, president of SRVTL, estimates that equestrians comprise 50 percent of users on trail facilities in the valley, while pedestrians and off-road bicyclists make up 40 and 10 percent, respectively. With the recent opening of Santa Rosa Valley Park, however, off-road bicyclist activity has increased.

In addition to trail users, road cyclists currently use routes such as Santa Rosa Road. Road



Equestrians traversing an unpaved trail in the Santa Rosa Valley.

cyclists from across Ventura County ride through the Santa Rosa Valley. The Channel Islands Bicycle Club, for instance, promotes a 45-mile “Tour de East County” loop that includes Camarillo, the Santa Rosa Valley, Simi

⁴ Buehler, Ralph, and John Pucher. *Cycling to work in 90 large American cities: new evidence on the role of bike paths and lanes*. *Transportation* (Volume 39, Issue 2). March 2012.

<http://link.springer.com/article/10.1007%2Fs11116-011-9355-8>

Valley, the Conejo Valley, and the Oxnard Plain. Mountain bikers also frequent the multi-use trails managed by COSCA to the south of the study area, including Wildwood Regional Park and the Hill Canyon area.

Relevant Plans and Documents

It is important for the Santa Rosa Valley Trails Master Plan to maintain consistency with and build upon existing relevant planning documents and efforts. A complete review of the following plans and documents is included in Appendix A (Data Review).

Countywide:

- Ventura County General Plan
- Ventura County Comprehensive Transportation Plan
- Ventura Countywide Bicycle Master Plan
- Santa Rosa Valley Equestrian Trail Policy

City of Thousand Oaks:

- Thousand Oaks General Plan
- City of Thousand Oaks Bicycle Facilities Master Plan

City of Camarillo:

- City of Camarillo Bikeway Master Plan

City of Moorpark:

- Moorpark General Plan (map of equestrian trail network)
- Moorpark Bicycle Transportation Plan

COSCA:

- COSCA Strategic Plan Beyond 2013
- Conejo Canyons Open Space Management Plan

Santa Rosa Valley:

- Wildwood Preserve Environmental Impact Report
- Santa Rosa Valley Municipal Advisory Council minutes

Current Trail Network and Regional Connectivity

Existing Trail Easements

Existing trails extend east-west throughout the study area and across the northern side of Santa Rosa Road in a network made up of easements obtained from Homeowners Associations (HOAs) and agreements with landowners to fill in gaps between housing developments.

Figure 1 shows the network of existing trail easements both within the study area and in surrounding jurisdictions. Trail easements with open access and publicly accessible trails maintained by COSCA are displayed in yellow, while trail easements with access restricted to HOA members are shown in light orange. Restricted trails occur in the Rancho Santa Rosa HOA, located in the center of the study area, and in the Lexington Hills Property Owners Association at the northeast corner of the study area.

SRVTI has acquired several trail easements in the study area. All such trails are clearly marked with signage indicating that SRVTI maintains them with public recreational access. For example, signage for the Thelma Connector Trail is shown below.

It should be noted that two trail segments shown in yellow on Figure 1 are limited to certain user groups. The trail that runs northwest from the intersection of Escollera



Clear signs mark the entrances to trail easements obtained by SRVTI.

Avenue and E. Las Posas Road is closed to bicycles. In addition, a north-south unpaved road to the east of Sumac Lane is currently open to equestrian users only; however, under an SRVTI easement for the Donnelly Property, this segment would become a multi-use trail upon transfer of the property to another party.

Informally Used Trails

As discussed in the *Introduction*, the Santa Rosa Valley has developed as an equestrian community with a network of informal as well as formal trails. Informal trails accommodate public access, in practice, but lack easements which would confer a legal right to such access in perpetuity. Figure 2 shows that informally used trails occur in the southwestern portion of the planning area, near to Santa Rosa Valley Park.

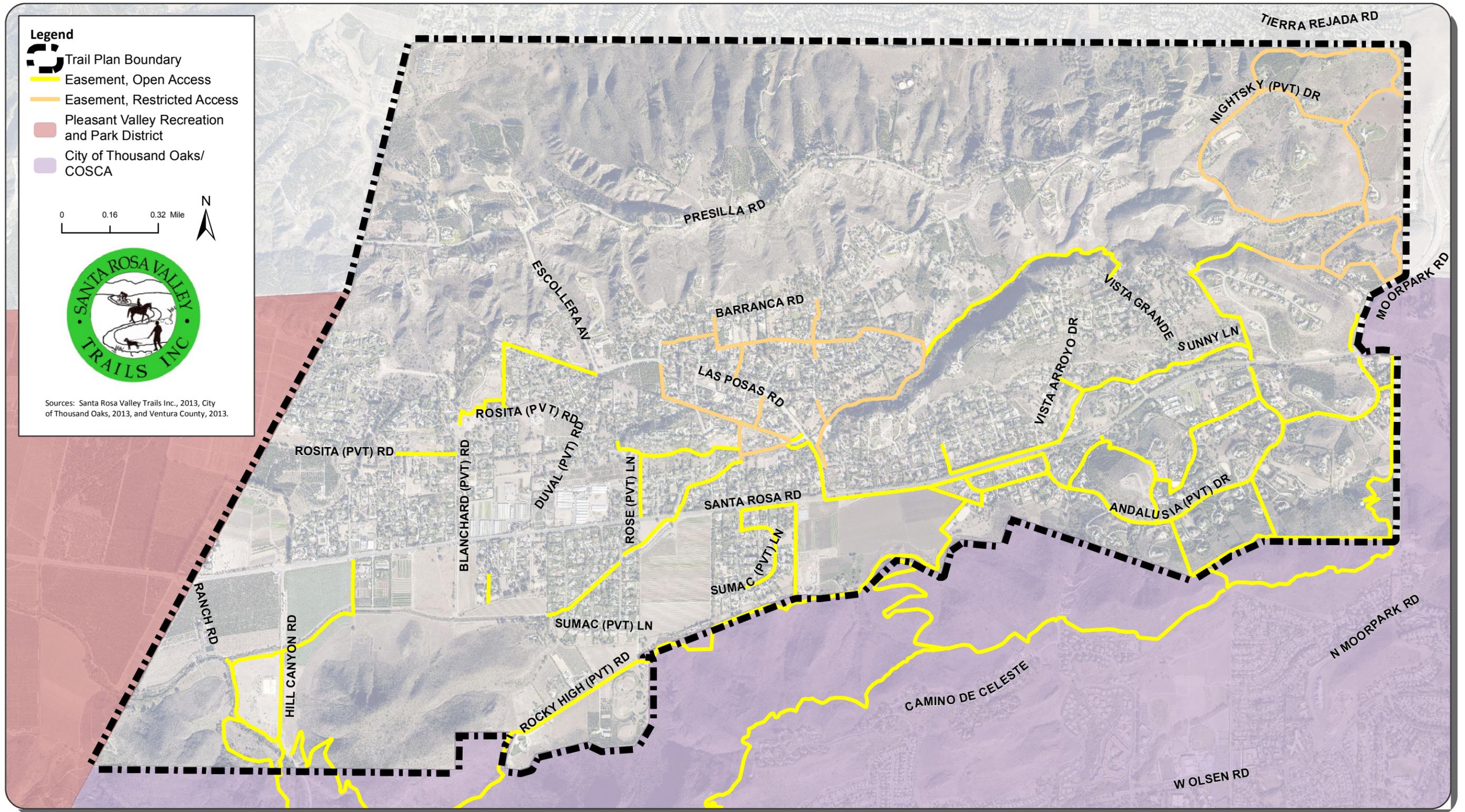


From the end of Rocky High Road, a COSCA trail easement leads to Wildwood Regional Park.

On-Road Trail Facilities

Both public and private roads in the Santa Rosa Valley provide equestrian access, whether on the roadway itself or on soft shoulders. On-road trail facilities serve as important links between existing trail easements in the study area. Figure 3 shows accessible public and private roads in purple and light pink, respectively. Although Santa Rosa Road is not shown as an on-road trail facility, signage warns motorists of the presence of equestrian users throughout the study area on the roadway.

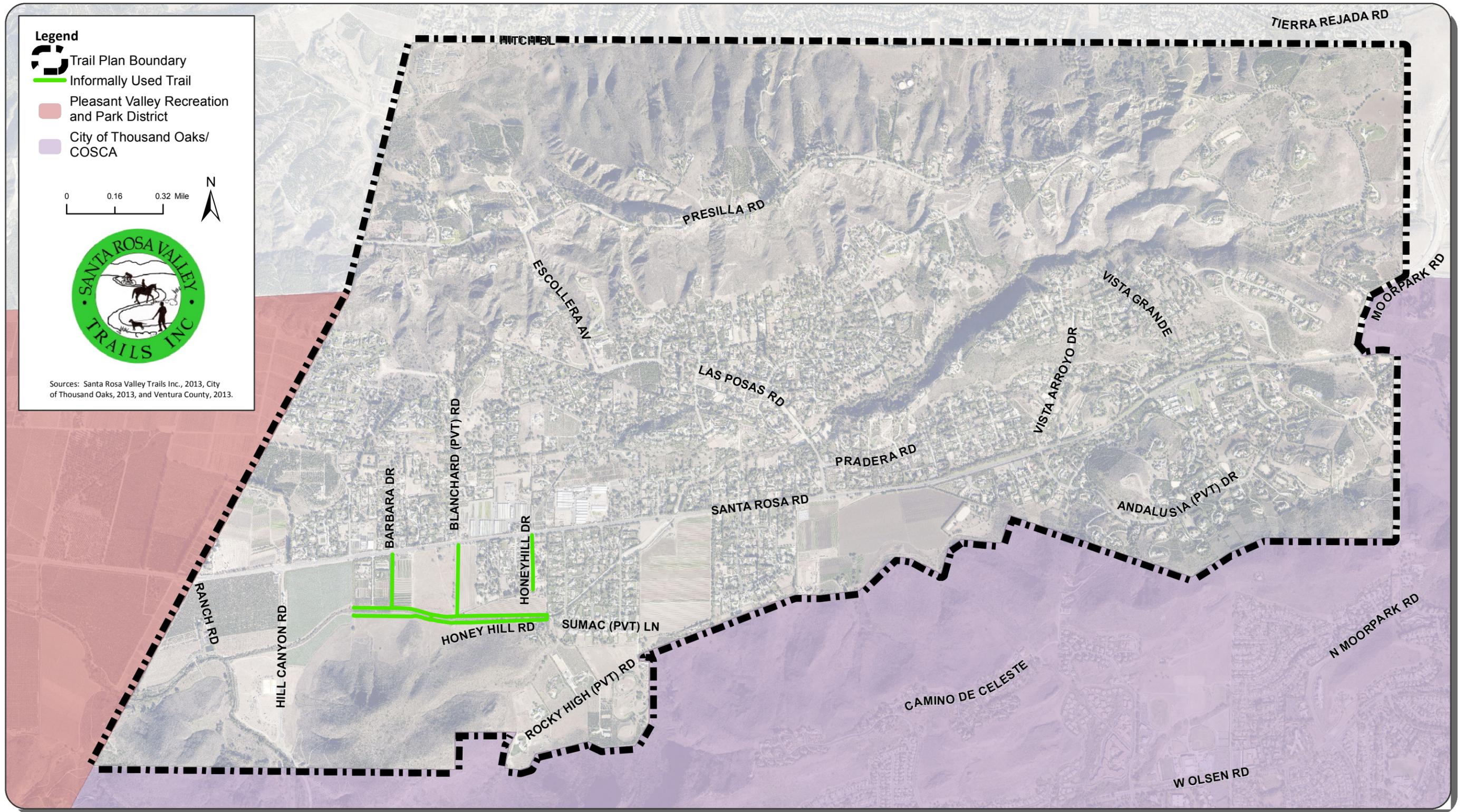
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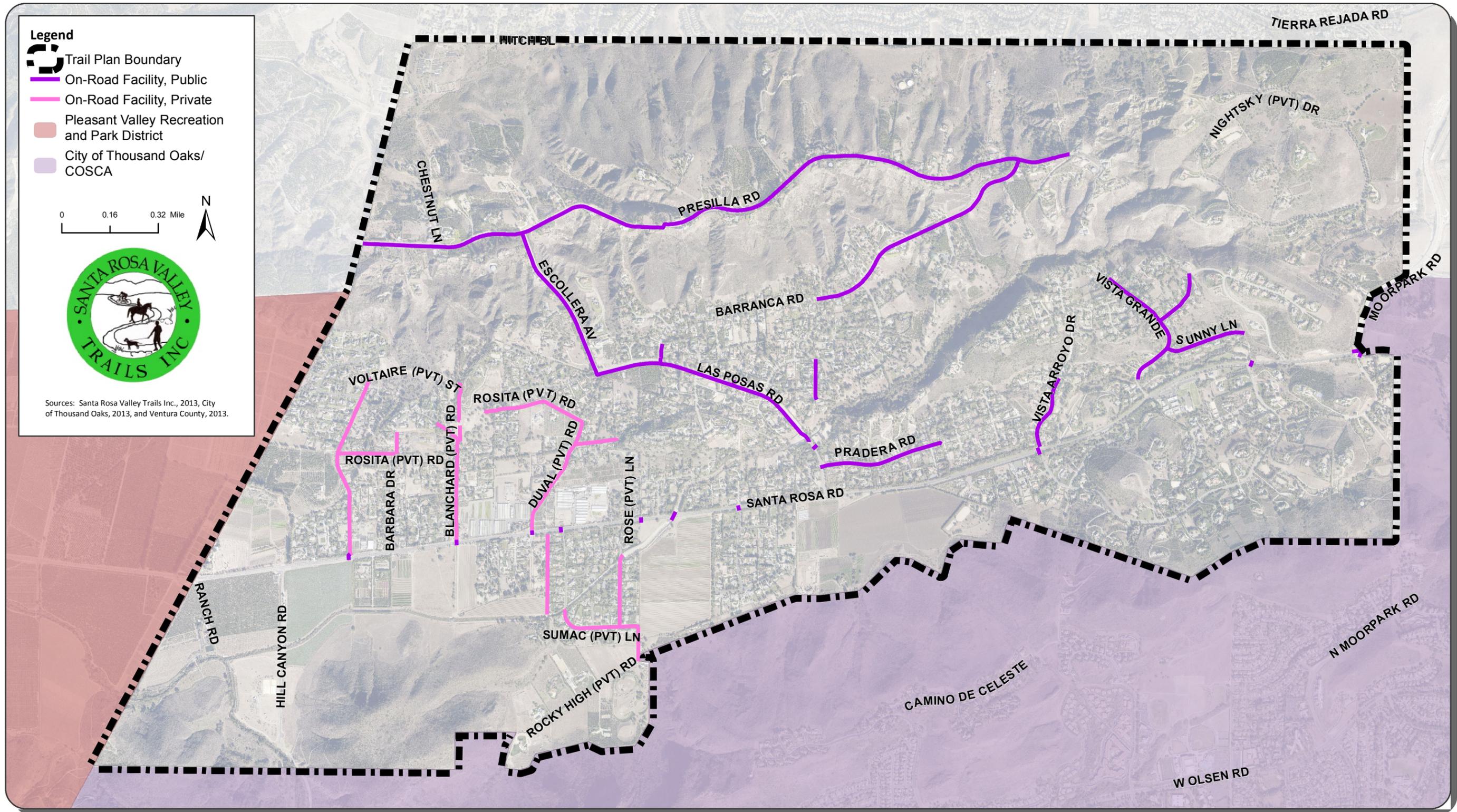


Sources: Santa Rosa Valley Trails Inc., 2013, City of Thousand Oaks, 2013, and Ventura County, 2013.

Santa Rosa Valley Trail Assessment Easements Only

Figure 1





All Existing Trails

The combination of existing trail easements, informally used trails, and on-road trail facilities forms a well-used and well-maintained system of multi-use trails which provide convenient access from many locations across the Santa Rosa Valley. Figure 4 shows the complete network of trail facilities in the study area.

Bicycle Facilities

In contrast to the well-developed network of multi-use trails in the Santa Rosa Valley, the study area almost entirely lacks designated facilities for road cyclists.

As shown in Figure 5, a Class II bike lane exists at the eastern edge of the study area, on Moorpark Road between Santa Rosa Road and Read Road. A sign on eastbound Santa Rosa Road at the signalized intersection with Moorpark Road shows a 0.4-mile route along Moorpark Road to Read Road and an additional two-mile route to Olson Road in Thousand Oaks.

In 2010, the City of Thousand Oaks completed the Read Road Bike Path Connector between Moorpark Road and Olson Road. The Read Road Connector is a Class I facility on Read Road and through residential streets in The Enclave, a rural residential development to the west of Highway 23. This route proceeds as a Class I facility parallel to Highway 23 along a private access road (the Read Road Bypass), on which the City of Thousand Oaks has secured bicycle and pedestrian access, and ends at Olson Road. The entire Read Road Connector provides bicycle access between the eastern Santa Rosa Valley and Thousand Oaks. In addition, the one-mile stretch of Moorpark Road between Santa Rosa Road and the City of Moorpark to the north has a Class II bike lane.

Although Santa Rosa Road is not designated as a bikeway, almost the entire road segment within the study area includes a wide shoulder that is, in practice, accessible to cyclists. This expansive shoulder derives from the historic designation of Santa Rosa Road as a four-lane

road; after local residents successfully campaigned to re-designate Santa Rosa Road as a two-lane road, to prevent future widening, the extra right-of-way remained as paved eastbound and westbound shoulders.

Figure 5 shows that to the west of the study area, Santa Rosa Road is designated by the City of Camarillo as a shoulder bike route to the Upland Road intersection. Future completion of a Class II bike lane between Upland Road and Oak Canyon Road, in accordance with the Camarillo Bikeway Master Plan, would provide a continuous bikeway to Highway 101 and beyond.

Staging Areas

Most equestrian users in the Santa Rosa Valley keep horses in their own facilities at their residences and use local access points to trails. Not having to trailer animals to a suitable riding facility is a benefit for local riders. However, the recent addition of an equestrian park, Santa Rosa Valley Park, on the western edge of the



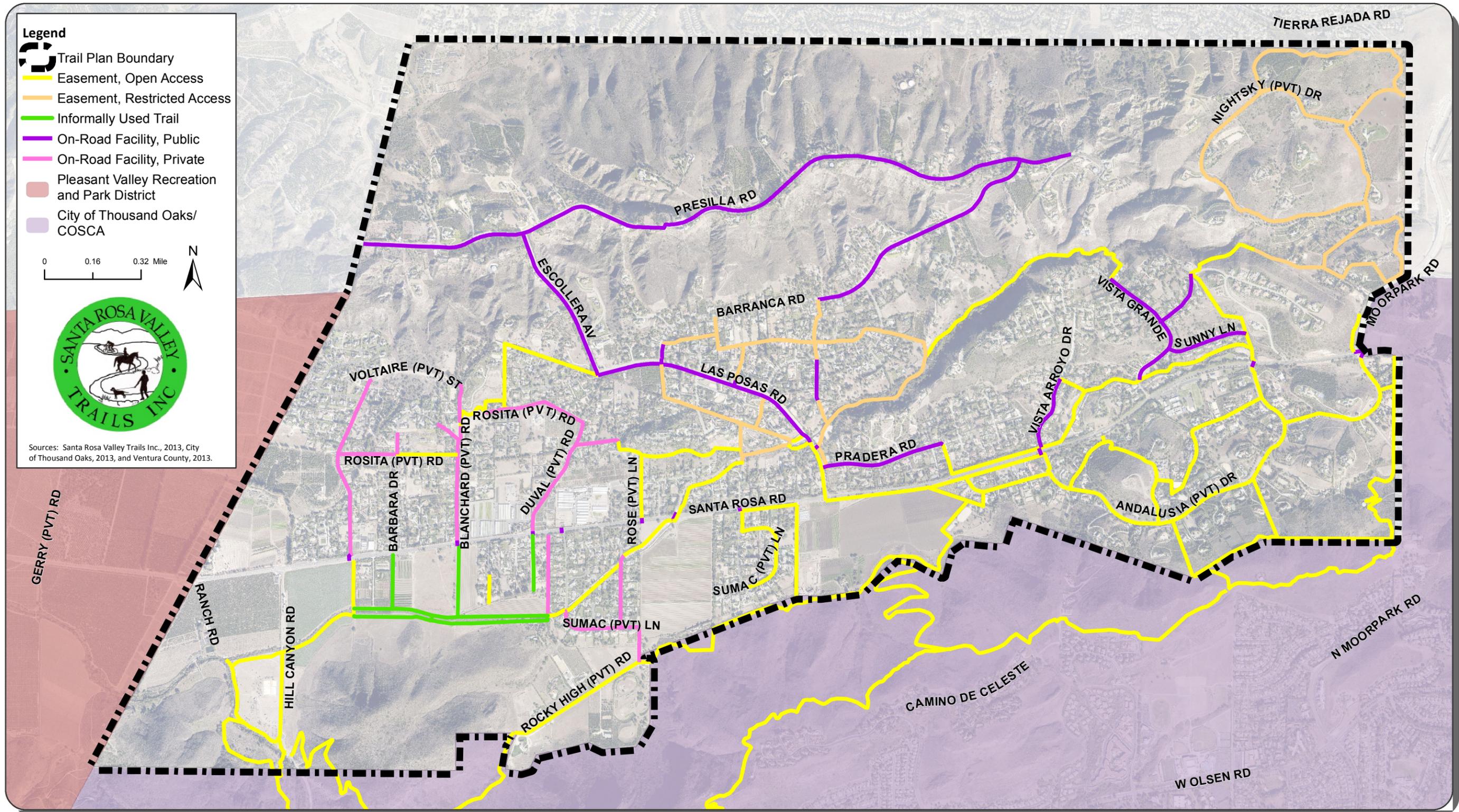
Santa Rosa Valley Park provides equestrian staging areas with connections to trails in Wildwood Regional Park in the background.

project area will allow outside users to trailer horses to the Valley. The park serves as a gateway both to trails in Wildwood Regional Park and in the Santa Rosa Valley. In addition to 50 acres of natural open space, Santa Rosa Valley Park includes two equestrian riding areas and a training area.

Trail Gaps

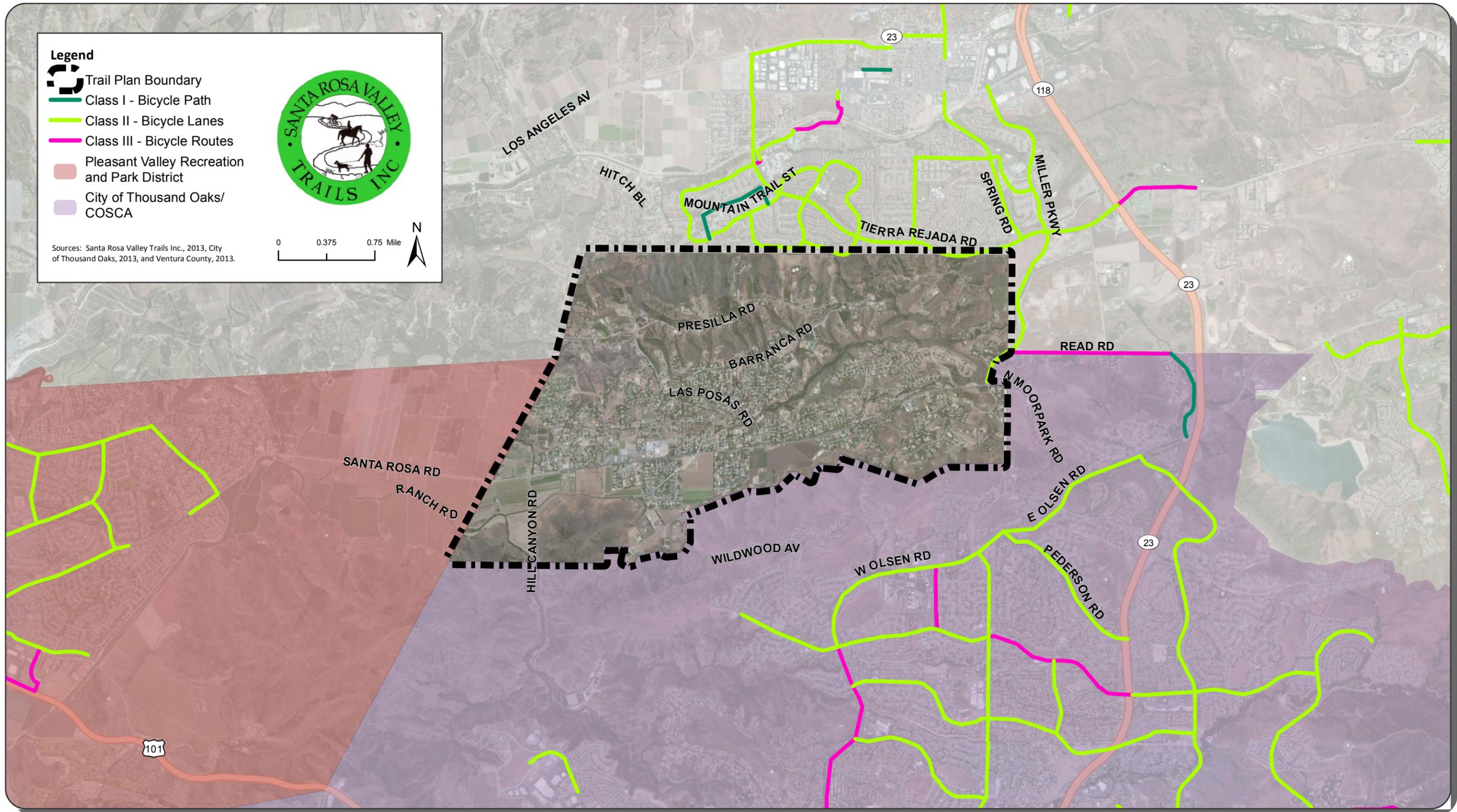
Using the existing trail network shown in Figures 4 and 5 as a starting point, important missing linkages to improve connectivity were identified. The process of identifying trail gaps relied primarily on input from SRVTI, as well as from community members attending MAC presentations on the Trail Master Plan and the Ventura County Parks Department and Transportation Department. Figure 6 shows the locations of identified trail gaps in the context of the Santa Rosa Valley's existing trail network. For the purpose of this assessment, trail gaps are

defined as inclusive of: 1) segments currently being used as trails but lacking formal easements, as shown in Figure 2; 2) segments where there is currently neither an easement nor any use by equestrians, pedestrians, or bicyclists; and 3) segments with an easement but no active use. For some trail gaps shown in Figure 6, no physical trail facility currently exists; filling these gaps would entail new construction and physical disturbance of the ground.



Santa Rosa Valley Trail Assessment Existing Trail Facilities

Figure 4



Santa Rosa Valley Trail Assessment Existing Bike Facilities

Figure 5

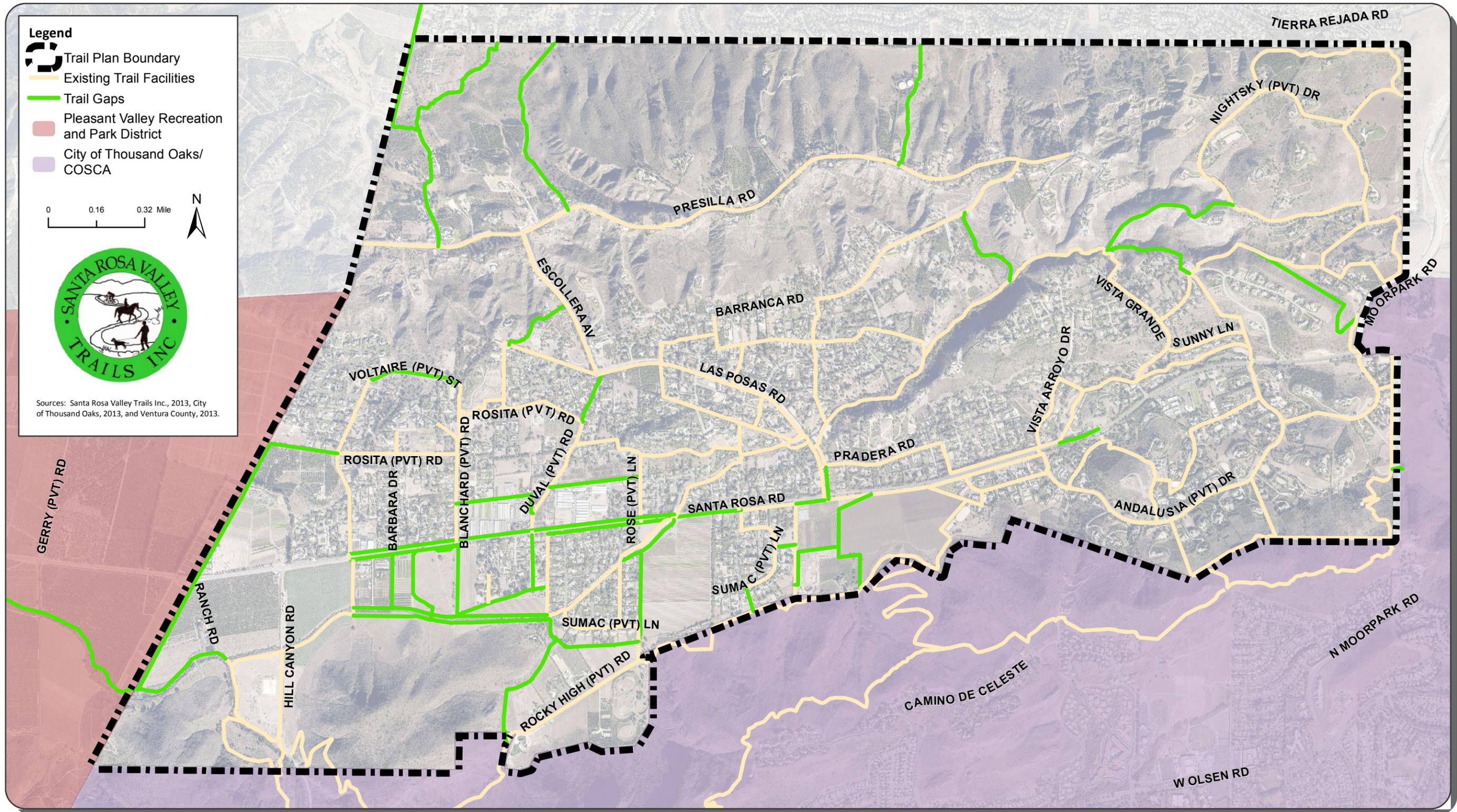


Figure 6

Challenges

This section analyzes existing conditions which pose challenges to trail users in the Santa Rosa Valley.

Physical Constraints

Equestrian Facilities

Several major roadways in the area impose physical constraints on equestrian trail use. The primary east-west roadway through the project area is Santa Rosa Road, which connects the Valley to Camarillo and Highway 101 on the west and Moorpark and Highway 23 on the east. Traffic flows are robust during the hours of the morning and afternoon commutes, and speeds are fast. Such a major collector roadway is especially difficult to cross on a horse if the crossing is not signalized or grade-separated. Currently an undercrossing exists midway through the Valley via the Arroyo Santa Rosa.



In single file, equestrians cross Santa Rosa Road at the intersection with E. Las Posas Road.

Though the current configuration of Santa Rosa Road is extra wide for most of its length, the section from just west of Vista Arroyo Drive/Andalusia Drive West presents a pinch point where the road narrows and the shoulder disappears. The separated equestrian trail that runs along the southern side of Santa Rosa Road also ends at the intersection. This constrained condition continues east for several blocks before widening out again until Andalusia Drive. From Andalusia Drive to Orions Flight Way there is effectively no shoulder on the north side of Santa Rosa Road and a very

narrow shoulder on the south. From Orions Flight Way there are, once again, wide shoulders on both sides of the street to Moorpark Road at the eastern end of the valley. These “pinch points” present a challenge to the addition of any off-street equestrian facilities that parallel the road, as well as bicycle facilities that span the length of the Valley.

Although Santa Rosa Valley Park has the potential to become a very well used facility for horse owners in the Santa Rosa Valley and from outside the area, equestrian users have expressed a desire for another staging area at the eastern end of the Santa Rosa Valley. With the addition of such a staging area, equestrian users would have access points at both the eastern and western ends of the Santa Rosa Valley.

Bikeways

Currently, the Santa Rosa Valley offers few designated bikeways. Although the majority of Santa Rosa Road has wide shoulders available for cyclists, the section of Santa Rosa Road from just west of Vista Arroyo Drive to Andalusia Drive West is a pinch point for cyclists. In this area, the proximity of cyclists to motorized vehicles traveling at high speed poses a safety hazard. E. Las Posas Road also includes ample paved shoulders in both directions but lacks designated lanes for cycling.



By Santa Rosa Elementary School, Santa Rosa Road narrows, creating a “pinch point” for equestrian and cyclist access.

Regional connectivity for cyclists is limited between the Santa Rosa Valley and Thousand Oaks. The Norwegian Grade is a two-mile stretch of Moorpark Road in Ventura County, (partially within the City of Thousand Oaks, California), carved out of a steep hillside by members of the Norwegian Colony and their hired help between 1900 and 1911. As of 2013, there is no bike lane on the Grade. However, since it is the only surface street that connects Thousand Oaks to Moorpark, Camarillo, and



Cyclists on the Norwegian Grade must ride with the flow of motorized traffic due to the lack of paved shoulders.

further cities, any bicyclists who wish to get to and from those points must use this route. Locals frequently express their frustration with both bicyclists and drivers on the historic Norwegian Grade. Until the construction of Highway 23, this was also the most direct route between Moorpark and Thousand Oaks for auto and truck traffic. There are currently no plans within the City to widen the Norwegian Grade because of the cost. Additionally, widening the Grade to accommodate cycling facilities would require retaining walls and would create environmental impacts on the canyon.

Another challenge is rumble strips which have been installed all along both sides of the Santa Rosa Road right-of-way. Cyclist groups have

told the MAC that the rumble strips to the right of the fog line not only use up a lot of space, but can be a hazard to cyclists, who may lose their balance after hitting one. Members of the community feel that the rumble strips are important and should remain, and the MAC has recommended that the rumble strips stay in place; however, in consideration of bicyclists, the MAC has recommended that the County extend the pavement width of the bike lane on each side of the road, adding stenciling and signage to designate the area as a bike lane. The MAC also requested that the County put the rumble strips on the left side of the fog line.

Property Access

A significant challenge to trail planning and implementation is obtaining land or permission to use land to build the trail through private areas, or other public land that is not open for public access. SRVTI has had much success in acquiring easements across private property to “fill in the gaps” in the trail network. However, more easements may need to be acquired to provide greater connectivity. The costs of the



Gates hinder or completely block access to trail linkages in several locations.

acquisition of easements or property to fill the gaps in the trail network would be dependent on the current market rates of real estate at the time of purchase and the discretion of the owner.

This section discusses mechanisms whereby trail access could be legally acquired or granted. The Trail Master Plan does not support the use of eminent domain to gain access to properties, but rather interactions with willing sellers.

To implement a trail on private land or another agency's land, lead agencies or organizations have several options to gain access to the portion of the property needed for the trail. These options include trail dedications, fee purchase, easement, license, memoranda of understanding, bargain sale, and donation. They offer a range of conditions for control of the land and assumed liability.

Fee Purchase

Purchasing a parcel of land (fee title) gives the buyer clear title to the property. It provides the simplest, and sometimes the most feasible approach toward acquiring access to land. Trail and greenway lands are often marginally developable and unsuitable for most development activity. The liability of these lands from a real estate tax perspective creates an opportunity for some developers to reduce their tax burden by selling or deeding the property to an agency for a trail.

Some agencies or nonprofits, particularly land trusts, will purchase a parcel of land to retain conservation and trail easement, and then sell it to provide parties for compatible uses - usually agriculture.

Easement

Easements provide the general public with the right to use a specific parcel of property, usually through a defined corridor. Easements come in variety of forms that all involve the landowner's willingness to allow the use of a portion of their property and/or forego development rights for an agreed upon timeframe. Under most circumstances, landowners relinquish liability and management of that portion of the property and the buyer purchases the right to construct and maintain the trail on the property or a

portion of the property. Easements are a more affordable option than fee purchase. They typically "run with the land," meaning the easement stands regardless of a change in ownership.

As part of a development permitting process, pursuant to the Quimby Act, an agency may require developers to dedicate an easement for recreational trails and parks. Also, as has been done in the Santa Rosa Valley in the past, dedications may be included within a proposed project or as conditions of approval of the development.

Bargain Sale

A property owner may sell property or an easement at a price less than the appraised fair market value of the land or easement. Sometimes the seller can derive the same benefits as if the property were donated. Bargain sales are attractive to sellers when the seller wants cash for the property, the seller paid a low cash price and thus is not liable for high capital gains tax, and/or the seller has fairly high current income and could benefit from a donation of the property as an income tax deduction. The lost capital gain, which is the appraised value less the sales price, is taken as a tax deduction.

License

A license is usually a fixed-term agreement that provides limited rights to the licensee for use of the property. Typically, these are employed in situations when the property cannot be sold (e.g. a publicly-owned, active electrical utility corridor), or the owner wants to retain use of and everyday control over the property. The trail management authority obtains permission to build and operate a trail. But it will have little control over the property, and may be subject to some stringent requirements that complicate trail development and operation. As with easement agreements, property owners would want a license agreement to address issues on

their side. Through cooperative negotiation issues such as access for maintenance, trail management, and future improvements or modifications of the trail can be addressed.

Memoranda of Understanding

Memoranda of Understanding (MOU) are agreements between multiple entities to delegate trail management and/or maintenance duties. MOUs are legally binding on the agreeing entities to carry out their duties in good faith. Entities involved in these agreements may include public, private, non-profit or any other interested party.

Donation

Donations typically include full transfer of property to an agency or non-profit for a specific use or purpose that may be simple or complicated by extensive conditions. Financial incentives in the form of tax credits are available in most cases. The receiving entity agrees to receive title to a parcel of land or easement at virtually no cost. In most cases, the donor is eligible to receive federal and state deductions on personal income, as describe under bargain sales. In addition, property owners may be able to avoid inheritance taxes, capital gains taxes, and recurring property taxes.

Design Standards and Guidelines

The term “trail” covers a very broad range of facility types, and can include formal and informal facilities, bike routes, sidewalks, equestrian trails and paved and unpaved paths. The appropriate type of trail facility depends on the intended users, the setting, and the requirements and standards of the funding or approving agencies. Trail design for the Santa Rosa Valley should address objectives or challenges, including accommodating a wide range of users of varied abilities including equestrian users, pedestrians/hikers (and depending on the setting, including strollers, skaters, and people walking dogs); people in wheelchairs and with other physical limitations; and bicyclists (both road and mountain bikes).

The Design Standards and Guidelines chapter summarizes standards and guidelines for equestrian, pedestrian, and bicycle facilities that may become a part of the trail network. All new trail facilities will need to meet the design criteria of the applicable federal, state, and local standards. All bicycle facilities should be consistent with and conform to the Ventura Countywide Bicycle Master Plan of 2007. Other design guidelines for bicycling facilities, contained within Appendix B, shall be for reference purposes only. Any guidelines for new on-street equestrian facilities contained within this plan shall be linked to Ventura County review of all future subdivision development applications in order to enable implementation of the planned equestrian trail segments within that subdivision. In addition, all on-road facilities, whether equestrian or bicycle/pedestrian, shall be designed to ensure that all Ventura County Transportation engineering and safety standards are met

Summary of Public Standards and Regulations

Table 3 identifies the topics addressed in each of the design guidelines and regulations contained in this chapter.

Table 3
Summary of Design Guidelines and Regulations

Design Guideline or Regulation	Topics Addressed
Federal	
<i>American Association of State Highway and Transportation Officials (AASHTO)</i>	
Guide for the Development of Bicycle Facilities (1999)	<ul style="list-style-type: none"> • Shared roadways (lane width, on-street parking, signing) • Bike lanes (widths, intersections, symbol guidelines) • Shared use paths (separation from roadways, width, clearance, design speed, grade, sight distance, intersections, signing, marking, drainage) • Other design considerations (bicycle facilities through interchange areas, traffic signals, bicycle parking, accessibility requirements)
<i>The Architectural and Transportation Barriers Compliance Board (Access Board)</i>	
Proposed Guidelines for Public Rights-of-Way (2011)	<ul style="list-style-type: none"> • Minimum standards for sidewalks, street crossings, and other elements of the public rights-of-way (including walkways and sidewalks, street or highway shoulders where pedestrians are not prohibited, crosswalks, islands and medians, overpasses and underpasses, on-street parking spaces and loading zones, and equipment, signals, signs, street furniture, and other appurtenances provided for pedestrians)
Final Guidelines for Outdoor Developed Areas (2013)	<ul style="list-style-type: none"> • (Recreational) Trails (surface requirements, maximum slope, clear tread width, passing spaces, signs, resting intervals, gates and barriers) • Outdoor recreation access routes (surface requirements, maximum slope, clear width, passing spaces, slopes, resting intervals) • Beach access routes (surface, clear width, slopes, resting intervals) • Picnic and camping facilities

**Table 3
Summary of Design Guidelines and Regulations**

Design Guideline or Regulation	Topics Addressed
U.S. Department of Justice (DOJ) Amendment to the ADA Regulations Regarding the Use of Wheelchairs and Other Power Driven Mobility Devices 28 CFR part 35 (2011)	<ul style="list-style-type: none"> • Requires managers of public facilities, including trails, to accommodate people with disabilities who wish to use various types of non-wheelchair powered vehicles for access • See California Department of Parks and Recreation Departmental Notice No. 2011-02: Permissible Uses of Other Power Driven Mobility Devices (OPDMD)
Federal Highway Administration (FHWA)	
Manual of Uniform Traffic Control Devices (MUTCD) (2009)	<ul style="list-style-type: none"> • Defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic • Caltrans adopted the updated California MUTCD (CA MUTCD) in January 2012
Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide (2001)	<ul style="list-style-type: none"> • Shared-use paths (access to path, path surfaces, changes in level, grades, rest areas, width, passing spaces, railings, signs) • Recreation trails (path surfaces, changes in level, grades, rest areas, width, passing spaces, trails through steep terrain, steps, edge protection, signs) • Outdoor recreation access routes (surface, clear tread width, openings, tread obstacles, protruding objects, passing space, cross slope)
USDA Forest Service (USFS)	
Equestrian Design Guidebook for Trails, Trailheads and Campgrounds (2007)	<ul style="list-style-type: none"> • Defines the standards used to develop recreational facilities for equestrian users. • Guidelines for equestrian elements – such as corrals, tread width, surfaces and cross section design. • Supplement to local jurisdiction design criteria
State	
California Department of Transportation (Caltrans)	
Highway Design Manual (HDM) (2009)	<ul style="list-style-type: none"> • Class I bikeway/shared use path (width, clearances, grade, separation from highways, design speed, sight distance, horizontal and vertical curves) • Class II bike lane (width, placement, at-grade interchange design) • Class III bike route (bike route criteria, at-grade interchange design) • Multipurpose trails, Clear recovery zones

Table 3
Summary of Design Guidelines and Regulations

Design Guideline or Regulation	Topics Addressed
California Highway Barrier Aesthetics (2002)	Barrier design
California MUTCD (2012)	<ul style="list-style-type: none"> • Signs (application, placement) • Pavement markings (word messages, symbols, arrows, reflectorization, patterns and colors on shared-use paths, demarcating obstacles, dimensions) Traffic signals and crossing beacons (application, placement)
Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclist and Pedestrians. (2010)	<ul style="list-style-type: none"> • Pedestrian and bicycle route and crossing design through intersections Mid-block crossing design
<i>California Department of Parks and Recreation</i>	
Trail Handbook	Trail design, construction, survey, operations and maintenance standards
Accessibility Guidelines (2009)	<ul style="list-style-type: none"> • Accessibility standards • Recommendations and regulations for compliance with accessibility laws Signs (placement standards, minimum character sizes, level of information required)
Departmental Notice No. 2011-02: Permissible Uses of Other Power Driven Mobility Devices (OPDMD) (2011)	Establishes standards for OPDMD access (size, weight, speed, noise, emissions)

Trail Design Objectives

Trail design standards refer to the characteristics of the trail to provide different levels of access, traffic loads, maintenance requirements, and costs. In order to select the appropriate trail standards for a particular trail or trail system, and resolve the overall appropriate design, a number of factors should be considered, such as:

- Trail grades;
- Anticipated trail traffic volumes and seasonal demands;
- Trail user types;
- Drainage needs;
- Maintenance vehicle access needs; and
- Maintenance costs and schedules.

Additionally, complete and consistent trail design, signage, marking and mapping creates a cohesive, functional and memorable trail. These elements help establish a distinctive identity or “brand” for the trail system. A consistent design theme should include elements such as fencing materials, site furnishings, and interpretive information, and a trail system logo.

The Santa Rosa Valley trail system accommodates a wide range of users including equestrians, pedestrians, and bicyclists. Given that equestrians are the overall driving force behind the trail system and the focus of accommodation, these Guidelines cover Equestrian Trails thoroughly. Where construction of off-street trail segments is needed, specific cross section and plan details can be found in the section entitled Off-Street Equestrian Trail Guidelines, consistent with the general equestrian trail design guidelines. Also, recommendations for marking existing on-street as well as new on-street equestrian improvements can be found in the sections entitled Existing On-Street Equestrian Trail Guidelines and Proposed On-Street Equestrian Trail Guidelines.

Any proposed on-street equestrian improvements outlined in this plan shall be linked to Ventura County requirements for future subdivision development applications. Applications will be reviewed by the County against the guidelines in the Trail Master Plan to enable implementation of the planned trail segments within that subdivision.

Equestrian Trail Design

As with any trail design, the design of an equestrian trail facility should respond to the setting, needs of the trail users, level of use, and safety issues. The needs of equestrian trail users are unique due to the natural flight instinct of a horse when startled. Trails reserved exclusively for equestrians are also called bridle trails, bridle paths, or bridleways. Multi-use paths can easily serve both pedestrians and equestrians, as they both accept unpaved surfaces and move at relatively slow speeds. However, equestrians and bicyclists are not typically compatible on the same tread. A quiet, fast moving cyclist can startle a horse. In areas where trail user conflicts seem likely, efforts should be made to physically separate non-compatible user groups.

Equestrians include youth, seniors, leisure riders, advanced riders, organized groups, novices, and people with disabilities. Riders may recreate individually or in groups for pleasure, exercise or challenge. While some equestrians prefer wide, gentle trails, others seek a technically challenging route. Safety concerns for riders include:

- Separation from traffic , including safe road crossings
- Visibility/security
- Room to pass other trail users
- Natural hazards

Bicycle and Pedestrian Design

The design guidelines have been drawn from a variety of sources. The sources listed below provide extensive detail on the design for bicycle and pedestrian ways. These design standards provide a good framework for future implementation, but may not be feasible in all Santa Rosa Valley locations given the terrain and/or environmental constraints of the region. Bikeway design and planning standards are continually changing and expanding.

Any planned bicycle facilities should be consistent with and conform to the Ventura Countywide Bicycle Plan of 2007. All other bicycle facility information, contained within Appendix B, shall be for reference purposes only. Any future bicycle projects must also meet state and federal design standards. Therefore, as well as the Ventura Countywide Bicycle Master Plan, planners and designers should also refer to the following documents and their subsequent updates when planning and designing bicycle and pedestrian facilities.

- *2009 Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration*
- *Guidelines for the Development of Bicycle Facilities, AASHTO*
- *Guidelines for the Planning, Design, and Operations of Pedestrian Facilities, AASHTO*
- *A Policy on Geometric Designs of Highways, AASHTO*
- *Urban Bikeway Design Guide, NACTO*

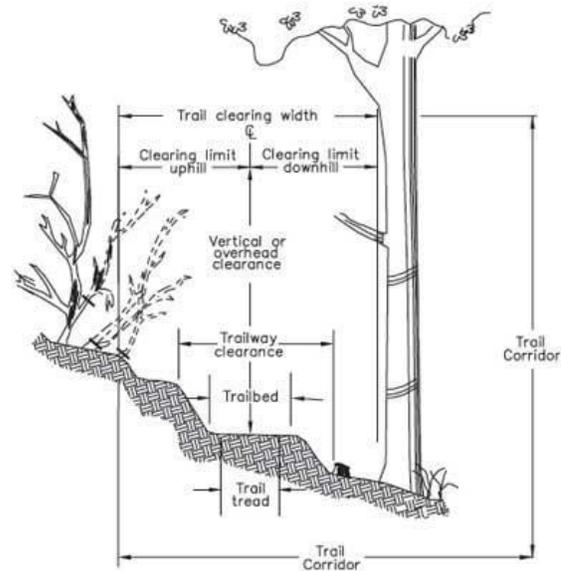
Disclaimer

This chapter does not constitute a standard, specification, or regulation. It is not intended to replace existing state or national mandatory or advisory standards, nor the exercise of engineering judgment by licensed professionals.

Trail Terms

When speaking about trails, it is helpful to use common terminology. Figure 7 illustrates some terms applicable to trail corridors.

Figure 7



This Trail Master Plan uses the following definitions:

- *Transportation corridor*--The larger alignment of a trail, which may include other modes of transportation; for example, a multimodal transportation corridor between two attractions that has separate trails for stock and bicycles and a road for motor vehicles.
- *Trail corridor*--The zone that includes the trail tread and areas immediately above and to each side. The edges of single-tread trail corridors generally are the same as the trail's clearing width plus its vertical clearance. Multiple-tread trail corridors include the trail clearing width and vertical clearance for all the treads. Sometimes trail corridors include more land than is needed to accommodate the trail tread and clearance.

- *Trail tread or tread*--The travel surface of the trail.
- *Trailbed*--The tread plus base materials.
- *Trail clearing width*--The space to each side of the trail tread that is cleared for trail users. Usually, there is an uphill and a downhill clearing width.
- *Trail vertical or trail overhead clearance*--The space over the trail tread that is clear of obstructions. For riders, this clearance is sometimes referred to as vertical shy distance.
- *Trail clearing limit*--The area over and beside a trail tread that is cleared of trees, limbs, and other obstructions; often the edges of the trail corridor.
- *Trailway clearance*--The trailbed plus the area to either side that is needed to accommodate construction cuts and fills.

Equestrian Trail Design Standards

Tables 4 and 5, and Figure 8, show suggested widths and clearances for equestrian trails from the federal *Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds*.

Table 4
Suggested Widths and Clearance for a Standard, Single-track Horse Trail

Level of Development	Tread Width	Clearance Width	Average Grade*	Maximum Grade	Outslope	Turn Radius	Vertical Clearance
Low	1.5'-2'	5.5'-8' (w) 10' (h)	≤ 12%	20% No more than 200'	5-10%	5'-6'	10'
Moderate	3'-6'	9'-12' (w) 10-12' (h)	≤ 10%	15% No more than 200'	5%	6'-8'	10' – 12'
High	8'-12'	14'-18' (w) 12' (h)	≤ 5%	5-8% (800'-1500') 8-10% (500'-800') 10% (≤500')	2-5%	8'-10'	10' – 12'

Figure 8
Width and Clearance Guidelines

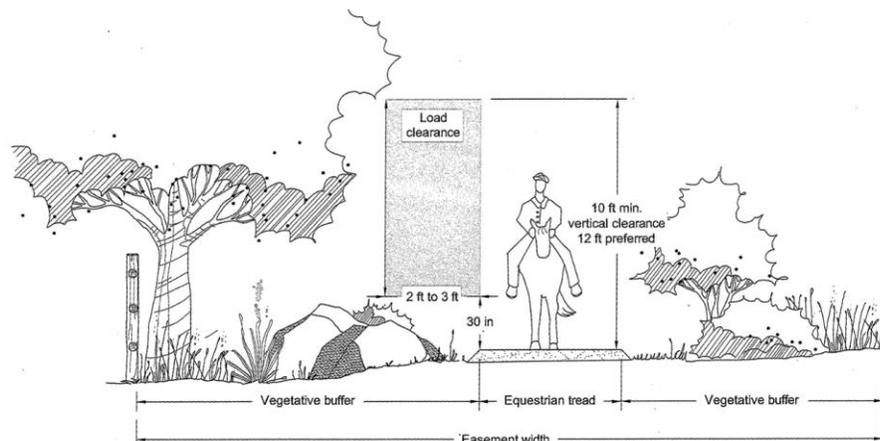


Table 5
Suggested Widths and Clearance for a Standard, Double-track Horse Trail

Level of Development	Tread Width	Clearance Width	Average Grade*	Maximum Grade	Outslope	Turn Radius	Vertical Clearance
Low	5' – 6'	10' – 12' (tread plus 3 feet on each side)	≤ 12%	20% No more than 200'	5-10%	5'-6'	10'
Medium – High	8' – 12'	14' – 18' (tread plus 3 feet on each side)	≤ 10% - ≤ 5%	15% (no more than 200') 5 – 8% (800'-1500'), 8 – 10% (500' – 800'), 10% (≤500')	2 – 5%	6' – 10'	10' - 12'

Source: USDA/FHWA, *Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds*

Less developed or rural equestrian trail settings include: rivers, open spaces, and drainages among others. Safety concerns for riders in rural settings involve: visibility, interactions with other trail users and natural hazards. Urban settings include developed or congested areas.

Trail Sight Distance

Mounted riders can see farther than trail users on the ground. This added height helps others see the rider. Near the crest of a hill, a trail user should see the head of another trail user on the other side of the hill before reaching the hill's crest. Downhill travelers need more stopping distance than uphill travelers. Curves in the trail reduce the sight distance; in such cases, trim vegetation along the curve. Design trail curves for appropriate speeds and sight distance to prevent conflicts, considering individual site conditions.

Sight distance in areas with low development is most critical when trail users encounter approaching bicyclists or riders. It is often customary for other trail users to yield to horses. To do so, trail users need adequate warning and space. When two horses meet, passing is difficult. Frequently, horses heading uphill take precedence.. Local custom often determines

who has the right-of-way. There are no fixed rules that apply nationwide.

Trail Tread

Tread is the actual travel surface of the trail, where the hoof meets the surface (Figure 9). Tread is constructed and maintained to support the designed trail use and may or may not be paved. Most trail construction involves establishing solid, obstacle-free tread that stays in place. A good job of locating, constructing, and maintaining tread discourages trail users from creating their own paths.

Tread Width

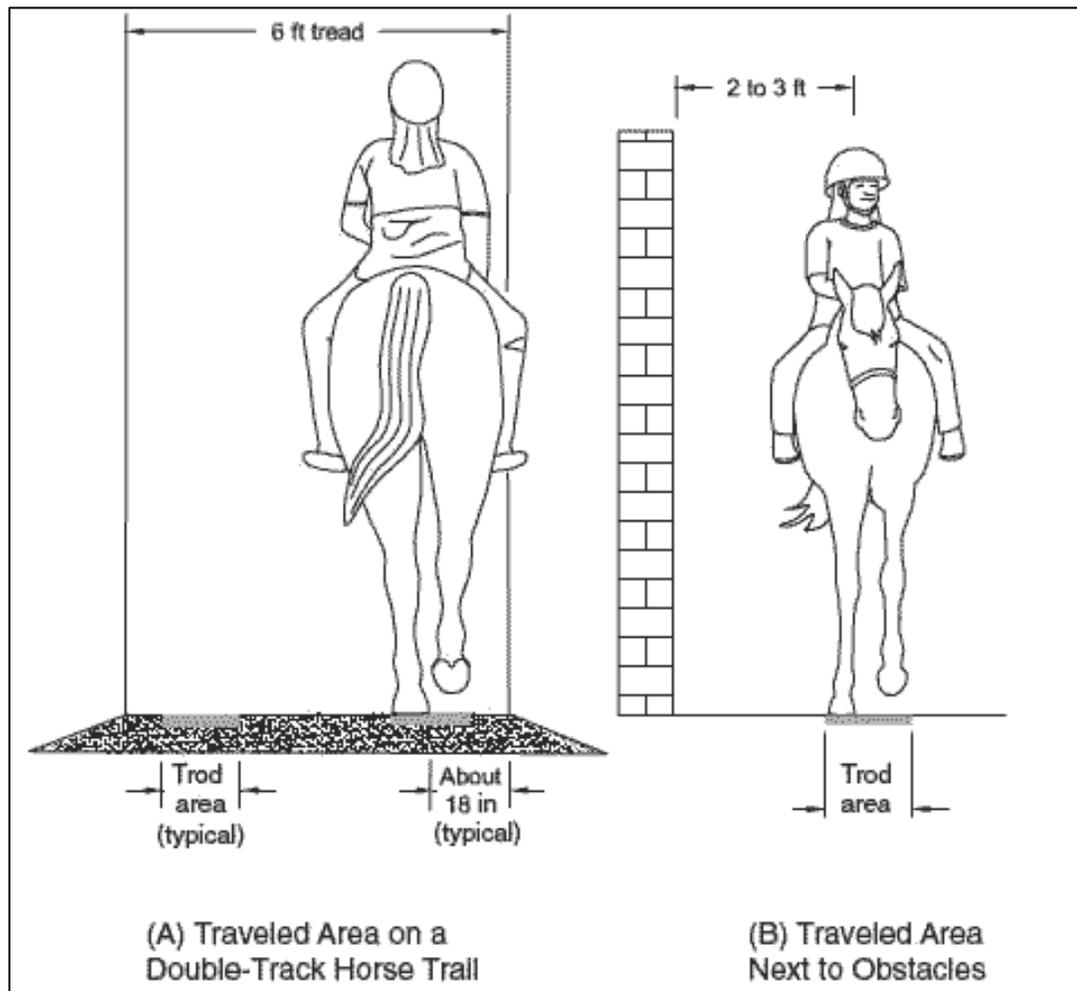
No national standards establish the width of shared-use trails. Determining the best trail width is site-specific and depends on many factors, including the types of trail users and their needs, the level of development, the setting, land availability, jurisdictional requirements, safety, potential conflicts, local expectations, and maintenance concerns.

To accommodate their natural stride, horses require a tread that's at least 1.5 to 2 feet wide. The animal and rider require about 4 feet of unobstructed width. Tread width also varies by the number of incorporated lanes--or *tracks*. A single-track tread forces trail users to travel

single file. They must move off or to the side of the trail when meeting or passing others. A double-track tread allows trail users to travel two abreast or easily accommodates passing. Single-track treads vary from 1.5 feet wide in wild land areas to 8 feet or wider in urban areas. Double-track treads are often 5 to 6 feet wide if

there is plenty of clearance on each side to allow passing. This is a common configuration for moderately developed trails in rural settings. In highly developed areas, double-track treads frequently are 8 to 12 feet wide to meet the needs of all trail users. Trails should be wider in areas with heavy shared use.

Figure 9
Trail Tread



Trail Clearance

Vegetation that encroaches on tread width and overhead clearance is more than a nuisance for trail users--it can entangle users and gear. Trim or remove vegetation and other obstacles--such as boulders--from this area (see Figure 7) so trail users can more easily avoid plants that have prickly seeds, thorns, and pointed branches. Periodically providing larger cleared areas for turnouts gives trail users room to move off the tread for breaks or to allow others to pass.

Horizontal and Vertical Clearances

At a minimum, 2 foot clear shoulders should edge the trail. Typical setback from edge of tread to obstructions (including signs) and buildings is 3 feet. A 10 foot vertical clearance should be maintained on multi-use trails used by pedestrians and cyclists. Equestrian trails should maintain a 12 foot vertical clearance. This area should be free from tree limbs and any other obstructions that may interfere with pathway use.

Horizontal trail clearance will vary based on the trail setting. USDA/FHWA suggested widths, with clearance tolerances for a standard single- and double-track horse trails are shown in Table 3. On a single-track trail, a horse will often travel 18 inches from the trail edge. Single track treads vary from 1.5 feet in open areas to 8 feet in urban areas. Double-track equestrian trails are designed to be 5 feet to 6 feet wide in open areas and are often 8 feet to 12 feet wide in developed. A double-track tread allows for equestrians to ride side by side while also providing a comfortable passing distance. This is a common configuration for moderately developed trails in rural settings where right-of-way is available.

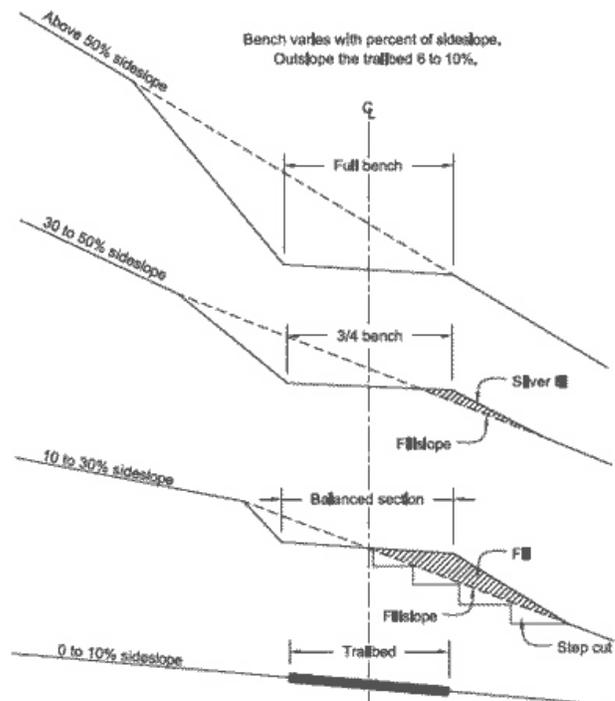
According to American Association of State Highway and Transportation Officials (AASHTO) design standards, two-way multi-use paths should be designed to be a minimum

of 8 to 12 feet in width. Eight foot wide sections should be reserved for pinch points that have physical or environmental constraints. Ten-foot wide trails are recommended for rural multi-use trails.

Trailbed Construction

On hillsides, excavate the trailbed into the hill to provide a slightly outsloped travel path. Figure 10 shows cross sections of a trail with a relatively flat trailbed, full-bench construction, 3/4-bench construction, and a balanced section. Full-bench construction is preferred because it produces a more durable trail that requires less maintenance. During full-bench construction, excavated soil from the hill is cast as far as possible from the trail since it is not needed for fill. Partial-bench construction incorporates part of the cut material in a process known as *sliver fill*. Because it is difficult to compact the fill evenly, the trail may be prone to failure, especially on the downhill side. If a slope needs to be filled, reinforce it with retaining walls or use step cuts and fills (see Figure 10) to key the fill material into the slope.

Figure 10
Trailbed Cross Sections



Grade

Steepness--or *grade*--determines how challenging a trail is. In the English measurement system, grade is the amount of rise in 100 feet expressed as a percentage. A trail that climbs 5 feet over a distance of 100 feet has a 5-percent grade. Grade directly affects how a trail needs to be designed, constructed, and maintained to establish and retain solid tread.

Generally it is easier for stock to maintain their balance when they are traveling uphill rather than downhill. This is because most of their weight is over their rear legs. Descents require stock to shift more weight to the forelegs. Table 6 shows suggested design grades for horse trails. Surface water runoff can be controlled on all of the grades listed in the table. On grades nearing 50 percent, erosion cannot be controlled.

The best contour trails have grades, slopes, and turns that are comfortable for all trail users, not just horses and mules. Following contours helps reduce erosion and minimize trail maintenance. Keep trail segments between slope breaks--

or *running grades*--as short as possible. Do so by following land contours, as opposed to cutting across or going straight up and down contours. Incorporate periodic short grade reversals as needed to remove surface water from the trail. Because water gains speed as it runs downhill, the potential for erosion increases greatly as the running grade becomes longer.

Horses easily can master steady grades steeper than 10 percent--even 20 percent. However, as the grade increases, so does the potential for runoff to harm the trail's surface. In areas where grades are steeper than 10 percent, consider using one or more switchbacks to gain elevation.

On running grades steeper than 5 percent, add 6 to 12 inches of extra tread width as a safety margin where possible. This helps a trail animal regain its footing if it accidentally steps off the downhill side of the trail. Benches or trail sections that are at least 100 feet long without a running grade can serve as resting areas for stock that are out of condition or large groups. The larger, relatively flat area means an entire group can rest together at one time.

Table 6
Suggested Design Grades for Horse Trails
Agency specifications may vary

Length of pitch	Low level of development**	Low level of development**	High level of development**
Target range* (Over at least 90 percent of trail)	Less than or equal to 12-percent grade	Less than or equal to 10-percent grade	Less than or equal to 5-percent grade
Steep exceptions*	20-percent grade for no more than 200 feet	15-percent grade for no more than 200 feet	15-percent grade for no more than 200 feet 8- to 10-percent grade for 500 to 800 feet 10-percent grade for no more than 500 feet

* May not meet accessibility requirements.

** Base any grade variances on soils, hydrological conditions, use levels, and other factors contributing to surface stability and erosion potential.

Outslopes

Flowing water follows the path of least resistance, which may be directly down a poorly constructed trail. An *outslope* -- also known as a cross slope -- helps shed water from the trail. Grading with an outslope leaves the outside edges of a hillside trail slightly lower than the inside edge. Table 7 shows suggested slope ranges for outslopes for horse trails.

Curves, Turns, Passing Areas, and Switchbacks

The large size of stock and their loads requires plenty of maneuvering space. While curves and switchbacks designed to accommodate riders are usable by many recreationists, the design parameters are slightly different than those for other users, such as bicyclists.

Curves and Turns

On trail curves and turns, the minimum comfortable radius is 5 feet. When turns are any tighter, stock may stumble over their own legs. Turns with a radius of 6 to 8 feet are more comfortable for both animal and rider.

Table 8 shows the minimum suggested turning radius on horse trails with different levels of development. Wider turns are preferred. In addition to handling increased traffic volume and being more comfortable, wider turns may

better suit tread width, site conditions, and trail users' experience levels.

Passing Areas

When trails are in steep terrain, other trail users can find it challenging to move aside for stock. Incorporate passing areas on narrow trails, particularly those on steep hillsides. A space 5 feet wide by 10 feet long will allow a single trail animal to pull off the tread. Locate passing areas in natural openings if possible. Larger passing areas, where large groups may move off the trail while another group goes by, are sometimes needed. Plan these areas to handle the expected traffic volume and group sizes.

Switchbacks

Switchbacks reduce the grade on a trail by incorporating sharp turns on one or more trail segments. Several switchbacks may be needed to traverse a steep area effectively. Switchbacks consist of an upper and lower approach, guide structures, a landing--or turn platform--and a drain for the upper approach and landing. Figure 11 illustrates suggested guidelines for trail switchbacks on horse trails.

Table 7
Suggested Slope Range for Outslopes on Horse Trails

Agency specifications may vary

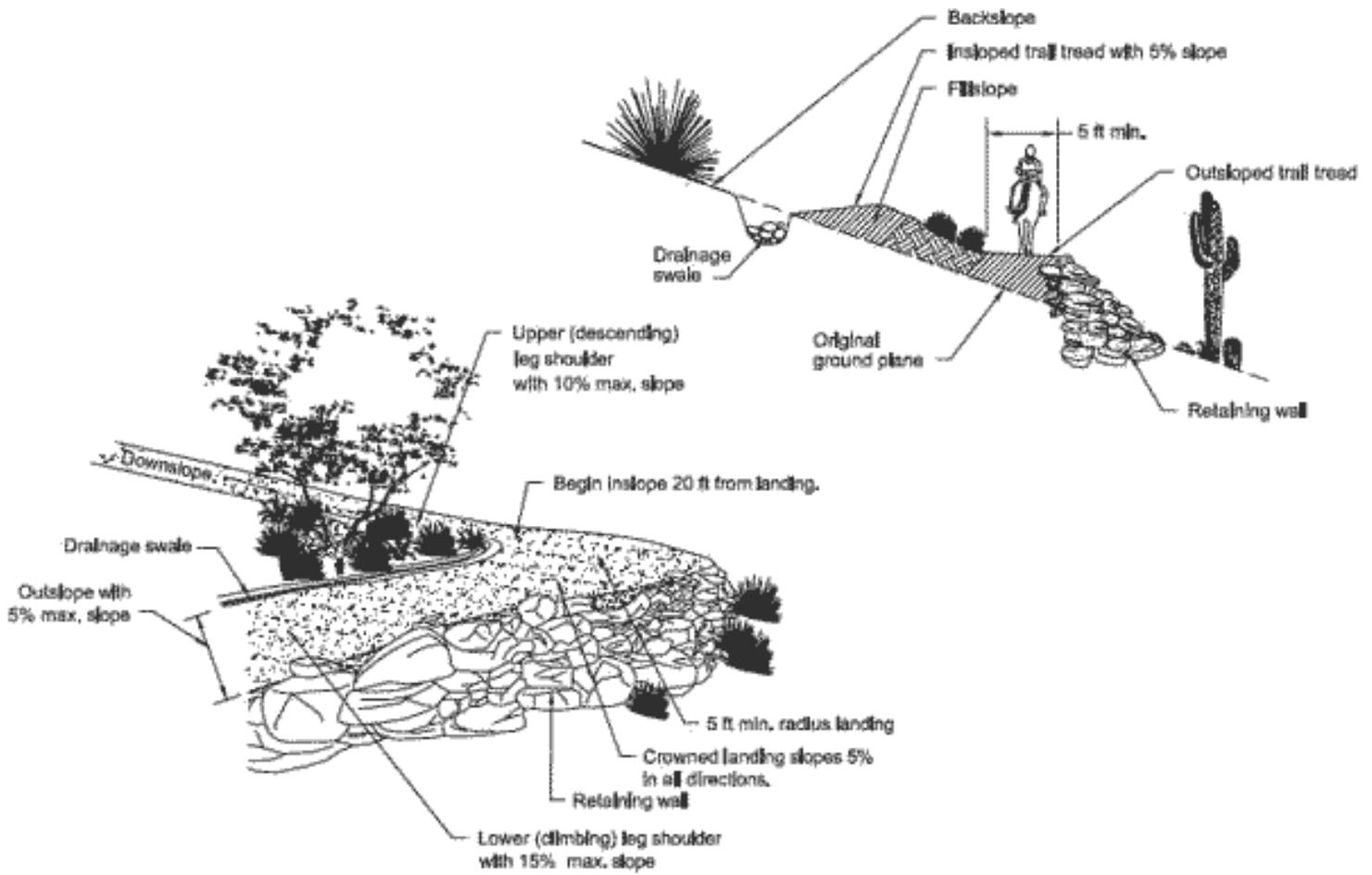
Low development (percent)	Moderate development (percent)	High development (percent)
5 to 10	5	2 to 5

Table 8
Minimum Suggested Turning Radius for Horse Trails, Depending on Site Conditions

Agency specifications may vary

Low development (feet)	Low development (feet)	High development (feet)
5 to 6	6 to 8	8 to 10

Figure 11
Trail Switchbacks



Surface Materials

The Santa Rosa Valley trail system is anticipated to accommodate a high number of equestrians each year. It will be important to carefully consider the surface material for the trail network. The choice of surface materials should be selected based on the regional climate, soil type, level of development, user comfort and the ability to stand up to compaction, displacement and erosion. The U.S. Forest Service's Equestrian Design Guidebook for Trails, Trailheads and Campgrounds summarizes the relative characteristics of common materials for equestrian trails and trailhead in Table 9.

This guidebook uses the following terms to describe construction elements for trails and recreation sites:

- **Surface course** - The top layer of applied materials. The surface course carries the traffic load, provides a finished surface, is slip-resistant, and resists traffic wear and water damage.
- **Base course** - A support layer of applied materials. The base course provides the immediate support for the surface course. The base course may be built directly on the subgrade (existing material) if no subbase is required.
- **Subbase** - A foundation layer used on engineered travelways. Recreation site roads and parking areas may require a subbase. Such construction must comply with the requirements of the AASHTO and ASTM International (formerly the American Society for Testing and Materials). The subbase consists of compacted granular material or soil that helps protect the base and surface courses from intrusion of fine-grained roadbed soils, damage from frost, and the accumulation of free water in or below paved surfaces.
- **Subgrade** - The material in place; usually the natural soil. The subgrade is

the base for succeeding layers of applied materials.

Native Soils

Native soils vary, even within a single trail corridor. Soils that are coarsely textured with high percentages of gravel and sand can be very good surface materials for trails and living areas--camp and picnic areas. Finely textured soils, those with a higher percentage of organic matter, silt, and clay, tend to be poor surface materials. Roads, parking areas, and parking pads surfaced with native soils are generally difficult to maintain and can become muddy. Hoofs, boots, and wheels can damage the tread in wet or boggy areas. When these areas dry out, the ruts may make the trail difficult to use. Some native soils also produce a lot of dust, an issue of special concern in urban areas and near residences. Unhealthy dust conditions may require abatement measures. Native soils may be economical, but they may require frequent maintenance, reducing their overall cost effectiveness.

Wood Chips

Wood chips cushion the impact of hoofs on soils, and most stock are comfortable walking or lying on them. Consider using wood chips about 2 by 2 by ½ inches on low development trails in drier climates. In areas where horses are confined, smaller chips or sawdust are suitable in many climates. Hardwood chips may last longer than chips from conifers.

Wood chips require more maintenance than other treatments. They absorb water and eventually decompose and become embedded in the soil surface. Heavy rainfall can wash the chips away unless they are contained with edging. Wet wood chips can be slick, making them less desirable in regions that have steep grades or heavy use. Wood chips also can harbor insects, retain unwanted moisture, and reduce accessibility. Chips with protruding

knots can injure the horse's frog if the animal is not wearing horseshoes. Don't use chips from trees that are toxic to horses and mules, such as black walnut or yew.

Gravel

Gravel is a coarse, granular material produced by the natural weathering and erosion of rock. The USCS distinguishes gravel as particles that pass through a 3-inch (76.2-millimeter) sieve but remain on a No. 4, 0.187-inch (4.750-millimeter) sieve. Particles larger than 3 inches (76.2 millimeters) are considered cobbles and boulders. Round gravel usually comes from alluvial deposits. Sometimes round gravel is used in wildland settings or areas with low development where it is readily available. Round gravel is a poor choice for trails, roads, parking areas, and parking pads because it doesn't compact well. The rocks roll against each other, making it difficult for people and stock to walk. Vehicles pulling a trailer also have difficulty getting traction, especially if the gravel is deep. As the gravel particles roll, the vehicle sinks and may become stuck. Round gravel with very small rocks sometimes is called pea gravel. Pea gravel is appropriate for surfaces in horse areas and around hydrants, water troughs, and wash racks.

Crushed Gravel and Crushed Stone

Crushing natural gravel produces crushed gravel. Crushed stone is produced by crushing bedrock. Examples of materials used for crushed stone include limestone and granite.

Many people refer to crushed gravel and crushed stone, either separately or in combination, as crushed rock. Crushed rock, with its angular faces, compacts relatively well. Crushed rock is suitable for trail areas where water collects or where there is heavy use. It is also suitable for subbases on roads, parking areas, parking pads, and trails. Generally avoid

using crushed rock without fines as a surface course because it doesn't compact well.

Crushed rock can be used in horse areas. Small rocks 3/8 inch or smaller are less likely to get caught in rakes during manure cleanup. Larger rocks can lodge in an animal's hoofs, causing pain or injury. Crushed rock is suitable near water, for example on wearing surfaces around water hydrants, water troughs, and wash racks.

Crushed rock, when combined with fines and well compacted, generally is preferred for surface courses on trails, roads, parking areas, and parking pads. This material fits together tightly, offering a stable surface for stock and vehicles. Compacted crushed rock with fines withstands high use and requires little maintenance. The material provides good traction and drainage. If it is well compacted and the surface hardens well, it is not dusty. The standard size for crushed material is 3/4-inch-minus, which includes rocks about 3/4 inch in diameter and smaller. Some agencies prefer crushed materials that are 1/2-inch-minus for trail building, but this material may be more expensive.

Sand

Sand is fine granular material produced by the natural disintegration of rock. The USCS says that sand is material that passes a No. 4 (4.750-millimeter) sieve, but is retained on a No. 200 sieve. Sand drains well and creates a soft trail tread for stock. When used alone, sand is easily eroded or replaced by other materials and can be dusty. Often, sand is combined with clay and gravel or other materials to improve its drainage or prevent too much compaction. If sand is applied more than 3 inches deep, it can strain an animal's tendons and ligaments. Over time, horses that eat or breathe sand can contract sand colic, a serious illness. Sand should not be used in areas where horses and mules eat or where they spend a lot of time.

Decomposed Granite

Decomposed granite resembles crushed stone, although it erodes into angular pieces through natural processes. Decomposed granite, with or without fines, compacts relatively well. When combined with fines and compacted, decomposed granite is a popular surface choice for trails, parking areas, parking pads, and living areas in campgrounds. Some designers group crushed stone, crushed gravel, and decomposed granite under the single term angular rock because these materials have many characteristics in common. All are excellent for many surfaces used by horses and mules.

Cinders

Cinders are pulverized pieces of volcanic lava about ½ inch in diameter or smaller. They are an alternative treatment for high-use areas that are subject to trenching or soil displacement caused by water, snow, or ice. The rough surface provides improved traction but requires periodic maintenance to replace displaced or buried materials. Cinders form an unpleasant walking surface for long-distance trails.

Additives

Soil additives reinforce or augment existing soil structure to improve the soil's engineering characteristics. They can be used to improve some native soils and leave them looking natural. Some additives also may be used with well-graded aggregate. Several commercial companies market additives described as environmentally friendly that produce firm surfaces.

Chemical additives--calcium chloride, sodium chloride, lignin sulfonate, magnesium chloride, or hydrated lime--may be added to aggregate to control dust, to adjust moisture levels, or to act as a binder. Sometimes, a small amount of portland cement is mixed with soil or aggregate

to slightly harden the surface. Soil stabilizers--a form of additive--act as a binding agent. After a rainfall, some stabilized materials may fail to adequately support the weight of stock. AASHTO or ASTM International specifications establish standards for many additives.

Asphalt

Asphalt surfaces generally are not recommended for horse trails, roads, parking areas, or parking pads because they provide little grip for horseshoes. However, trails may have to cross sections of asphalt. Roughen the surface in such areas. Some uncoated asphalt surfaces are somewhat rough, providing a degree of traction that is better than coated asphalt. Rubberized asphalt--regular asphalt mixed with finely ground used tires--has been used with some success in Arizona. Caution: asphalt heats up and softens in hot climates. The softened material sticks to hoofs and can burn the living tissue under some circumstances.

Rough-Textured Concrete

Concrete is one of the slipperiest surfaces a horse or mule may encounter, and many riders do not recommend it. Nonetheless, stock manage to cross concrete surfaces without incident. This doesn't make concrete any safer. A heavy, rough-broom finish, applied perpendicular to the direction of travel, is one mitigation measure used successfully in some places. A rough finish may increase traction, but does not eliminate the danger that a horse or mule might slip and fall on the hard surface.

Concrete with Washed Surface

Concrete, with exposed 1- to 1½-inch (about 25- to 38-millimeter) crushed aggregate and a ½- to ¾- inch water wash finish, provides more traction than smooth concrete. Riders do not agree on the advisability of using this finish. Local weather, site conditions, or top coatings can reduce surface traction. For example, the

surface may be slippery when wet, especially if a sealer coat has been applied. Before choosing this surface treatment, consult with local trail users.

Pavers

Generally, hard pavers are not horse-friendly surfaces. However, interlocking or articulating pavers that facilitate traction can be good choices for equestrian water crossings where stream erosion is a problem. Interlocking pavers fit into each other, holding them in place. Some styles allow vegetation to grow through, others have voids that can be filled with soil, gravel, or other suitable material. Articulating concrete pavers form a mat with spaces that are filled with soil. In highly erodible soils, pavers combined with geotextiles are an option. These materials provide a horse-friendly choice for durable surfaces, but they are costly.

Interlocking synthetic or rubberized pavers are relatively softer than other pavers and may be suitable for horse trails. They are costly. Possible locations for rubberized pavers include approaches to bridges, culverts, and on roads with grades steeper than 5 percent. They also may be suitable in urban and rural areas on unpaved treads that are dusty or drain poorly. Some areas have had problems keeping the pavers in place.

Path Surfacing Options Analysis

The surfacing material of a path contributes to the overall feel of the trail and can affect which users can comfortably utilize the trail. Whether or not a trail is paved can encourage or deter neighborhood support for the trail, if they consider a paved trail to be an invitation for outsiders to pass through their community, or if they have safety or aesthetic concerns about an unpaved trail. The selection of trail surface treatments should take into consideration that some patterns and joints may cause vibrations

that are uncomfortable for wheelchair users. It is also desirable that the surface be stable, firm and slip resistant.

In arriving at a recommended trail surface, several key criteria should be considered, including:

Initial Capital Cost – Trail surface costs vary dramatically and dollars to build trails are scarce. Construction costs include excavation, subbase preparation, aggregate base placement, and application of the selected trail surface.

Maintenance and Long Term Durability – The anticipated life of a trail surface can vary from a single year (bark surface in a moist climate) to 25+ years (concrete). In addition, each trail surface has varying maintenance needs that will require regular to sporadic inspections and follow-up depending on the material selected. Some surface repairs can be made with volunteer effort such as on a bark surface trail, while other such as a concrete surface will require skilled craftsmen to perform the repair.

Life Cycle Cost – An economic life cycle cost analysis evaluates the costs over time for the surface alternatives. Asphalt pavement was shown to have the lowest life cycle cost over concrete, permeable concrete and permeable asphalt.

Existing Soil and Environmental Conditions – Soil conditions are predetermined and play a critical role in surfacing selection. In addition, when considering the use of a permeable concrete or asphalt surface, the success rate of these surfaces is directly correlated to the permeability of the soil and climatic conditions. The lower the permeability and moisture, the greater risk of failure.

Anticipated Use/Functionality – Who are the anticipated users of the trail? Will the trail surface need to accommodate equestrians, wheelchairs, maintenance vehicles, bicycles,

etc.? Does the trail provide critical access to a popular destination for many users or is it a local access route to a community park? Multiple use trails attempt to meet the needs of all anticipated trail users. This may not be feasible with a single trail surface. Considering the shoulder area as a usable surface, it is possible to provide enough width to accommodate use by those preferring a softer material. Each surface also has varying degrees of roughness and therefore accommodates varying users. In-line skates, for example, cannot be used on a chip seal surface or most permeable concrete surfaces due to the coarseness of the finished surface.

Funding Source – The funding source for the trail may dictate the trail surface characteristics. If the trail has federal funds and is being administered through Caltrans, funding agency will need to review and approve the selected trail surface.

Aesthetics – Each trail surface has varying aesthetic characteristics that should fit with the overall design concept desired for the project and for the neighborhood in which the trail is located.

Grading, Drainage, Erosion Control and Water Retention

Trail grade is one of the most important design aspects of trail design. Steep grades should be avoided on any multi-use trail, with 5% the recommended maximum gradient. Steeper grades of up to 8.33% can be tolerated for short distances (up to about 500 feet), although these require periodic landings.

Trails that are comfortable for equestrians are ones that can accommodate most trail users. For equestrians, grade or steepness determines how challenging a trail is. While horses can negotiate grades up to 20% (up to 200 feet), steeper running grades result in faster water run-off and erosion problems. The Federal Highway

Administration's Equestrian Design Guidebook for Trails, Trailheads and Campgrounds recommends to "keep trail segments between slope breaks – or running grades – as short as possible". Following contours helps reduce erosion problems, minimizes maintenance and increases comfort levels. A 2% cross slope or crowned tread and periodic grade reversals along running slopes will minimize standing surface water and resolve most drainage issues on a multi-use path. An exception is cut-sections where uphill water must be collected in a ditch and directed to a catch basin. From there, water can be directed under the trail in a drainage pipe of suitable dimensions. Additionally, on running grades steeper than 5%, add 6 to 12 inches of extra tread width as a safety margin where possible.

Not only are steep trail grades difficult to traverse, they are expensive to maintain. In a report by the Virginia Tech Department of Forestry for the U.S. Forest Service, it was noted that trails steeper than 10% erode "at increasingly greater rates because erosion rates become exponentially greater with increasing trail grades". In addition, the report also states that gravel applications on trail sections of 10% or more can be four to five times greater, thereby increasing maintenance costs.

Natural Surface Trails

A sustainable natural surface trail balances many elements. Natural surface trails have very little impact on the environment, they accommodate erosion through proper design, construction and maintenance and they blend in with the surrounding area. The trail tread is typically made by clearing, grading and compaction of the native soil. Non-native material may be used to increase tread stabilization.

**Table 9
Surface Materials**

	Surface Material	Traction or Slip-resistance*	Durability	Natural Appearance**	Dust Free	Horse comfort	Cost of material	Maintenance	Susceptibility to displacement
Natural Materials	Native soil***	Variable	Variable	Excellent	Variable	Good to Excellent	Low	Variable	Variable
	Wood chips****	Fair to good	Poor	Good	Good	Excellent	Low	Moderate	High
Aggregate	Crushed rock w/ fines	Excellent	Excellent	Good	Good to excellent	Good	Moderate	Low	Low
	Crushed rock w/o fines	Good	Excellent	Good	Good	Fair	Moderate	Moderate	High
	Rounded gravel without fines	Poor	Excellent	Fair to good	Good	Poor to good (varies with particle size)	Moderate	Moderate	High
	Sand	Good	Good	Excellent	Poor	Good		Moderate	High
	Cinders	Good			Good	Poor		Moderate	High
Additives	Soil additives*****	Good	Good	Good	Good to excellent	Good	High	Moderate	Moderate
Pavement*****	Asphalt	Poor	Good	Poor	Excellent	Poor	High	Moderate	Low
	Asphalt with chip seal	Fair	Good	Fair	Excellent	Poor	High	Low	Low
	Rough textured concrete	Good	Excellent	Poor	Excellent	Poor	High	Low	Low
	Concrete with washed surface	Poor to fair	Excellent	Fair	Excellent	Poor	High	Low	Low
	Hard, traction friendly pavers	Good	Good	Poor to fair	Excellent	Poor	High	Moderate	Low

*Wet surfaces may have reduced traction.

** How natural a product appears varies by location.

***Native soils are quite variable. Consult a local geotechnical engineers or soil scientists for more information.

**** Alta does not recommend wood chips as a sustainable trail surface.

*****Characteristics of soil additives vary according to the manufacturer and the method of installation.

*****Coatings and surface washes may change the characteristics of paved surfaces, including traction and appearance.

The successful design, construction and management of natural soft-surface trails is critical to building a trail network that accommodates a wide range of users. There is not one set of design standards for natural surface trails, although there are many resources available to guide their construction. It is important to remember that natural surface trails are much more susceptible to natural forces than paved pathways.

The following trail classification guidelines are not a “how-to” for building trails, rather they offer a framework for management and decision making to help build a trail system in the Santa Rosa Valley. In addition, this guide establishes standard terms and definitions that can aid communication with planning partners about trail needs, design standards and environmental issues. Table 10 provides a summary of natural surface trail classification standard dimensions.

Trail Design Features

In addition to trail surface material, there are many other design elements that range from essential to the development of the trail, to amenities that benefit trail users and minimize trail impacts. This section addresses those features.

Access Control

Bollards

Bollards are an effective way of keeping motor vehicle traffic off of trails, but they can be hazards to trail user traffic – especially bicyclists, so they should not be used unless there is a demonstrated need for them. Where bollards are installed at least the center post typically needs to be removable to allow passage of maintenance or emergency vehicles. Solid bollards that are secured to the base with a lock should use combination locks only.

Table 10
Natural Surface Classifications Summary

Trail Type	Tread Width	Trail Corridor	Surface	Average Grade	Max Grade*	Outslope	Turn Radius
Hiking Trail	18"-48"	3'-6' (w) 7-8' (h)	Native soil and rock; compacted	≤ 5%	15-25%	2-5%	3'
Equestrian Trail	1.5'-12'	3.5-5.5' (w) 10-12' (h)	Native soil and rock; compacted	2-10%	5-20%	2-10%	5-10'
Mountain Bike Trail	12"-36"	2-6' (w) 6-8' (h)	Native soil and rock; compacted	2-10%	≥15%	5-10%	≥2'
Multipurpose Trail	10'-12'	10'-16' (w) 8-12' (h)	Native soil or compacted granulated stone	2-5%	10%	2-4%	5-10'

* Max grade depends largely on soil type and running distance of slope

A single bollard located in the center of a trail entrance can be enough to keep cars out while multiple closely spaced bollards or bollards with a chain in between are sometimes used to separate a path from a parallel roadway.

Minimize the use of bollards to avoid creating obstacles for bicyclists. Bollards, particularly solid bollards, have caused serious injury to bicyclists. Instead, design the path entry and use signage to alert drivers that motor vehicles are prohibited. Bollards also are used to slow down cyclists approaching a street crossing.

Flexible bollards and posts are designed to give way on impact and can be used instead of steel or solid posts (see Figure 12). These bollards are typically made of plastic that is bolted to the roadway and bend and return to their original position when hit. They are intended to deter access, but allow vehicles through in an emergency.

Bollards typically are installed using one of two methods:

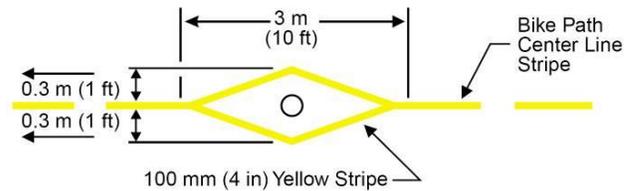
- 1) The bollard is set into concrete footing in the ground.
- 2) The bollard is attached to the surface by mechanical means (bolting the bollards or using epoxy glue and bolts).

Where removable bollards are used, the top of the mount point should be flush with the path's surface so as not to create a hazard. At the time of this publication, flexible bollards that do not leave an anchored mounting device on the path or roadway surface when removed are not commercially available.

All posts shall be permanently reflectorized for nighttime visibility and painted a bright color for improved daytime visibility. Figure 12 shows a recommended pavement striping

pattern to reduce the risk of user collisions with the bollard.

Figure 12
Bollard Striping



When more than one post is used, an odd number of posts at 5-foot spacing is desirable. Wider spacing can allow entry by adult tricycles, wheelchair users and bicycles with trailers.

Fencing & Access Gates

Fencing can serve multiple purposes along trail facilities, including access control, channeling of trail users, and elimination of liability concerns. The fencing should allow for good natural surveillance and not obstruct the ability to visually monitor the activities taking place on the trail.

Access gates should be designed to allow maintenance vehicle and emergency access when appropriate; click-to-enter or combination locks are acceptable options.

Split rail or lodgepole fencing allow good visual access to the trail and should be used in areas where keeping “eyes on the trail” is important. Decorative fencing can add visual interest to a trail and could be used at gateway entrances or adjacent to neighborhoods. Secure access gates are needed at access points to adjacent private properties and in areas deemed necessary by the Ventura County.

Context Sensitive Design Elements

The colors, forms and materials used in the various site amenities recommended in this plan reflect several specific elements of the region, including: the unique landscape of the Santa Rosa Valley, the mountains and the connection to the adjacent Ventura County region.

A consistent theme of site amenities should be carried throughout the trail corridor as a way to tie the trail together from one unique end to the other.

The following list illustrates the key elements that will make the Santa Rosa Valley trail system an integral part of the Ventura County region.

Lighting

Due to the environmental concern of light pollution affecting adjacent residences, installation of new lighting is not recommended on the Santa Rosa Valley trail system. The trail sections on Santa Rosa Road and other streets will receive lighting from the existing streetlights on those roads. In other parts of the trail system, the entity responsible for managing trail improvements may choose to light portions of the path, especially where there is considerable evening pedestrian and bicycle commuter traffic. Adjacent private property owner concerns must be considered when locating lights on the right-of-way section. Lighting improves the safety of the trail or path user by increasing visibility during non-daylight hours. Lighting fixtures should be installed at the roadway and trail crossings. Depending on the location, average maintained horizontal illumination levels of 5 lux to 22 lux (.5 to 2 foot candle) should be considered American Association of State Highway and

Transportation Officials (AASHTO). Where special security problems exist, higher illumination levels may be considered.

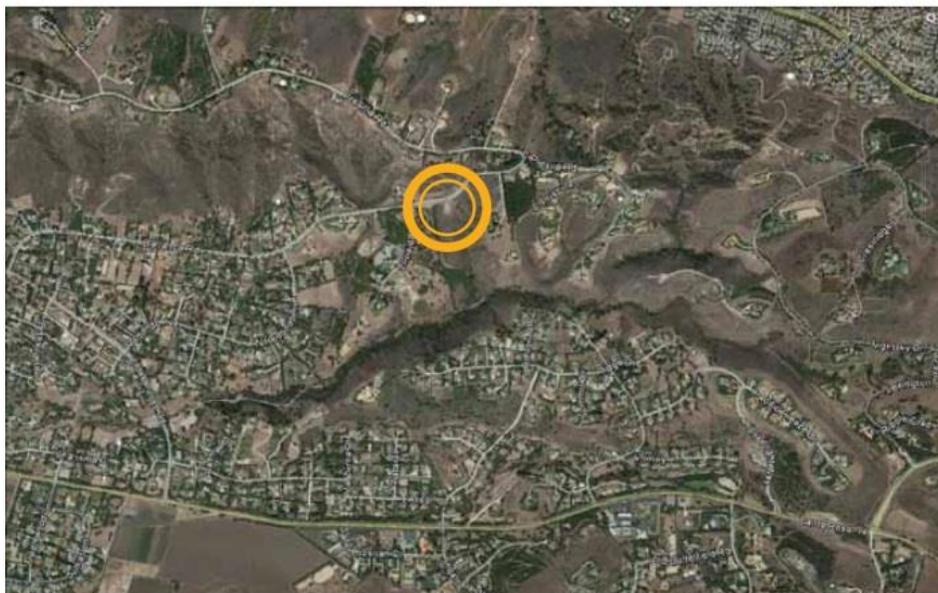
Light standards (poles) should be installed to meet the recommended horizontal and vertical clearances from trail users and should include use of an equestrian level push-button actuator where needed at road crossings. In addition to full height light standards, bollards also provide an effective mounting location for pathway lighting. Their low height and frequent locations reduce light pollution by keeping the illumination source close to the trail surface. There are many types of lighting bollards available. Solar powered bollards lit by LEDs can last about 20 times longer than incandescent bulbs and provide pathway lighting for over 100,000 hours. Watt stopper or similar technology is another option for reducing energy consumption from lighting.

Staging Areas

Although Santa Rosa Park has been developed as the primary staging/trail head for the Santa Rosa Valley trail network, the trail network would benefit from a secondary trailhead. One area for potential development of an additional trailhead/water stop within the network exists at the equestrian trail connection to Barranca Road (Figure 13). The flat overlook area could accommodate a few trailers and provide a rest stop for those using the trail network. Whether a trailhead is developed at the location shown in Figure 13 or in a different location, the conceptual layout for this overlook staging area and the schematic layout list of amenities could be used to guide its design.

Figure 13
Overlook Staging Area at Barranca Road

Overlook staging area



Site Furnishings

Litter Receptacles and Pet Waste Bag Dispensers

Trash receptacles and dog waste clean-up bag dispensers with biodegradable bags help keep the trail clean, although the ability to follow up with removal is critical. To minimize enticing varmints along the trail corridor, the Santa Rosa Valley trail system could adopt a “leave only footprints” policy along the trail corridor. Litter receptacles are recommended only at gateways and staging areas. A wildlife proof lid is required for litter receptacles.

Benches

Providing benches at key staging areas and viewpoints supports use of the trail by people of all ages, and provides an opportunity for memorial donations or service projects. A metal slatted bench with a middle seat divider is recommended for durability and to minimize large surface areas for graffiti.

Bicycle Parking

In some locations along the trail system, it may be appropriate to provide bicycle parking. Bicycle racks permit the locking of the bicycle frame and at least one wheel to the rack and support the bicycle in a stable position without damage to wheels, frame or components. Racks should be placed outside of the clear right-of-way, particularly at trailheads or trail start- or end-points.

Drinking Fountains/Water Troughs

Drinking Fountains provide water for people (and animals), particularly at trailheads and staging areas. Drinking fountains should only be considered in the Santa Rosa Valley at trailheads and staging areas with existing water service. Regularly scheduled maintenance should be observed to include flushing the lines and avoid long periods of standing water within the apparatus.

Signing

Signs on the Santa Rosa Valley trail system can indicate to pedestrians, bicyclists and equestrians their direction of travel, location of destinations, etiquette of how to use the trail, and regulatory and warning information. Guide and information signs indicate information for route selection, for locating off-road facilities, or for identifying geographical features or points of interest.

Signing style and imagery should be consistent throughout the trail to provide the trail user with a sense of continuity, orientation, and safety. Signs can impart a unique theme so path users know which path they are following and where it goes. The theme can be conveyed in a variety of ways: engraved stone, medallions, bollards, and mile markers. However, the trail should not be over signed; where possible, incorporate signage into trailside vertical elements such as bollards.

Directional Signs

Directional signs are used on the trail and provide orientation to the trail user and emphasize trail continuity. At a minimum, street names should be called out at all trail intersections with roadways. Directional signage should identify key destinations along the trail route and include schools, parks, municipal centers, trails, and other points of interest.

Table 11
Sign Type and Location

Type of Sign	Sign Type	Location/Frequency
Directional signs	Blade	Where the trail crosses major roadways
Trail Etiquette signs	Blade	At gateways
Interpretive signs	Waysides	At gateways or staging areas
Regulatory and warning signs	Blade	According the CA MUTCD guidelines
Wayfinding signs	ID sign w/blade	In neighborhoods and major roadways, within ¼ - ½ mile of trail access points

Wayfinding Signs

Wayfinding signs are used in nearby neighborhoods and roadways to provide guidance to the community trying to access the trail. At a minimum, wayfinding signs should be placed ¼ - ½ mile from nearest trail access points. Wayfinding signs should identify access points by landmark or nearest intersection.

Trail Etiquette Signs

Establishing goals and policies sets a common framework for understanding trail rules and regulations. Rights and responsibilities of trail usage should be stated at gateways. Once rules and regulations are established, the trail managing agency has a means of enforcement. Local ordinances may be adopted to help enforce trail policies. Penalties such as fines or community service may be imposed in response to non-compliance.

Interpretive Signs

Interpretive signage provides enrichment to the trail user experience, focuses attention on the unique attributes of the local community, and provides educational opportunities. Educating trail users can help foster trail stewardship by providing a venue to explain the “why” behind some trail rules. For example, providing information about the fragile riparian habitat and species it supports helps trail users understand why they should stay on the trail and out of the riverbed.

Regulatory and Warning Signing

Regulatory signs indicate to trail and road users the traffic regulations which apply at a specific time or place. Warning signs indicate in advance conditions on or adjacent to a road or trail that will normally require caution and may require a reduction in vehicle speed.

The Manual on Uniform Traffic Control Devices (MUTCD) requires yield lines and “Yield Here to Pedestrians” signs at all uncontrolled crossings of a multi-lane roadway. The MUTCD includes a trail crossing sign, which may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path.

Intersection Warning (MUTCD W2-1 through W2-5) signs may be used on a roadway, street, or shared-use path in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic. A trail-sized stop sign (MUTCD R1-1) should be placed on a pathway about 5 feet before the intersection.



An MUTCD-approved sign indicating protocol for yielding among multiple trail uses.

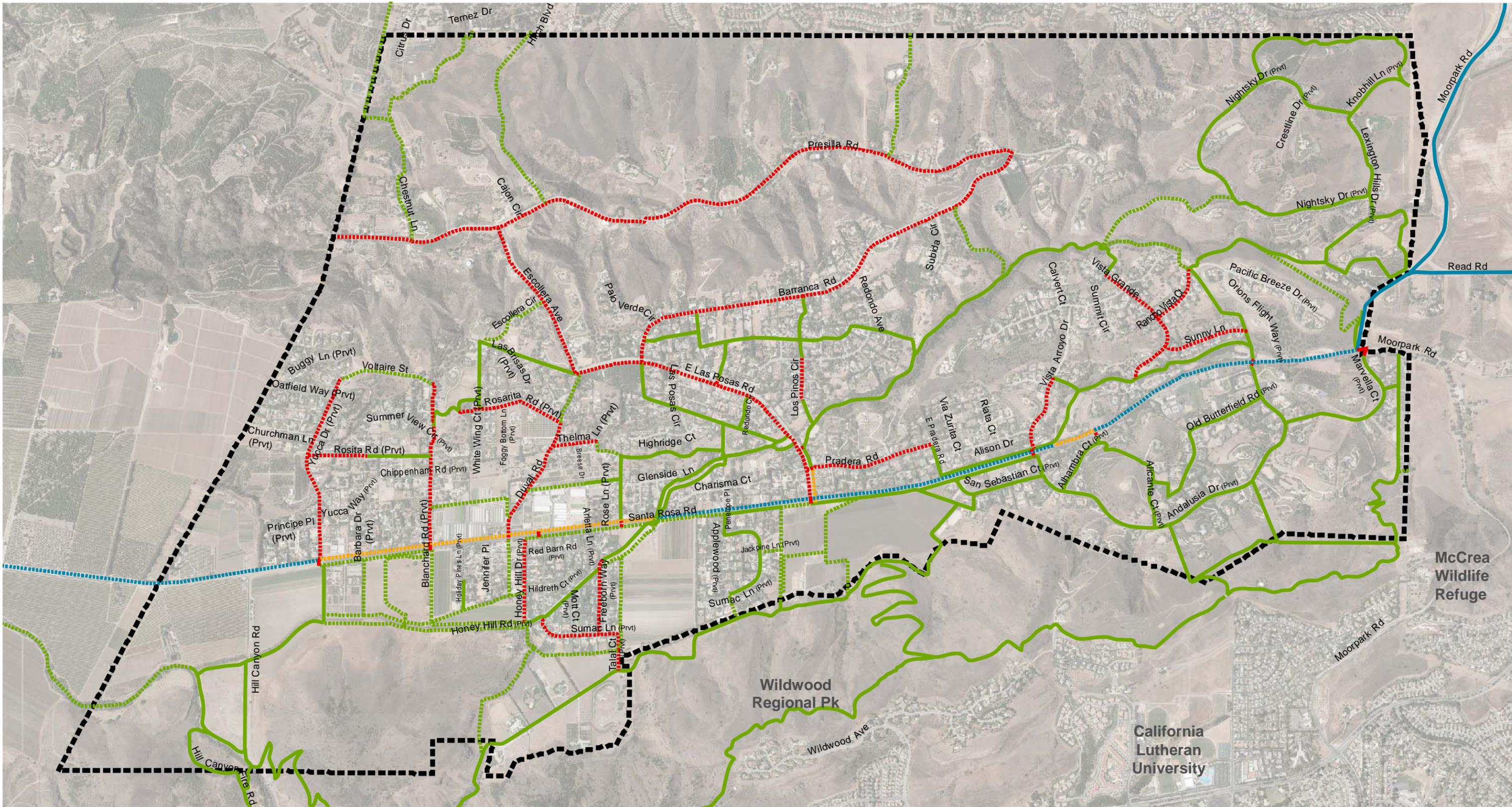
Trail Development Plan

The objective of the following planned trail improvements is to create safer conditions for bicyclists, pedestrians, and equestrian users. To fully achieve this, the trail facilities must be located and designed to meet standards and best practices for bicycle, pedestrian, and equestrian facilities. Meeting these standards and guidelines not only helps to assure the safety of trail users; it improves the functionality and enjoyment of the trail, and is a legal requirement with regard to the Americans with Disabilities Act (ADA), and for facilities in the state right-of-way and/or receiving state or federal funding. Resolving trail location and design is particularly important at street crossings, driveway crossings, and at “pinch points” where the trail runs parallel to the roadway in close proximity.

Figure 14 shows the locations and type of improvements that together establish the Trail Master Plan in the Santa Rosa Valley.

Addition of New Off-Street Equestrian Trail Facilities:

As mentioned above in the Current Trail Network and Regional Connectivity section of this report and shown on the Santa Rosa Valley Trail Assessment Easements graphic (Figure 1), a network of off-street equestrian trails currently connects individual HOAs and is linked by a system of agreements comprised of easements controlled by HOAs, landowners and/or SRVTI. Maintenance of these trails resides with the governing body, owner or easement holder. In the future, it would be desirable to increase the amount of off-street connections between HOAs and future housing development in an attempt to “fill gaps” in the existing network of trails. These trails shall be constructed using the general equestrian facility guidelines and, where feasible, the cross section shown below. Maintenance agreements are required to be filed with the County prior to the construction of any new off-street equestrian trails. Any new off-street equestrian trail facilities also would be accessible to pedestrians and mountain bikers, consistent with the trail network in COSCA-managed land directly to the south. It should be noted that for the planned off-street equestrian trails along Santa Rosa Road, the width of the County right-of-way for the roadway is inconsistent; thus, the purchase of neighboring land may be necessary to fully implement these trails.



Santa Rosa Valley Trail Master Plan



Trails outside of the study area are shown for informational purposes only.

- On-Street Bikeways (Existing)
- - - On-Street Bikeways (Proposed Improvements)
- On-Street Equestrian Trail Connections (Existing)
- - - On-Street Equestrian Trail Connections (Proposed Improvements)
- - - Combined On-Street and Unpaved Facilities (Proposed Improvements)
- Off-Street Unpaved Equestrian Trails (Existing)
- - - Off-Street Unpaved Equestrian Trails (Proposed Improvements)
- Study Area

Figure 14

Using the standards discussed in the general Equestrian Trail Design Standards section, any new off-street equestrian paths should conform, to the extent possible, to one of the cross sections shown in Figures 15 and 16, and use the suggested widths and clearances shown in Tables 4 and 5 in this plan.

An existing equestrian trail is located along a shoulder of the Santa Rosa Arroyo. If there is a desire to expand access along the arroyo edge for the purposes of adding a multi-use trail connection through the Santa Rosa Valley, the design guidelines shown in Figure 16 recommend separating the uses between equestrians and pedestrians/cyclists.

Figure 15

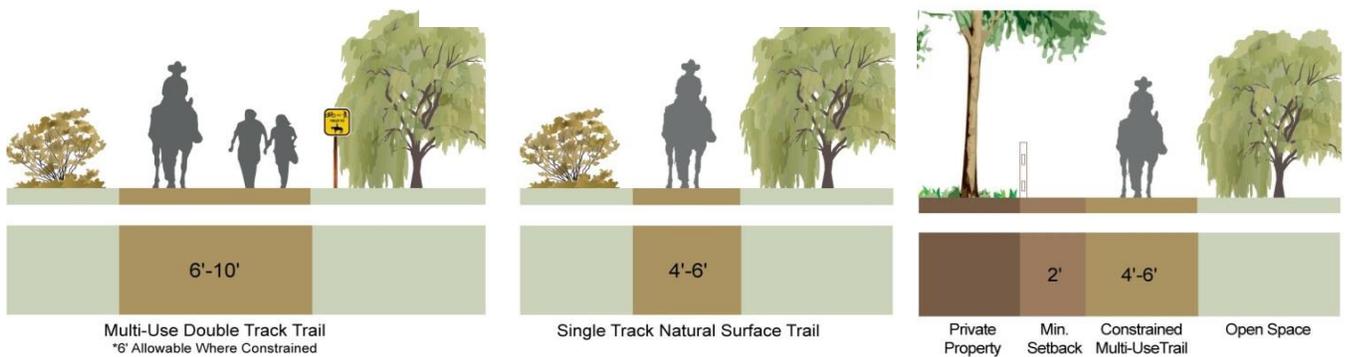
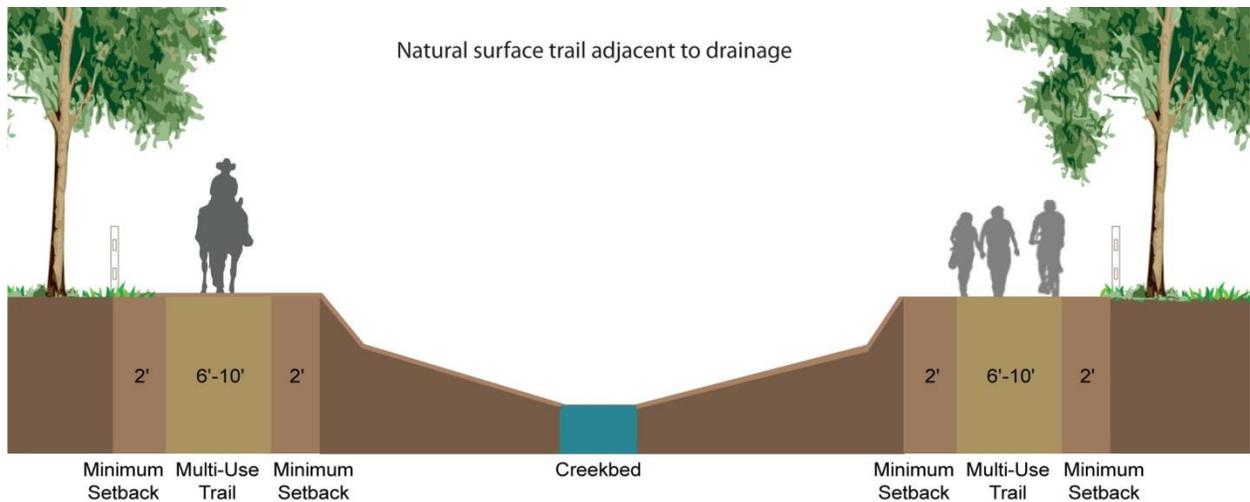


Figure 16



Improvements to Existing On-Street Equestrian Trails

A network of on-street equestrian trails currently exists within residential neighborhoods and on low volume collector streets. Both public and private roads in the Santa Rosa Valley provide equestrian access, whether on the roadway itself or on soft shoulders. On-street trail facilities serve as an important link between existing trail easements throughout the valley. On-street facilities are shown in the Current Trail Network and Regional Connectivity section of this report and shown on the Santa Rosa Valley Trail Assessment graphic.

A desire exists to make this informal on-street network a marked trail system and part of the overall equestrian trail network using the existing wide right-of-ways along these low volume collector streets. Table 12 provides a summary of improvements to on-street equestrian trails, as mapped in Figure 14. Demarcation of these trail connections can be made using striping and signage as shown in Figure 17. This condition is to be used only on existing paved residential streets where there is a desire to mark an equestrian right-of-way separate from the vehicular lanes.

Maintenance of the roadway (paving and striping only) is the responsibility of the Ventura County Transportation Department. As explained in greater detail in the Trail Operation and Maintenance Guidelines, additional maintenance (sweeping, etc.) is not the responsibility of the Transportation Department.

Figure 17

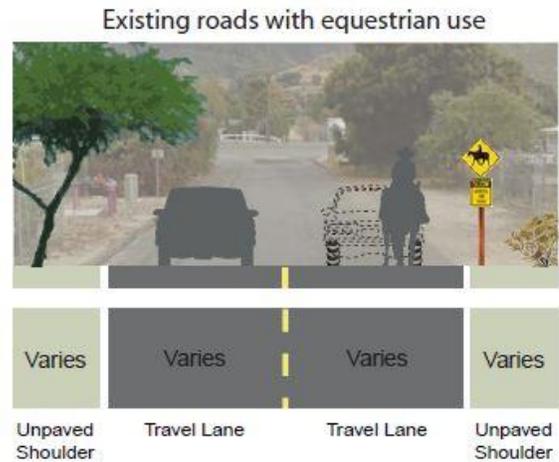


Table 12
On-Street Equestrian Trail Improvements

Location	Public/Private	Off or On Street	Sides of Street
Voltaire Way	Prvt	On	2
Moorpark Connections	Public	Off	1
Presilla Road	Public	On	2
Escollera Avenue	Public	On	2
Barranca Avenue	Public	On	2
Las Posas Road	Public	On	2
Nightsky Drive	Prvt	Off	1
Vista Arroyo Drive	Public	On	2
Pradera Road	Public	On	2
Applewood Lane, Wildwood Ranch-Arroyo Connection	Prvt	Off	1
Santa Rosa Road	Public	On	2

Future On-Street Equestrian Trail Improvements:

There currently exists a network of on-street equestrian trail usage within residential neighborhoods and on low volume collector streets. Using the standards discussed in the general equestrian trail design guidelines of this report, any new on-street equestrian paths should, to the extent feasible, conform to one of the cross sections shown in Figures 17 and 18, and using the suggested widths and clearances shown in Tables 4 and 5 in this plan.

As feasible, future subdivision applications shall be reviewed against the guidelines in this trail master plan to enable implementation of the planned trail segments within that subdivision. Maintenance of these trails resides with the governing homeowner’s association or easement holder.

A painted shoulder exists along both sides of the length of Santa Rosa Road through the valley. In some locations this road width is wide enough to accommodate an equestrian trail connection.

The County should consider implementing signed equestrian trails along the side of Santa Rosa Road where there are existing soft shoulder areas, as shown in Figure 19. Improvements would include striping as outlined below and installing signage and buffers as indicated above.

Future Addition of Santa Rosa Road Class II Bike Lanes:

A wide painted shoulder exists along both sides of the length of Santa Rosa Road through the valley with the exception of the “pinch point” adjacent to Santa Rosa School at the eastern end of the valley. A continuous rumble strip and some signage exist to mark this shoulder as a bike lane. The addition of bike lanes on Santa Rosa Road would be consistent with the Ventura Countywide Bicycle Master Plan of 2007, which

gave a planned Class II bicycle facility a “moderately high” Suitability Rating from Upland to Moorpark Roads.

If dedicated funding sources are identified, the County should study the feasibility and costs with implementing the improvements called for in the 2007 Ventura Countywide Bicycle Master Plan. This 5.7 mile Class II Bicycle Lane, using the existing shoulders, together with projects on Moorpark and Read Road would link Camarillo with Moorpark and Thousand Oaks and provide for a safe facility for cyclists using this connection. Improvements would include striping or stenciling Class II bike lane markings.

Bike lanes are generally found on major arterial and collector roadways and are 5-7 feet wide. Bike lanes can be found in a large variety of configurations, and can even incorporate special characteristics including coloring and placement if beneficial. Future construction of a Class II Bicycle facility on Santa Rosa Road should consider the following guidelines in Figures 20 through 22. In order to maintain the minimum width for the bike lane and shoulder, as shown in Figure 20, the vehicular travel lanes may vary in width and require restriping. In no case shall the traffic lanes be narrower than 11 feet in width.

Figure 18

Residential Roads in New Developments (Proposed)

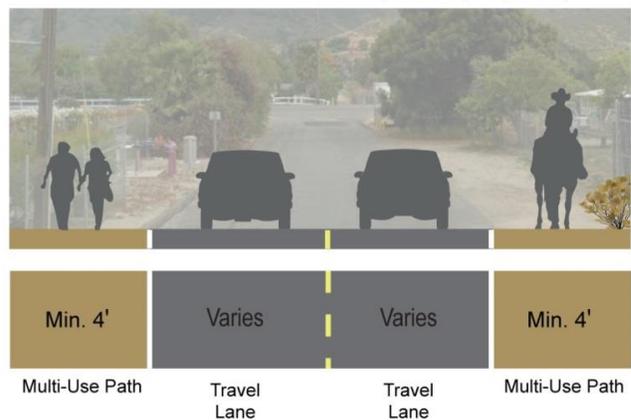


Figure 19

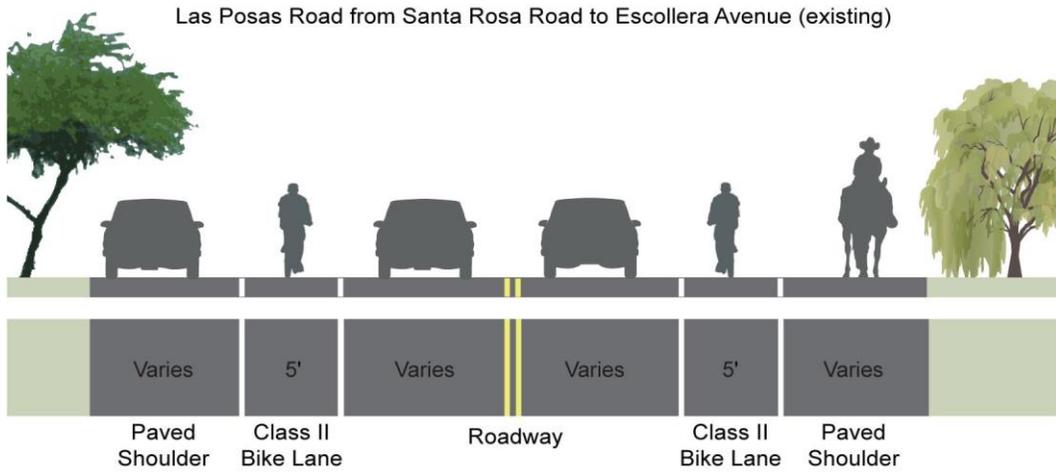


Figure 20

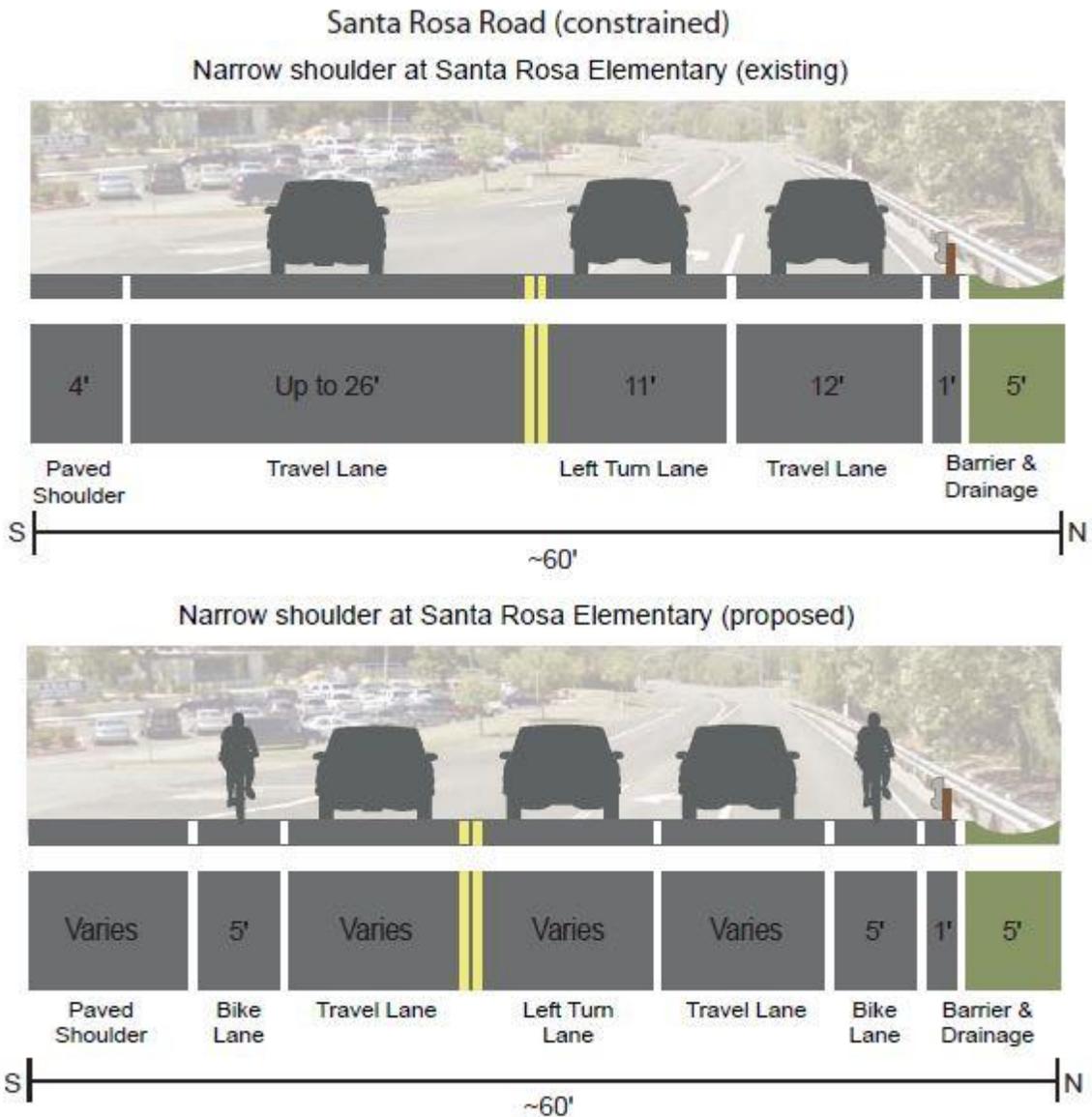


Figure 21

Santa Rosa Road

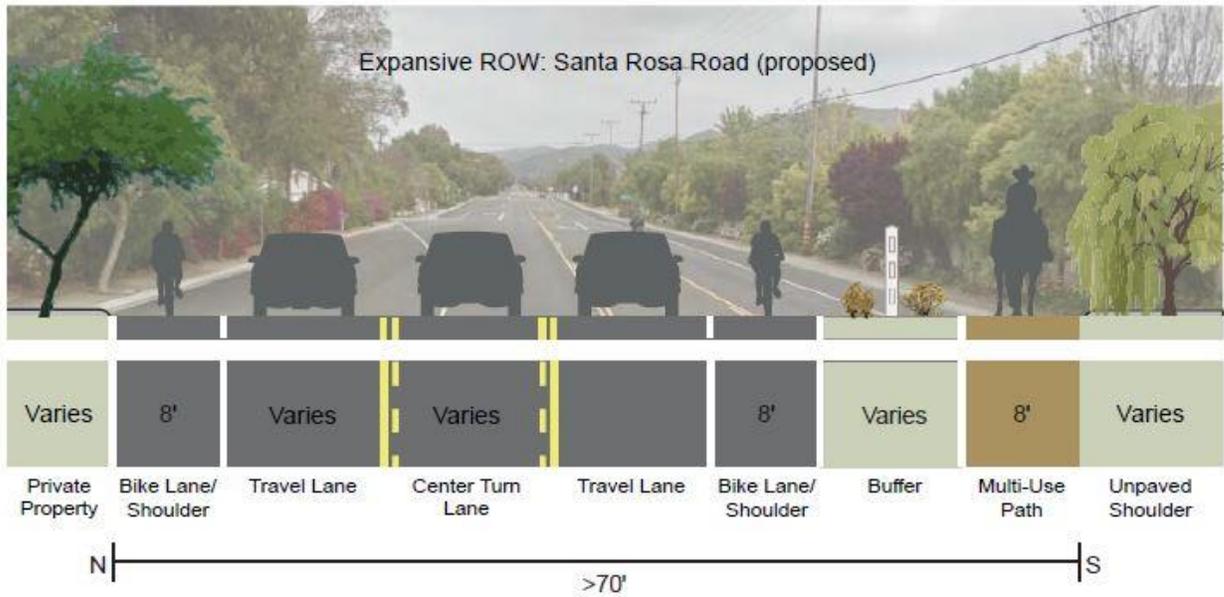
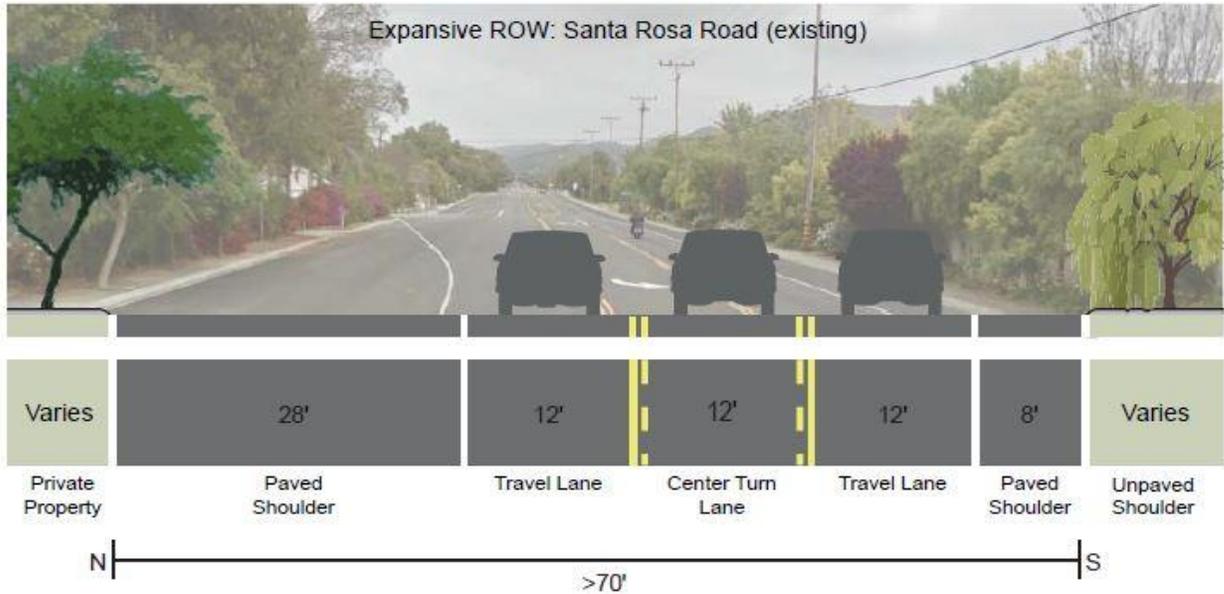
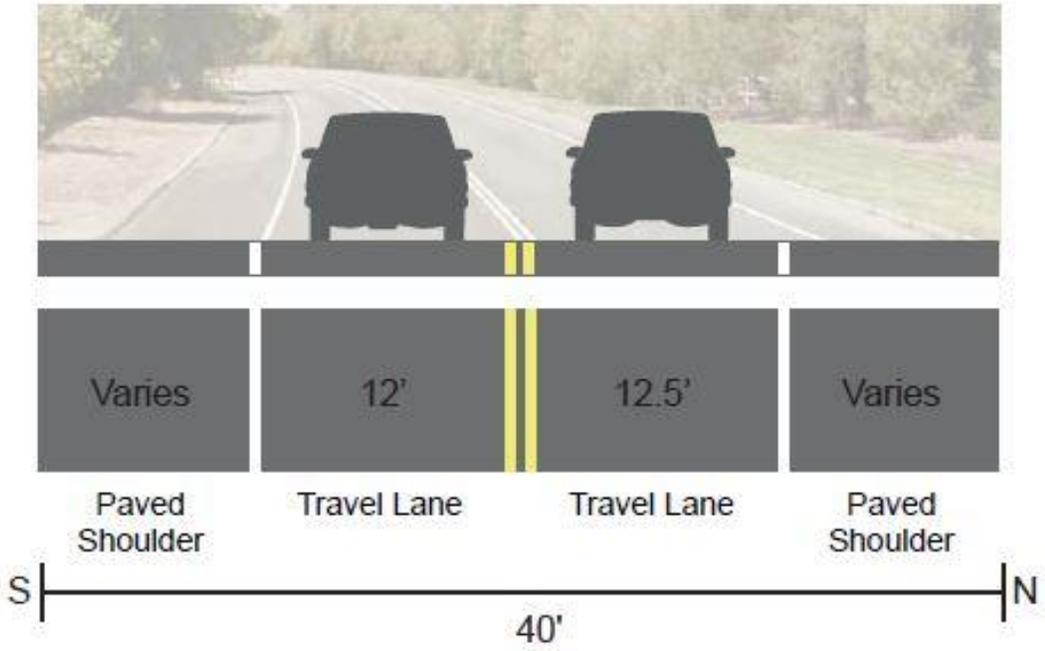


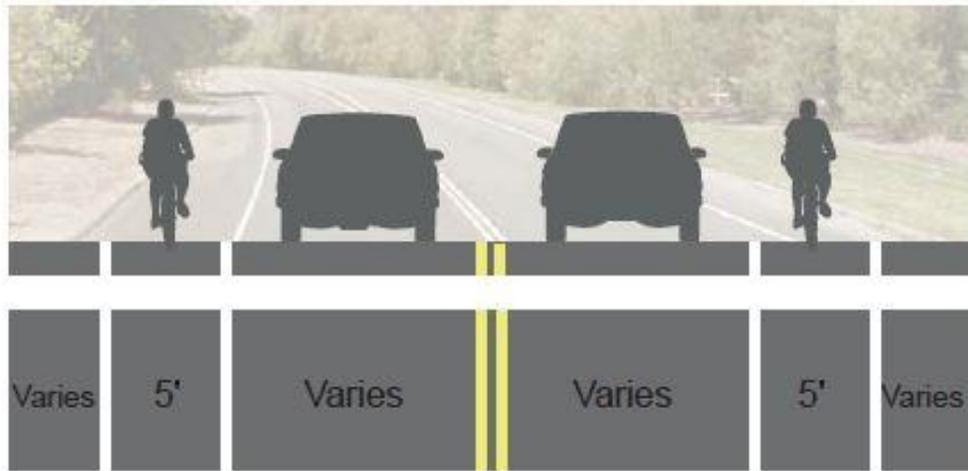
Figure 22

Santa Rosa Road (constrained)

Narrow ROW east of Santa Rosa Elementary (existing)



Narrow ROW east of Santa Rosa Elementary (proposed)



Priority and Costing of Proposed Trail Improvements

The proposed trail improvements shown in Figure 14 vary in importance, as identified by SRVTI and other community members. Accordingly, the Trail Master Plan assigns a

high, medium, or low priority to each proposed improvement. This prioritization will assist in the phasing of trail projects in the Santa Rosa Valley. Table 13 shows the priority and estimated cost of planned trail improvements. It should be noted that the costs do not account for the acquisition of easements for trails.

Table 13
Priority and Estimated Cost of Trail Improvements

Location	Improvement	Priority	Capital Costs	O&M Costs
Voltaire Way (easement required)	Off-street Equestrian Trail Connection	High	\$12,520.00 4' Natural Surface Trail \$300.00 D11-4 Signage	\$375/year
Equestrian Trail Connections to Moorpark (easement required)	Off-street Equestrian Trail Connection	Low	\$73,376.00 4' Natural Surface Trail \$600.00 D11-4 Signage	\$2,100/year
Presilla Road	On-Street Equestrian Trail Connection	Low	\$4,000.00 Stencil \$1,200.00 Signage	As needed/paving, striping
Escollera Avenue	On-Street Equestrian Trail Connection	Low	\$800.00 Stencil \$600.00 Signage	As needed/paving, striping
Barranca Road	On-Street Equestrian Trail Connection	Low	\$4,000.00 Stencil \$1,200.00 Signage	As needed/paving, striping
Las Posas Road	On-Street Equestrian Trail Connection	Medium	\$4,000.00 Stencil \$1,200.00 Signage	As needed/paving, striping
Nightsky Drive (easement required)	Off-street Equestrian Trail Connection	Medium	\$22,520.00 4' Natural Surface Trail \$300.00 D11-4 Signage	\$650/year
Vista Arroyo Drive	On-Street Equestrian Trail Connection	High	\$2,000.00 Stencil \$600.00 Signage	As needed/paving, striping
Pradera Road	On-Street Equestrian Trail Connection	High	\$2,000.00 Stencil \$600.00 Signage	As needed/paving, striping

Table 13
Priority and Estimated Cost of Trail Improvements

Location	Improvement	Priority	Capital Costs	O&M Costs
Honey Hill Drive	On-Street Equestrian Trail Connection	Medium	\$1,200.00 Stencil \$600.00 Signage	As needed/paving, striping
Applewood Lane/Wildwood Ranch-Arroyo Connection (easement required)	Off-street Equestrian Trail Connection	High	\$3,200.00 4' Natural Surface Trail \$300.00 D11-4 Signage	\$100/year
New Residential Development	On-Street Equestrian Trail Connection	Medium	\$150.00 Stencil/EACH \$600.00 Signage/EACH \$8.00 4' Natural Surface Trail/LF	\$1,200/mile/year
Santa Rosa Road (work between Rosita Road and Vista Grande)	On-Street Combined Equestrian and Cycle Facilities	Medium	\$8,000.00 Stencil \$2,400.00 Signage \$75,000.00 Split-rail Fencing \$52,000 Landscaping/Irrigation	As needed/paving, striping, fencing \$1,800/year landscaping
Staging Area at Barranca Road	New Equestrian Staging Area	Medium	\$7,455.00 Site Preparation \$32,000.00 Site Furnishings: (2) Benches, (1) Picnic Table, (1) Shade Structure, (3) Trash Receptacles, Lodgepole Fencing/Hitching Post Assemblies, Signage	\$1,200/year

The above costs do not include costs for acquisition of easements or property. Those costs associated with filling the gaps in the trail network would be dependent on the current market rates of real estate at the time of purchase and the discretion of the owner.

Table 14 shows the methodology for the capital costs and O&M costs listed above.

Table 14
Methodology for Cost Estimates

Feature	Installation Cost	Unit	Description
4' Natural Surface Trail	\$8.00	Linear Foot (LF)	Includes rough grading, assumption surface material is native soil
Site Preparation	.25	SF	Demolition, Removal, Clearing and Grubbing, Rough Grading
Equestrian Trail Metal Signage	\$150.00	EACH	MUTCD D11-4 (Equestrian Allowed) MUTCD R9-14 (No Equestrians)
On-Street Thermoplastic Stencil	\$400.00	EACH	White Thermoplastic "Bike Lane" Stencil
Thermoplastic High-Visibility Crosswalks	\$600.00	EACH	At any new crossings; 8' – 10' continental or ladder type striping
Rectangular Rapid Flash Beacon (RRFB)	\$12,000.00	EACH	At any unsignalized crossings in lieu of additional signals
Benches	\$1,000.00	EACH	Style to be determined
Shade Structure	\$20,000.00	EACH	Style to be determined
Trash Receptacle	\$500.00	EACH	Style to be determined
Picnic Table	\$1,000.00	EACH	Style to be determined
Lodgepole Fencing/Hitching Posts	\$100.00	LF	Lodgepole Style Fencing/Hitching Post Assemblies

Table 14
Methodology for Cost Estimates

Feature	Installation Cost	Unit	Description
Shrub & Groundcover Landscaping & Irrigation	\$6.00	SF	Native, drought tolerant landscaping and water-wise irrigation for buffer planting
O&M	\$1,200	Mile	Trail repair and upkeep, landscaping and irrigation maintenance

Funding Sources

This section provides information on potential funding sources for trail improvements. Federal, state, and local government agencies invest billions of dollars every year in the nation’s transportation system. However, only a fraction of that funding is used in development projects, policy development, and planning to improve conditions for pedestrians and bicyclists. Public funding for recreational facilities, such as equestrian trails and staging areas, is even further limited, as is funding for maintenance of trails. Nevertheless, although appropriate funds are not abundant, they are available. To support efforts to find outside funding sources to implement the proposed improvements, a summary by source type is provided below. It should be noted that grant applications for Federal and State funds that are administered by Caltrans must be submitted by the County Transportation Department.

Federal and State Sources

There are numerous federal aid programs. The largest source of federal funding for bicycle and pedestrian projects is the US DOT’s Federal-Aid Highway Program, which Congress has reauthorized roughly every six years since passage of the Federal-Aid Road Act of 1916. The latest act, Moving Ahead for Progress in the

Twenty-First Century (MAP-21) was enacted in July 2012 as Public Law 112-141 and includes many elements that support bicycle and pedestrian programs. In California, these programs are combined into a single source called the Active Transportation Program (ATP). This program includes funding for construction, planning, and design of facilities for pedestrians, bicyclists, and other non-motorized forms of transportation.

Among the many programs outside of MAP-21 are the Partnership for Sustainable Communities, the Rivers, Trails and Conservation Assistance Program (RTCA), and the Community Transformation Grants administered through the Centers for Disease Control and Prevention (CDC).

In addition to its role in administering the new ATP, the State administers a number of other grant programs. Among these are the Transportation Planning Grant Program and the Climate Ready Grant, which is administered by the Coastal Conservancy. Program

Regional & Local Sources

Developer Impact Fees

As a condition for development approval, municipalities can require developers to provide

certain infrastructure improvements, which can include bikeway projects. These projects have commonly provided Class II facilities for portions of on-street, previously-planned routes. They can also be used to provide bicycle parking or shower and locker facilities. The type of facility that should be required to be built by developers should reflect the greatest need for the particular project and its local area. Legal challenges to these types of fees have resulted in the requirement to illustrate a clear nexus between the particular project and the mandated improvement and cost.

Roadway Construction, Repair and Upgrade

Future road widening and construction projects are one means of providing improved pedestrian and bicycle facilities. To ensure that roadway construction projects provide these facilities where needed, it is important that the review process includes input pertaining to consistency with the proposed system. In addition, California's 2008 Complete Streets Act and Caltrans's Deputy Directive 64 require that the needs of all roadway users be considered during "all phases of state highway projects, from planning to construction to maintenance and repair."

More information:

http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html

Cable Installation Projects

Cable TV and telephone companies sometimes need new cable routes within public right of way. Recently, this has most commonly occurred during expansion of fiber optic networks. Since these projects require a significant amount of advance planning and disruption of curb lanes, it may be possible to request reimbursement for affected bicycle facilities to mitigate construction impacts. In cases where cable routes cross undeveloped areas, it may be possible to provide for new

bikeway facilities following completion of the cable trenching, such as sharing the use of maintenance roads.

Private Sources

Private funding sources can be acquired by applying through the advocacy groups such as the League of American Bicyclists and the Bikes Belong Coalition. Most of the private funding comes from foundations seeking to enhance and improve bicycle facilities and advocacy. Grant applications will typically be through the advocacy groups as they leverage funding from federal, state and private sources. Specific private funding sources include the Bikes Belong Grant Program; Bank of America Charitable Foundation, Inc.; The Robert Wood Johnson Foundation; The Wal-Mart Foundation; and the Kodak American Greenways Program.

Corporate Donations

Corporate donations are often received in the form of liquid investments (i.e. cash, stock, bonds) and in the form of land. Employers recognize that creating places to bike and walk is one way to build community and attract a quality work force. Bicycling and outdoor recreation businesses often support local projects and programs. Municipalities typically create funds to facilitate and simplify a transaction from a corporation's donation to the given municipality. Donations are mainly received when a widely supported capital improvement program is implemented. Such donations can improve capital budgets and/or projects.

Other Sources

Local sales taxes, fees and permits may be implemented as new funding sources for pedestrian and bicycle projects. However, any of these potential sources would require a local

election. Volunteer programs may be developed to substantially reduce the cost of implementing some routes, particularly multi use paths. For example, a local college design class may use such a multi-use route as a student project, working with a local landscape architectural or engineering firm. Work parties could be formed to help clear the right of way for the route. A local construction company may donate or discount services beyond what the volunteers can do. A challenge grant program with local businesses may be a good source of local funding, in which the businesses can “adopt” a route or segment of one to help construct and maintain it.

Trail Operation and Maintenance Guidelines

Responsible Entities

To implement trail improvements in the Santa Rosa Valley, a responsible party and funding must be identified for operations and maintenance. It is expected that no single entity would operate and maintain the entire trail system in the Santa Rosa Valley. If approved by the Ventura County Board of Supervisors, the County would manage the portion of the Santa Rosa Valley trail system within its public right-of-way.

The Ventura County Parks Department is experienced in managing public parks, trails and facilities. The typical mechanism for the Parks Department to take on responsibility for a trail improvement and obtain funding for operations and maintenance is through an action of the County Board of Supervisors or through an assessment district for the area.

However, it is important to note that the Parks Department would only accept responsibility for maintaining property that belongs to the County. If other property is identified for trail improvements, then the Parks Department would not take on such responsibility unless the Ventura County Board of Supervisors first accepts the property and also identifies a funding source for maintenance. Future additions to the Santa Rosa Valley's trail network could go through this process.

In the unincorporated County, which includes the Santa Rosa Valley, the Transportation Department only maintains pavements, signals, shoulders, and striping for roads. In this area, the Transportation Department provides no municipal services such as street sweeping for bike lanes or on-road equestrian facilities.

However, it is possible for the community to form a County Service Area (CSA) -- an assessment district for a public purpose -- which could fund regular maintenance. A proposed CSA would first go to the Ventura County Local Agency Formation Commission (LAFCo) for approval. Subsequently, an engineering report would need to be completed to determine the cost and extent of the program and the appropriate amount of the assessment. Then the property owners would vote on whether to assess themselves through formation of the CSA. The County Real Estate Services Division is responsible for administering funds obtained through CSAs, for instance contracting for street sweeping.

Alternatively, a nongovernmental entity such as SRVTI could take on responsibility for maintaining trail improvements. As discussed in the Assessment Report and shown in Figure 1, SRVTI has already negotiated with property owners and developers to acquire several trail easements in the study area. For trail improvements on County property, SRVTI could become responsible for maintenance through agreement with the County.

Operation and Maintenance Strategies

Standard management policies and practices for multi-use trails, as described below, may apply to the Santa Rosa Valley trail system. Such policies and practices for trail maintenance and use management are perhaps the best defense to protect public safety and guard against undue injury-related lawsuits. Implementation of a user education program and responsive maintenance and management will be paramount in creating safe trail conditions. Posting trail rules is an effective way to reinforce safe behavior. Peer pressure to abide by the rules is a key to successful trail operation and maintenance.

Possible operation and maintenance strategies to improve public safety and mitigate liability include:

- **Implementation of a Safety Program.** The trail management partners should implement a safety program that includes systematic risk management assessment, cooperative design review for proposed improvements, and coordinated accident and crime reporting and response. In addition to managers, planners, designers and engineers, Ventura County Sheriff and Fire/Rescue and field maintenance personnel should be consulted in the design and review process.
- **Implementation of an Emergency Response Protocol.** The management entities should implement an emergency response protocol working with law enforcement, EMS agencies, and fire and rescue departments that includes mapping of trail and open space access points, design of trails and access roads (to accommodate loads up to 6.5 tons), an “address system” such as mile markers to identify locations and, where appropriate, 911 emergency phones in remote areas.
- **Operations and Maintenance (O&M) Plan.** Partners responsible for implementation of any specific trail plan should develop an O&M Plan; a schedule of maintenance and management tasks and responsible parties, along with associated costs. Funds and resources for the O & M plan should be specifically committed, and ideally funded through an endowment that guarantees they will be available in the long term.
- **Implementation of a User Education Program.** The management partners should implement a user education program reaching out to key user groups, such as communities, groups and clubs, to teach safe trail behavior and conflict prevention.
- **Conducting Routine Trail Inspections.** The management partners should

routinely inspect for safety hazards, defective structures, missing safety signs, etc. A key part of this oversight is maintaining contacts with neighboring property owners, residents and businesses, and being responsive to their concerns. A properly trained and coordinated volunteer trail patrol/docent staff is used by many regional and local trail agencies to supplement the work of limited paid staff on inspections and routine contacts.

- **Posting and Enforcing Safe Trail Behavior.** The management partners should post and enforce safe user behavior and pathway speed limits (in congested and high risk areas). Again, trained and coordinated volunteers can be key to success in providing information and enforcement.
- **Regular Trail Patrol and Maintenance.** The trail will require maintenance to address deterioration due to weather or general use. Patrol and maintenance will be required to prevent and address potential problems such as damage to signs, litter, and graffiti; travel at unsafe speeds; mismanaged pets; pavement or decomposed granite stabilization; facility upkeep; or unauthorized motor vehicles on the trail. The management partners should trim trees, bushes, tall grasses, etc. to address clearance, fire safety and sight distance issues. Control of litter and maintenance of the trail surface, signs, fences and gates are regularly required. Maintenance and management activities will require staff, equipment, and the associated funding. Each trail segment or project should have a specific operation and maintenance plan that identifies tasks, responsible parties, sources of funding and support. Volunteers can play a big role in trail monitoring and maintenance, provided there is overall on-going oversight and coordination.

Routine maintenance on a year-round basis will not only improve trail safety, but will also prolong the life of the trail.

In addition to these benefits, a high standard of maintenance is an effective advertisement to promote the trail as a local and regional recreational resource, preserves positive public relations between the adjacent land owners and managing agency, and makes enforcement of regulations on the trail more efficient. Local clubs and interest groups will take pride in “their” trail and will be more apt to assist in protection of the trail.

The following should be part of the maintenance checklist:

Vegetation

In general, visibility between plantings at trailside should be maintained so as to avoid creating the feeling of an enclosed space. This will also give trail users good, clear views of their surroundings, which enhances the aesthetic experience of trail users. Understory vegetation along the trail corridor shall not be allowed to grow higher than 36 inches. Tree species selection and placement should be made to minimize vegetative litter on the trail and root uplifting of pavement. Tree branching should be pruned up to a minimum of ten feet.

Surfacing

Natural soil, decomposed granite, gravel or asphalt may be the recommended surface material for much of the Santa Rosa Valley Trail system. Erosion, cracks, ruts and water damage will need to be repaired. The trail surface should be kept free of debris, especially broken glass and other sharp objects, loose gravel, leaves, and stray branches. Asphalt trail surfaces should be swept periodically.

Pest and Vegetation Management

Some basic measures should be taken to protect the trail investment. This includes a bi-annual shoulder plant trimming along both sides of the trail to prevent invasion of plants into the pavement area. Recommended time of year for shoulder plant trimming is in fall and in spring.

All runoff will ultimately lead to the Pacific Ocean. Wherever possible, vegetation control should be accomplished by mechanical means or hand labor. Effort should be made to eradicate invasive species found along Santa Rosa Valley Trail system. Volunteer removal via hand labor is recommended.

Vertical clearance along the trail should be periodically checked and any overhanging branches over the trail should be pruned to a minimum vertical clearance of 10 feet.

Litter and Illegal Dumping

Staff or volunteer efforts should remove litter along the trail. Litter receptacles should be placed at access points such as trailheads. Litter should be picked up once a week and after any special events held on the trail. Alternatively, the trail corridor could be signed “pack it in, pack it out.” This technique has been met with mixed results, but if maintenance funds are not available to meet trash removal needs, it is best to remove trash receptacles.

Illegal dumping should be controlled by vehicle barriers, regulatory signage, and fines as much as possible. When it does occur, it must be removed as soon as possible in order to prevent further dumping. Neighborhood volunteers, friends groups, alternative community service crews, and inmate labor should be used in addition to maintenance staff.

Signage

Signage will be replaced along the trail on an as-needed basis. A monthly check on the status of signage should be performed with follow-up as necessary.

Flooding

Portions of trail are proposed along the Santa Rosa Arroyo and thus could be subject to periodic flooding. Debris accumulated on the trail surface should be removed after each recession of water. Debris should be

periodically removed from the waterway under any bridge structure.

of attendance to these items based on industry standards and Ventura County Parks Department recommendations for trails.

Maintenance Recommendations and Schedule

Table 15 shows the items that require maintenance and the recommended frequency

**Table 15
Maintenance Recommendations for the Santa Rosa Valley Trail Network**

Item	Anticipated Frequency
Inspections	Quarterly
Sign replacement / repair	1-3 years
Site furnishings; replace damaged components	As needed
Pavement marking replacement	3-7 years
Planted tree, shrub trimming / fertilization	Annually
Pavement sweeping	Monthly
Shoulder plant trimming (weeds, trees, branches)	1-2 years
Trash disposal	As needed, once a week
Graffiti removal	Immediately, as reported
Litter pick up	Twice monthly and as needed
Fencing repair	As needed
Pruning to maintain vertical clearance	1-4 years
Remove fallen trees	As needed
Weed control	Late Spring / mid-Summer
Maintain emergency telephones	1 year
Irrigate / water introduced plants	Until established, or 1-2 years at most
Major damage response (fallen trees, washouts, flooding)	As needed

Typical maintenance vehicles for the trail will be light pick-up trucks and occasionally heavy dump trucks, semi-trucks and tractors. A mechanical sweeper is recommended to keep trails paved with asphalt clear of loose gravel and other debris. Care should be taken when operating heavier equipment on the trail to warn trail users and to avoid breaking the edge of the trail surface.

Liability

The County would be liable for trail facilities owned and maintained by the County. Facilities owned and maintained by other entities, such as

SRVTI, would be the liability of those other entities.

In California, the following laws and statutes apply to public entities and would provide liability protection to the County and to private landowners who allow the public to use their land for recreational purposes:

- California Tort Claims Act (Cal. Gov't Code §810-996.6 et seq.)
- California Recreational Use Statute (RUS) (Cal. Civ. Code §846.1)

A brief overview of each statute is provided below.

California Tort Claims Act

California's Tort Claims Act provides public entities and their employees broad immunity from lawsuits similar to the protections provided by the California RUS. The Tort Claims Act provides that public entities cannot be sued under common law or generally applicable principles of tort law or negligence (e.g., Cal. Civ. Code §1714). In order for a public entity to be held liable for an injury, the injury must have been caused by a dangerous condition of its property (Gov. Code §835).

The California Tort Claims Act protects public entities, public employees and persons granting an easement to a public entity from liability for an injury caused by the condition of a trail (paved or unpaved) and some unpaved roads. The trail or unpaved road must be used for access to recreational or scenic areas, fishing, hunting, camping, hiking, riding (including animal and all types of vehicular riding) and water sports. In order for this statute to apply to paved trails/paths, the public entity must "reasonably attempt to provide adequate warnings" of the existence of any condition that constitutes a hazard to health or safety (Gov. Code §831.4). Warnings are not required along unpaved trails or roads.

The California Tort Claims Act includes specific protections for hazardous recreational activities (Gov. Code §831.7). The Act states that public entities and public employees are generally not liable to any person who participates in a hazardous recreational activity conducted on public property. As defined by the Act, hazardous recreational activities include animal riding, boating, biking on unpaved surfaces, windsurfing and water contact activities under certain conditions. In order for the statute to limit liability, public entities or their employees must guard or warn of known dangerous

conditions and properly construct and maintain facilities. Liability is not limited if the public entity is paid a specific fee (that is, fees other than general park admission fees, vehicle entry or parking fees or group use permit fees) for granting permission to engage in a hazardous recreation activity on its land.

California Recreational Use Statute

The California RUS affords liability protection to private landowners who allow the public to use their land for recreational purposes (such as to traverse a trail), provided they do not charge a fee. A person injured on land made available to the public for recreational use must prove that the landowner deliberately intended to harm him or her. RUSs are intended to limit landowners' liability to encourage them to make their land available for public recreation.

As stated in the California RUS, "An owner of any estate or any other interest in real property... owes no duty of care to keep the premises safe for entry or use by others for any recreational purpose or to give any warning of hazardous conditions, uses of, structures, or activities on such premises to persons entering for such purpose" (Cal. Civ. Code § 846).

For statutory protection to apply, the injured party must have entered the land for recreational purposes. Nonetheless, there are three circumstances for which the California RUS does not apply. Statutory immunity will not apply if the landowner commits a willful or malicious failure to warn or guard against dangerous condition, charges a fee to use their property or extends an express invitation to the injured party to use their property. As long as landowners do not engage in any of these actions, they may not be held responsible for an injury sustained by others on their property who entered for a recreational purpose.

In addition to placing limits on liability, the California RUS allows landowners or others

with an interest in real property to present a claim for reasonable attorney's fees (within limits) in certain circumstances. Landowners who have given permission to the public to enter their land pursuant to an agreement with a public or nonprofit agency for purposes of recreational trail use may present a claim for reasonable attorney's fees when a civil action is brought against them by a person who alleges to have sustained an injury or property damage while on their land (Cal. Civ. Code § 846.1).

Public Safety

Any trail improvements in the Santa Rosa Valley should create safer conditions for equestrians, bicyclists and pedestrians. To fully achieve this, the trail facilities must be located and designed to meet standards and best practices for equestrian, bicycle and pedestrian facilities, and accommodating other users where applicable, such as maintenance vehicles. Meeting these standards and guidelines not only helps to assure the safety of trail users; it improves the functionality and enjoyment of the trail, and is a legal requirement in the case of ADA compliance, and for facilities receiving state or federal funding. Resolving trail location and design is particularly important at street crossings, driveway crossings, and at "pinch points" where the trail runs parallel to the roadway in close proximity. The Design Guidelines chapter details the standards, guidelines and best practices, which will be reflected in the specific trail project designs developed for this study area.

Trail Safety

Trail safety is a major concern of both trail users and those whose property is adjacent to the trail. Creating a safe trail environment goes beyond design and law enforcement, and should involve the entire community. The most effective and most visible deterrent to illegal activity on the Santa Rosa Valley Trail system will be the presence of legitimate trail users.

Getting as many "eyes on the corridor" as possible is a key deterrent to undesirable activity in the Santa Rosa Valley Trail system. There are several components to accomplishing this, as outlined below:

Provide Good Access to the Trail

Access ranges from providing conveniently located trailheads along the trail, to encouraging the construction of pathways and sidewalks to accommodate access from private developments adjacent to the trail. Access points should be inviting and signed so as to welcome the public onto the trail.

Good Visibility from Adjacent Neighbors

Neighbors adjacent to the trail can potentially provide 24-hour surveillance of the trail and can become an ally to the County's policing of the trails. Though some screening and setback of the trail may be needed for privacy of adjacent neighbors, complete blocking of the trail from neighborhood view should be discouraged. This eliminates the potential of neighbors' "eyes on the trail," and could result in a "tunnel effect" for trail users.

High Level of Maintenance

A well maintained trail sends a message that the community cares about the public space. This message alone will discourage undesirable activity along the trail.

Programmed Events

Community events in Santa Rosa Valley Park and along the Santa Rosa Valley Trail network will help increase public awareness and thereby attract more people to use the trail. Various civic organizations can help organize public events which will increase support for the trail. Events might include a day-long trail clean-up or a series of short interpretive walks and/or rides led by long-time residents or a naturalist.

Community Projects

The support generated by the Santa Rosa Valley Trail could be further capitalized by involving

neighbors and friends of the trail in a community project. Ideas for community projects include volunteer planting events, art projects, and interpretive research projects. These community projects are the strongest means of creating a sense of ownership along the trail, and are perhaps the strongest single deterrent to undesirable activity along the trail.

Adopt-a-Trail Program

Nearby businesses, community institutions, and residential homeowner's associations often see the benefit of their involvement in the trail development and maintenance. Businesses and developers may view the trail as an integral piece of their site planning and be willing to take on some level of responsibility for the trail. Creation of an adopt-a-trail program should be explored to capitalize on this opportunity and foster civic pride.

Design Elements that Improve Trail Safety

Because many of the existing and proposed trails are located within and between residential properties and are, in some cases, tight easements directly adjacent to structures and houses, any trail improvements in the Santa Rosa Valley should create safer conditions for equestrians, bicyclists, and pedestrians as well as consider the privacy and rights of those homeowners who live next to the trails.

Below are common trail safety concerns and ways in which thoughtful design treatments can prevent safety problems along the Santa Rosa Valley Trail network:

Litter and Dumping

- Post trail rules encouraging "pack it in, pack it out" etiquette.
- Place garbage receptacles at trailheads.
- Provide good visual access to the trail.
- Manage vegetation within the right-of-way to allow good visual surveillance of the trail

from adjacent properties and from roadway/trail intersections.

- Encourage local residents to report incidents as soon as they occur.
- Remove illegal dumping as soon as possible.
- Encourage use of yard debris recycling service.

Trespassing

- Clearly distinguish public trail right-of-way from private property through the use of low vegetative buffers and good fencing.
- Post trail rules that encourage respect for private property.

Crime

- Manage vegetation so that corridor can be visually surveyed from adjacent streets and residences.
- Select shrubs that grow below three feet in height and trees with canopies that begin to branch out greater than six feet in height.
- Place lights strategically and as necessary.
- Place benches and other trail amenities at locations with good visual surveillance and high activity.
- Provide mileage markers at quarter-mile increments and clear directional signage for orientation.
- Create a "Trail Watch Program" involving local residents.
- Provide proactive law enforcement.
- Design the trail so that police vehicles can access the entire corridor.

Intersection Safety

- Require all trail users to stop at public roadway intersections through posting of stop signs and/or signals.

- Provide crosswalk striping and trail crossing warning signs for vehicle drivers. Put Santa Rosa Valley Trail logo on warning signs.
- Manage vegetation at intersections to allow visual access at crossings.

Vandalism

- Select benches, bollards, signage, and other site amenities that are durable, low maintenance, and vandal resistant.
- Remove or replace vandalized items in rapid manner.
- Keep a photo record of all vandalism and turn over to local law enforcement.
- Encourage local residents to report vandalism.
- Create a “Trail Watch Program” and maintain good surveillance of the corridor.
- Involve neighbors in trail projects to build a sense of ownership.
- Place amenities (benches, etc.) in well used and highly visible areas.

Trail Watch Program

A trail watch program would provide an opportunity for local residents to become actively involved in crime prevention along the trail. Similar to Neighborhood Watch programs, residents are brought together to get to know their neighbors, and are educated on how to recognize and report suspicious activity.

Safety Inspections

Regular inspection of the trail and associated amenities is a key factor to trail safety. Periodic visual inspections should be conducted by personnel. These inspections can help identify and correct problems before they become an issue. A fallen tree or limb, for example, can be readily removed from the trail or coned off to divert trail users away from the hazard until

such time as maintenance crews can remove the hazard. A written record of inspections is recommended. This will help create a database of information that can assist the responsible entity in several ways. Written records can reveal safety trends and use patterns that can assist in prioritizing maintenance dollars. Written records also can help protect from potential liability, providing documentation of diligent maintenance practices targeted towards protection of the public. A typical inspection record should include:

- Inspection reports noting any hazards that have been found along the trail, along with remedial action. This should note basic items such as debris found on the trail, wash outs, or other trail obstructions.
- Monthly inspections of the entire trail should be conducted. These inspections should document the condition of the trail, and notes should be made of any potential hazards on the trail (cracks, erosion, overhead vegetation, etc.). Corrective actions should be integrated into the next 30-day work plan.
- Quarterly visual and operational inspections should be made of all of the trail amenities such as benches, signage, hitching posts, drinking fountains, bike racks, etc. Recommended corrective actions should be made and be integrated into a three-month maintenance work plan. A resident response system should be established so that problems with the trail can be systematically recorded if maintenance crews are unable to visit the trail daily.

Trail Closure

Portions of the Santa Rosa Valley trail system should be closed if any heavy equipment is expected to use the trail during flooding events, or when any maintenance or construction activities are occurring that could be injurious to

the general public. The responsible entity should take appropriate measures to notify the public of closure of the trail and arrange detours where appropriate.

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Appendix A

Data Review



Appendix A

Data Review

Relevant Plans, Policies and Documents

It is important for the Santa Rosa Valley Trail Master Plan to build upon existing project and planning efforts affecting the short-term construction and long-term sustainability and vitality of the Santa Rosa Valley Trail Master Plan. Relevant plans and documents include regional Ventura County conservation planning efforts, neighboring city plans, neighboring open space jurisdictions, and environmental review documents, and meeting minutes of the Santa Rosa Valley Municipal Advisory Council.

Ventura County Regional Plans

Ventura County General Plan: Goals Policies & Programs (2011)

Executive Summary

The County General Plan, which is mandated by State law, sets forth the goals, policies, and programs the County will implement to manage future growth and land uses. The General Plan, adopted by the Board of Supervisors and last amended on June 28, 2011, embodies the vision for the future of unincorporated Ventura County.

Ventura County has formatted its General Plan in a manner which is clear, concise, logical and usable, while meeting the requirements of the Government Code. Specifically, the County General Plan consists of: (a) Countywide Goals, Policies and Programs containing four chapters (Resources, Hazards, Land Use, and Public Facilities and Services), (b) four Appendices (Resources, Hazards, Land Use, and Public Facilities and Services; three of the four sections relate to pathway and trail facilities. These sections include Resources, Land Use, and Public Facilities and Services) which contain background information and data in support of the Countywide Goals, Policies and Programs, and (c) several Area Plans which contain specific goals, policies and programs for specific geographical areas of the County

Chapter 1: Resources

Section 1.2 Air Quality presents information which is related to active transportation. This section identifies a need for Trip Reduction that will be implemented by the AIR Pollution Control District. They include options such as promotion of Commuter Rail System and ride sharing but do not touch on bicycle lanes and trails.

- 1.2.2 Policies
 - 4 - Where deemed necessary by the APCD, discretionary development shall be conditioned to develop, implement, and maintain over time, Transportation Demand Management (TDM) programs consistent with APCD's trip reduction rule 210. TDM programs shall include a requirement for annual performance reporting to and approval by the APCD.

Chapter 2: Hazards

The liquefaction hazard generally exists throughout the Oxnard Plain and Pleasant Valley. The hazard areas extend up the Ventura and Santa Clara Rivers, mainly in the areas underlain by extensive alluvial deposits. Some of the valleys in the Thousand Oaks area are also affected, as is the Arroyo Santa Rosa downstream of the City of Thousand Oaks-Hill Canyon Wastewater Treatment Plant.

Chapter 3: Land Use

This section seeks to guide the future growth and development in unincorporated areas. Section 3.2 Land Use Designations identifies open space and refers to linkages between major recreation and open space reservations which include trails and scenic highway corridors.

Section 3.1.3 Programs: Greenbelt Agreements: In order to maintain the integrity of separate, distinct cities and to prevent inappropriately placed development between city boundaries, some cities and the County have entered into joint greenbelt agreements. These agreements protect open space and agricultural lands and reassure property owners located within these areas that land will not be prematurely converted to uses which are incompatible with agriculture or open space uses. In addition, the greenbelt agreements reinforce the County Guidelines for Orderly Development. Traditionally, agreements have been executed as joint or co-adopted resolutions by mutually interested cities and, in cases where the County is a party to it, by the Board of Supervisors.

In the vicinity of the study area, a greenbelt agreement has been adopted for the westerly portion of the Santa Rosa Valley, east of the City of Camarillo. A map of the Santa Rosa Valley Greenbelt is shown below.



Ventura County
 Resource Management Agency
 Information Systems
 Date Printed: 11/29/2011

SANTA ROSA VALLEY GREENBELT

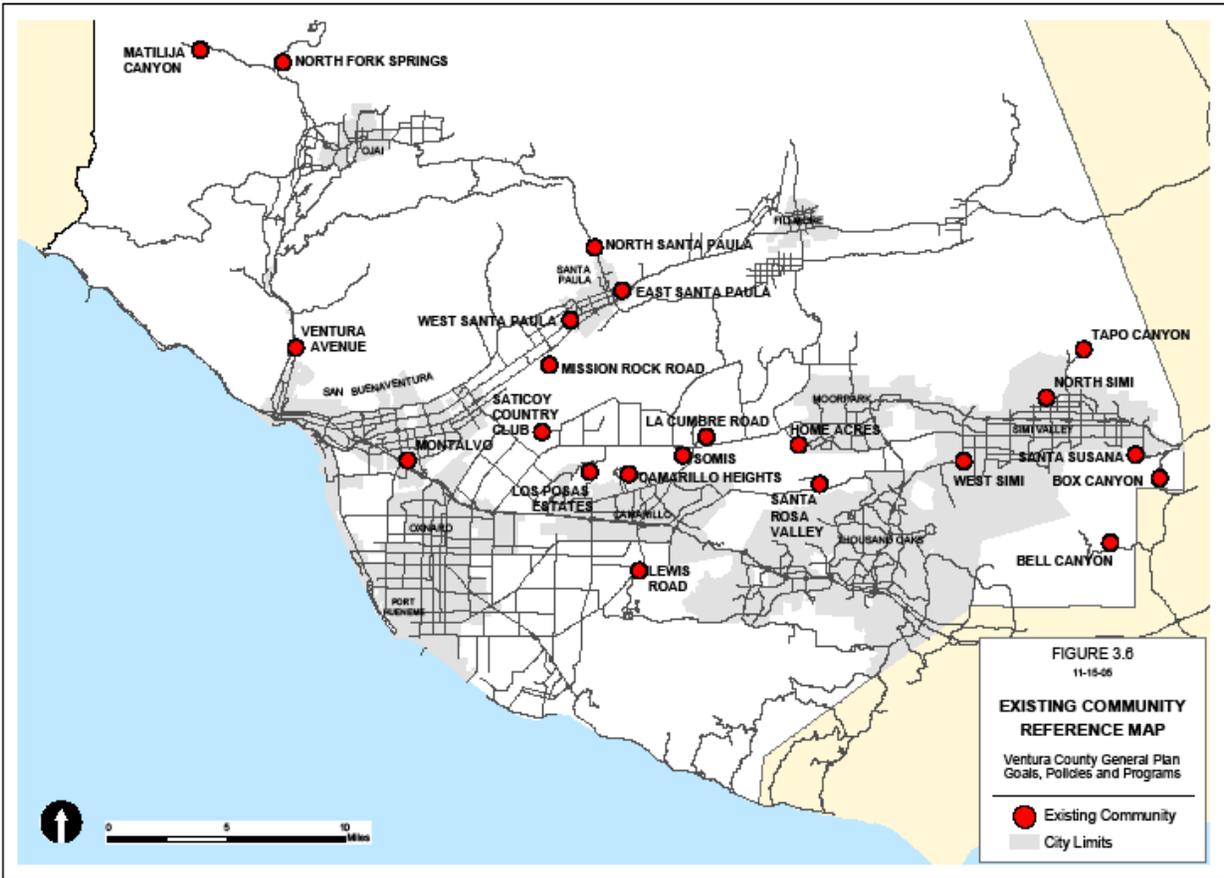
Last Boundary Revision: Nov. 12, 1996

0 2,700 5,400
 Feet

N



Disclaimer: this map was created by the Ventura County Resource Management Agency, Mapping Services - GIS, which is designed and operated solely for the convenience of the County and related public agencies. The County does not warrant the accuracy of this map and no decision involving a risk of economic loss or physical injury should be made in reliance therein.



SANTA ROSA VALLEY EXISTING COMMUNITY

Building Intensity/Population Density Table – Santa Rosa Valley Existing Community							
Residential							
Designation	Acres	Max. Bldg. Coverage (% of Lot Area)*	Maximum Density (DU/Ac)#	Dwelling Units	Average Pop/DU@	Population	Average Pop. Density (Pop/Acre)
RE-2Ac	51.90	25%	.50	25	3.11	78	1.50
RE-1Ac	910.88	25%	1.00	910	3.11	2,830	3.11
RA and RA-1Ac	228.77	25%	1.00	228	3.11	709	3.10
Total	1,191.55			1,163		3,617	

*The maximum *building coverage* for lots of less than one acre shall be as specified, or 2,500 square feet plus 1 square foot for each 4,596 square feet of lot area over 5,000 square feet, whichever is greater.

#Excludes second dwelling units per Section 65852.2 of the State Government Code.

@ Year 2000 Forecast for Camarillo Non-Growth Area.

Chapter 4: Public Facilities and Services

Section 4.2 Transportation/Circulation relates to roads, highways, transit, and rail service are identified in this section. In addition to automobiles, buses and bicycles share roads in the Regional Road Network.

- 4.2.1 Goals
 - 10 – In cooperation with the ten cities and the Ventura County Transportation Commission, plan a system of bicycle lanes and trails linking all county cities, unincorporated communities, and CSUCI.
- 4.2.2 Policies
 - 8 – Discretionary development shall be conditioned, where feasible, to minimize traffic impacts by incorporating pedestrian and bicycle pathways, bicycle racks and lockers, ridesharing programs, transit improvements(bus turnouts, shelters, benches), and/or transit subsidies for employees or residents of the proposed development.
 - 9 – In the event that any railroad right of way within Ventura County is abandoned in the future, the County Public Works Agency and the General Services Agency shall evaluate the feasibility of acquiring such land for public use such as transit, bicycle, and equestrian paths.

Section 4.9 Education and Library Facilities and Services identifies that students need safe paths to access school.

- 4.9.2 Policies
 - Convenient access, preferably on or near the Community’s major vehicular and pedestrian traffic routes.

Section 4.10 Parks and Recreation identifies the Los Padres National forest and Santa Monica Mountains National Recreational Area as recreational facilities that have extensive trail systems. The county is attempting to connect various trails throughout the County. To aid funding, Ventura County has adopted local parkland dedication requirements.

- 4.10.1 Goals
 - 5 – Establish or assist in the establishment of a countywide network of trails which will meet the needs of equestrians, bicyclists, hikers and other trail user groups.

Ventura County Comprehensive Transportation Plan (August 20, 2013)

The CTP is a long range policy document, built from community-based, local priorities and community-expressed need to enhance regional connections. It is aimed at ensuring mobility and enhancing the quality of life for all Ventura County residents. The CTP also fully examines various funding strategies and options from the federal, state, regional and local levels. It is intended to provide a framework for future community-based planning and collaboration and inform Ventura County’s long range transportation decisions.

Executive Summary:

Priorities Expressed by the Public

Public opinion research conducted by VCTC from 2008-2011 among registered voters, businesses, and general community members indicated that, while transit, bicycle and pedestrian improvements were important, maintaining roads and filling potholes were a higher priority.

Solutions for the Future

A growing shortfall of funds for local streets and roads will shift efforts from maintaining existing conditions to taking a “triage” approach to maintaining only those that are most critical. Supplemental revenues are needed to keep roads in good condition, and develop more “complete streets” that support bicycle, transit and pedestrian users and even add lanes on some of the busiest city streets.

Connecting existing bicycle networks between cities through the unincorporated areas on a regional scale would further strengthen these networks’ usefulness, and supplemental revenue could support leveraging outside funds.

Summary of Revenue and Sources and Expenditures

The \$258.3 million 30-year need to construct proposed bicycle lanes throughout the County is short \$28.3 million, which does not create a countywide network or include annual maintenance costs.

Chapter 2: A Shared Vision for the Future:

Convenient and Accessible Options. Many options that are easy to use at local and regional levels will help to improve connectivity. Improving local streets, roads, highways and rail will expand and enhance their use for bus, bicycle, pedestrian, train, rideshare, car share, and future technology options, creating more choices for traveling locally and beyond.

Following are concise summaries of priorities for each community-based Local Advisory Group (listed alphabetically), and for the Regional Advisory Group:

Moorpark: Expanding the bicycle network and safety.

Chapter 3: Public Awareness and Opinions of Transportation:

This chapter summarizes key findings from two surveys conducted in recent years. The Business Survey was conducted in October 2010. The purpose of the survey was to identify transportation priorities specific to businesses’ unique needs. A Community Survey conducted in November 2010 was to understand community members’ awareness of the county’s transportation services and role in the county.

Potential Solutions for Transportation

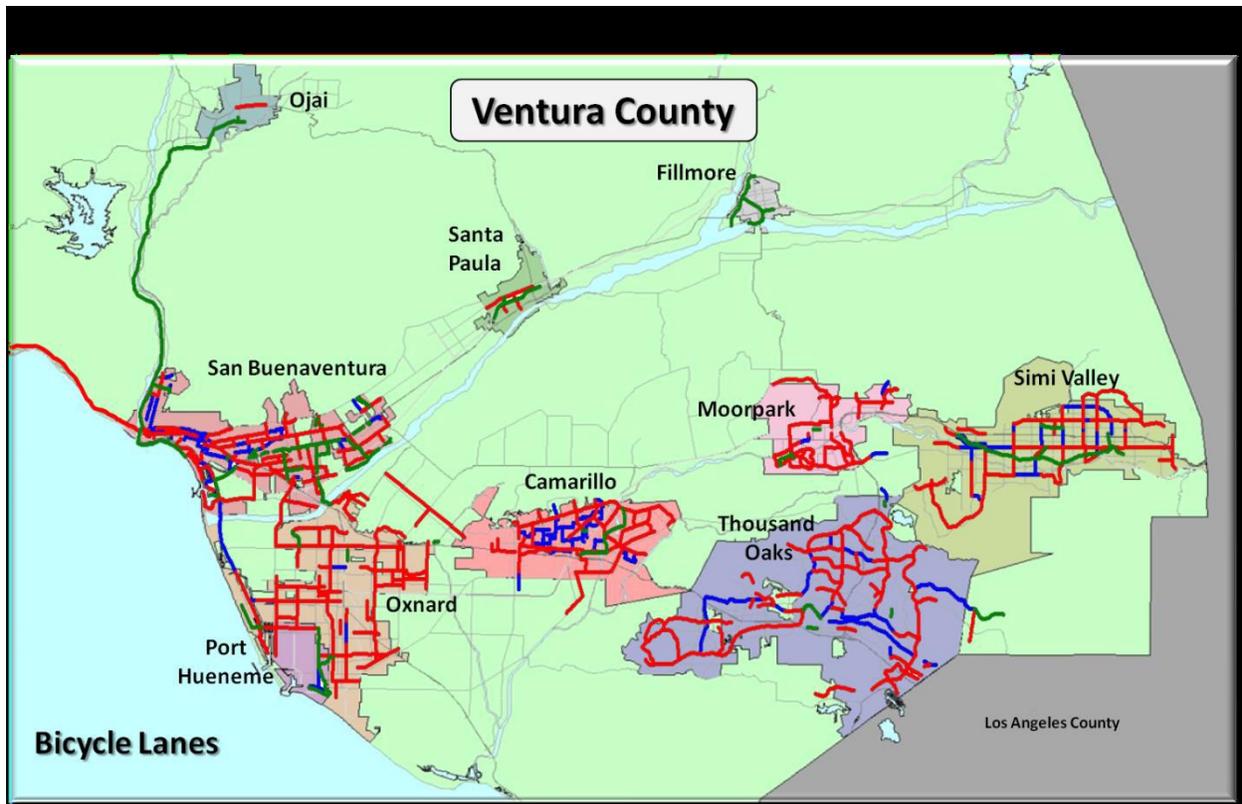
In the Business Survey, respondents indicated their top three transportation solutions to resolving their identified issues. Developing long range plans for new solutions, widening and maintaining roadways, bus service and connection improvements, and freeway and onramp improvements all ranked among top choices. “Build more bicycle paths” was selected first by 2 respondents; second by 27 respondents; and third by 21 respondents.

In the Community Survey, respondents indicated the top three transportation solutions that VCTC should focus on. Developing long range plans for new solutions, improving local roads and streets, and adding bus service all ranked among top choices. “Build more bicycle paths” was selected 5.7% as First Choice; 6.6% Second Choice; and 10.2% Third Choice.

Chapter 4: State of the System

Active Transportation

Active Transportation is defined as any means of using human power to travel. While the most common definition is biking and walking, it can also involve use of public transportation where a person walks or bikes to and from a bus or train stop. Despite the limited resources available for active transportation, each city has developed a fairly extensive bicycle lane network using a combination of federal, state and local funds. Locally, approximately \$400,000 per year is allocated from the Local Transportation Funds (LTF) Article 3 to cities and the County for bicycle and pedestrian projects. Similar to the transit network, the bicycle lane network illustrated in the following map stops at each city’s borders with few city to city connections.



Congestion Mitigation and Air Quality (CMAQ). CMAQ funds are allocated by VCTC for transportation projects that reduce transportation-related emissions. Project types include public transit, rail transit capital improvements, pedestrian and bicycle paths and others that serve to reduce congestion and improve air quality. The matching ratio is approximately 89% federal to 11% local.

Transportation Alternatives Program (TAP). MAP 21 consolidates several programs which addressed pedestrian and bicycle transportation, scenic beautification, safe routes to schools, historic preservation, recreational trails, and other uses. TAP funds are eligible for pedestrian and bicycle facilities, projects to

provide safe routes to schools and for non-drivers, scenic roadway overlooks, recreational trails, rehabilitation of historic transportation facilities, preservation of abandoned railway corridors, control/removal of outdoor advertising, archaeological planning and research, vegetation management along transportation corridors, and mitigation of water pollution due to highway runoff. California has not yet determined process for selecting projects for this new program.

Chapter 5: Challenges for the Future

Population

Despite the perception that Ventura County is growing slowly, the County's 9.3% growth rate between 2000 and 2010 exceeds that in Los Angeles County and Orange County. According to the California Department of Finance population projections, Ventura County's Overall, for Ventura County's transportation system, greater demands will be placed on all components: streets, roads, highways, transit, bicycle, and pedestrian.

State of Good Repair

The paved streets and roads that support all of those traveled miles must support vehicles ranging from bicycles, to ultra-small cars weighing 1,800 pounds, to fully loaded freight trucks weighing 80,000 pounds. Commuters, transit riders, bicyclists and pedestrians all have vested interests in and are directly impacted by the safety and functionality of streets and roads. A growing "complete streets" movement is focused on expanding the safety and usability of streets and roads for all users including vehicle, bicycle, pedestrian and transit. In fact, California State Assembly Bill 1358 specifically addressed this issue in 2008 and mandates that when a city or county updates the circulation element of their general plan they must consider all users of a street, a "complete streets" approach. Currently about half of Ventura County's jurisdictions have complete street updates to their general plan.

Transportation Finance

In most of the other project areas--local roads, highways, and bicycle and pedestrian improvements--the needs outweigh available funds.

Chapter 7: Solutions for the Ventura County Region

Local Streets and Roads

Everyone has a vested interest in the safety and functionality of local streets and roads. Whether moving from point A to B by driving a vehicle, riding a bicycle, taking transit, or walking -- or by a combination of these modes -- a traveler would be hard-pressed to avoid using local streets and roads.

For those communities meeting or exceeding standards, supplemental revenues can offer the opportunity to broaden the safety and functionality for all users as "complete streets," which could include installing traffic safety measures, bicycle lanes, enhanced bus transit stops, and crosswalks.

Bicycle and Pedestrian

Cities and communities have strengthened their local bicycle and pedestrian infrastructure in recent years, working to improve the safety and viability of these modes for local trips, reduce localized congestion, and enhance design of city centers and major destinations. These ongoing improvements and the growing "complete streets" movement focused on expanding the safety and usability of streets and

roads for all users (i.e., vehicle, bicycle, pedestrian and transit) offer significant promise for continued development of complete and safe local networks. However, significant gaps and safety issues in these networks still exist, both within and between cities. Connecting these networks on a regional scale would further strengthen these networks' usefulness and contributions to congestion relief. Prioritizing projects that delivery greater connectivity and safety will be most effective at leveraging state and federal funds in a more competitive environment. Supplemental revenue could provide a new localized source of funds for expanded "complete streets" planning and implementation that are distributed on a similar competitive basis and support leveraging of other sources.other amenities.

Chapter 8: Financial Plan, Scenarios and Realities

Bicycle and Pedestrian

Bicycle and pedestrian projects' estimated \$230 million in funds over 30 years will need to leverage other state and federal grant programs to complete any large scale projects. Compiling the construction costs for proposed bicycle lanes throughout the County reveals a need of \$258.3 million resulting in a shortfall of \$28.3 million. Annual maintenance cost have not been included in this calculation.

In addition to the shortfall noted above there are a number of projects for bicycles and pedestrians that have been identified at a conceptual level but have yet to have real work done to estimate costs. The Santa Paula Branch Line Recreational trail proposed to span 32 miles from east San Buenaventura to east of Piru is an example of such a project. While several miles of trail have been built in the cities of Santa Paula, Fillmore and the community of Piru, the connecting segments in the unincorporated County are not included in the estimated shortfall.

Bicycle and Pedestrian project could benefit greatly from California State Assembly Bill 1358 which mandates that when a city or county updates the circulation element of their general plan they must consider all users of a street, a "complete streets" approach. Unfortunately this mandates brings no new funding with it and adds to the unfunded needs for bicycle and pedestrian projects. As cities and the County update their circulation elements the shortfall in this area will increase significantly.

Chapter 11: Plan Implementation

Outcome 1: Status Quo Actions:

Realign the Transportation Development Act Article 3, Bicycle and Pedestrian funding criteria, to foster greater use of bicycling and walking for daily transportation. Base project rankings on quantitative analysis of improved connectivity within and/or between communities, schools, job centers and other important destinations.

Ventura Countywide Bicycle Master Plan (2007)

The 2007 Ventura Countywide Bicycle Master Plan provided a blueprint for bicycle transportation and recreation in Ventura County. The plan made recommendations to enhance and expand the existing bikeway network, connect gaps, address constrained areas, provide for greater local and regional connectivity, and encourage more residents to bicycle.

Santa Rosa Valley Equestrian Trail Policy (April 4, 2002)

Memo from Tom Berg, RMA Director to Supervisor Frank Schillo, Second District, County of Ventura outlining the practices within the Planning Department for implementing the Equestrian Trail Policy for the Santa Rosa Valley, adopted by the Board of Supervisors in October of 1982.

At the time of writing, the current Planning Division policy was to strongly encourage subdivision applicants to work with the Homeowner's Associations (HOA) on the design and location of equestrian trails to ensure compatibility and connectivity to the greatest possible extent. Where an applicant has agreed to an equestrian trail on their property, the easement has always been to the benefit of the HOA and not the County. This has had the effect of making the HOA legally and financially responsible for maintenance. Where trails have been dedicated, they have been twelve feet (12') wide. Trail location with respect to existing easements and right-of-way has been handled on a case-by-base basis.

This practice has in large part been driven by County Counsel's opinion that currently no "nexus" exists for the County to require dedication of equestrian trails. As such the County cannot require the use of reciprocal-use agreements in the CC&Rs. However, per the adopted policy, Planning has been encouraging establishment of agreements with homeowners to allow the use of trail by all residents, albeit with mixed success.

County authority for this issue could be extended by appropriate Board action to create the required nexus. If the Board of Supervisors were to adopt an area plan or trails plan for the Santa Rosa Valley that included equestrian facilities, a "nexus" would be created and the Planning Division could then require establishment of equestrian trails. A more expensive and time-consuming alternative would be to create some sort of trails plan on a countywide basis.

Neighboring City Plans

Thousand Oaks General Plan

Open Space Element (September 2013)

Adopted in September 2013, the Open Space Element is a tool to carry forth the Thousand Oaks vision to protect open space, direct growth and maintain the community's character and enviable quality of life. This Element identifies the open space resources that should be protected and specific methods to protect them.

Chapter 4: The Open Space System

The open space system delineated by the General Plan includes natural open space lands, existing parks, future parks for both active and passive recreation, golf courses, and a system of equestrian, hiking, and bicycle trails linking sections of the Planning Area with each other, and with regional trails systems, such as the National Scenic Trail System.

Section B: Open Space Inventory

Thousand Oaks' permanent open space has grown steadily since the General Plan was adopted in 1970. Land classified as natural open space within the Planning Area in 2013 totals about 15,155 acres, or about 40% of the land within the Planning Area.

Other active elements of the open space system, including parks (1,126 acres) and golf courses (532 acres), account for another 1,658 acres, bringing the total for the open space system as a whole to about 16,813 acres, or 44% of the Planning Area.

This sub-chapter inventories the existing natural open space, including lands which have been or are required to be set aside for this purpose, both in public ownership and in private ownership. For purposes of identification and description, open space parcels within close proximity to each other have been grouped into open space "areas." The descriptions below summarize open space resources, natural features, size, ownership, location, trails and access points. Table 1, on the next page, summarizes and tabulates open space acreage for these areas, and Figure 2, the Open Space Inventory, shows their location within the Planning Area.

Subsection 20: Mount Clef Ridge

The Mt. Clef Ridge Open Space totals 212 acres, and extends from the Norwegian Grade (Moorpark Road) west to Wildwood Park. This area protects ridgelines that afford sweeping views of both the Conejo Valley and the Santa Rosa Valley. Plant communities include coastal sage scrub and chaparral. Two sensitive plants- Lyon's Pentachaeta and Conejo Dudleya- are found in this area, and the area also supports many wildlife species such as deer, coyote, and gray fox. The trail in this area connects to trails in Wildwood Park. Open space is owned by COSCA and CRPD, and a conservation easement on private property protects additional habitat.

Conservation Element (1996)

The Conservation Element of the Thousand Oaks General Plan is based on the premise that the existing natural environment possesses inherent values and qualities that should be preserved. In the context of local planning, conservation is a positive action to assure that community development is compatible with preservation of significant physiographic, hydrological, biological and cultural resources. Such resources enhance the community's sense of spaciousness and semi-rural character and contribute to the overall quality of the environment.

The Conservation Element identifies the Conejo Canyons as a key topographic feature in the City: "...the Conejo Canyons area through which the bulk of stormwater generated within the watershed eventually flows. This area is characterized by very steep, rugged, hillside and mountainous terrain that descends rapidly northward toward the Santa Rosa Valley" (p. 5). The Element also mentions that the only remaining entirely natural floodplain in the City of Thousand Oaks is along the Conejo Creek in the Hill Canyon area. (p. 11)

City of Thousand Oaks Bicycle Facilities Master Plan (November 2010)

The 2010 Bicycle Facilities Master Plan was prepared to assist the city in meeting the needs of commuter and recreational bicycle users. This plan provides guidelines, bicycle safety improvements, design standards, implementation processes, operation and maintenance of bike facilities, educational programs, performance standards, and funding options. In the city there are 76 miles of bikeways: 2 miles of bike paths, 54 miles of bike lanes, and 20 miles of formal or informal bike routes.

The main purpose of this Plan is to encourage the development of an integrated bicycle system throughout Thousand Oaks with connections to other regional bike systems. Projects shown on the 20-Year Bicycle Facilities map will be given priority for various state and federal funding sources prioritized through the City and the Ventura County Transportation Commission (VCTC).

Major Recommendations – 20 Year Plan

The overall concept for the bicycle system is a linkage between Thousand Oaks neighborhoods and key destinations such as schools, parks, transit connections, and employment/shopping centers. The planned system is based on a broad range of criteria including access, traffic conditions, right-of-way availability, and connection to major destinations, cost and implementation constraints, and level of support expressed at the public workshops.

The system will serve all neighborhoods in Thousand Oaks, linking people with schools, parks, shopping areas, work centers, and other destinations. Bike paths will provide important linkages and allow bicyclists to travel without having to ride along busy streets. Bike lanes and routes will provide an extra level of comfort for bicyclists negotiating city streets and avenues. Crossing improvements will help minimize conflicts between motorists and bicyclists. New bicycle racks will encourage bicycle commuters.

This Bicycle Mater Plan outlines the planning and design criteria used to select the high and low priority projects. Detailed descriptions of each proposed bikeway segment are provided, along with implementation issues. The Plan provides specific recommendations on safety improvements, design standards, implementation, operations and maintenance, educational programs, performance standards, and funding.

Bikeway facilities with ties to the Santa Rosa Valley run along Lynn Road, a Class III Read Road Connector Bike Path (under design) and the proposed bike routes on Moorpark Road at the Norwegian Grade. The southern portion of Lynn road, Thousand Oaks Boulevard and Hampshire Road serve as the prime east-west routes through the City, connecting with the eastern and western portions of the regional system. Moorpark Road and the northern portion of Lynn Road serve as the major north-south routes through the City, connecting with the northern portion of the regional system. In certain parts of the City, these roadways often do not provide usable outside travel lanes, which serve to constrain bicycle riding.

What Are the Four Issues Thousand Oaks Must Address to Increase its “Bicycle Friendliness”?

Safety is the number one concern of citizens, whether they are avid or casual recreational cyclists or bicycle commuters. For the most part, bicyclists can use back streets to avoid busy streets such as Thousand Oaks Boulevard or Moorpark Road. However, a consistent bicycle network with either bike lanes or wider curb lanes and signing would improve the safety of bicycling in the City.

Access for bicycling to shopping, work, recreation, school, and other destinations is somewhat hampered by major transportation corridors such as U.S. 101, S.R. 23, Thousand Oaks Boulevard, Lynn Road, Moorpark Road, and the varied topography of the area. Movement across major interchanges and arterial streets is hampered by the high volume of traffic (especially during the pm peak period), even at signalized intersections.

Moorpark Road

Access for bicycling to work, school, shopping and other key destinations is difficult on Moorpark Road due to high traffic volumes. Moorpark Road is a Class 3 facility and extends 3.4 miles in length. Moorpark Road serves as a major north-south routes through the city. Shoulder bike routes are proposed on Moorpark Road at the Norwegian Grade. There is also a proposed 0.4 mile Class 2 facility on Moorpark Road; the facility starts at Greenmeadow Avenue and ends at Rolling Oaks Drive. Another Class 2 facility on Moorpark Road would start at Lynn Road and end at Calle Contento; this stretch would be 0.7 miles.

Read Road

Read Road Bike Path Connector was a short term project which was completed in 2010. The connection begins at Olsen Road and ends at Read Road. It is a Class 1 and 3 facility that stretches ½ a mile.

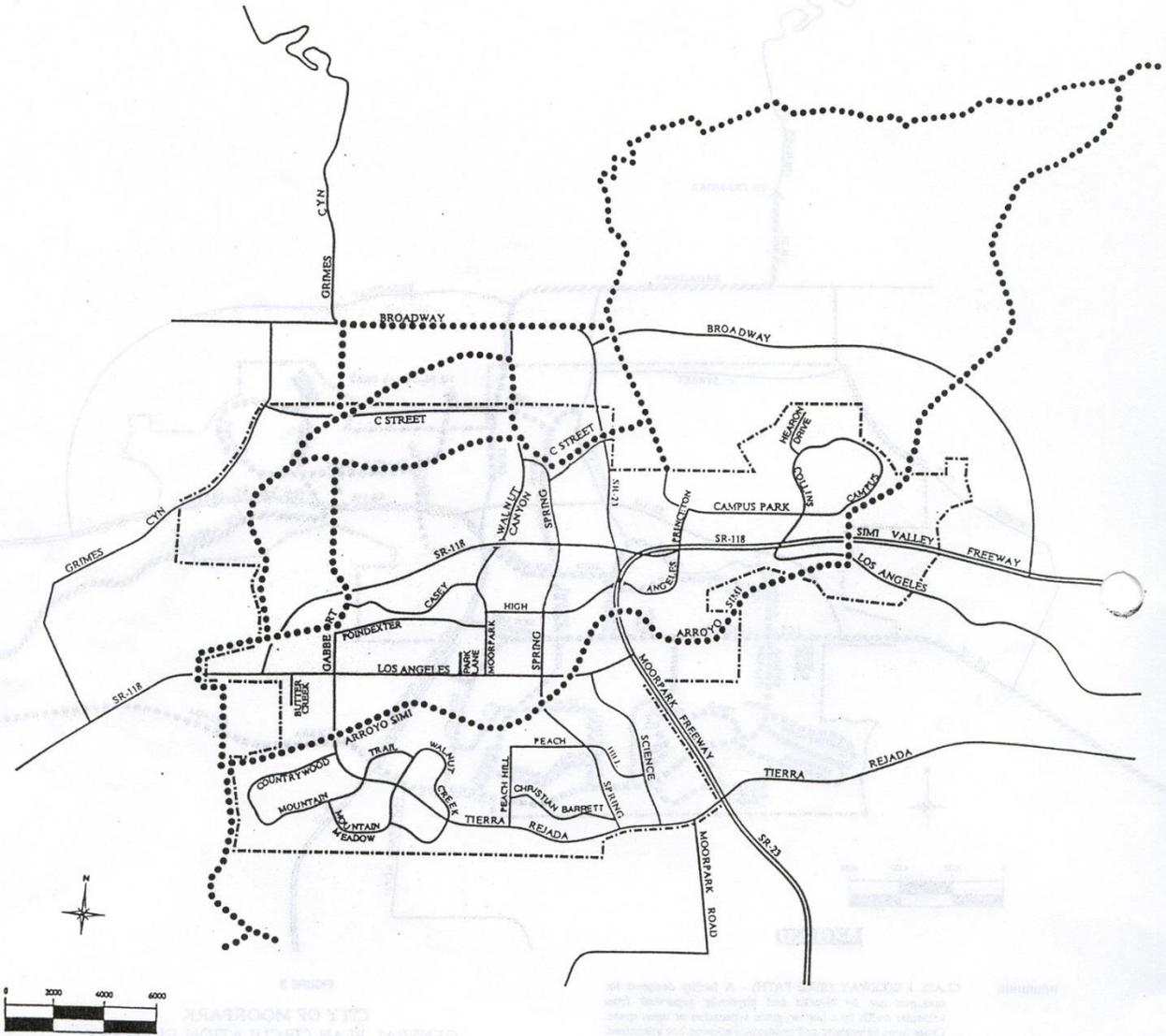
Olsen Road

Olsen Road currently has a Class 2 facility that is 1.6 miles in length. It begins at Spring Meadow Avenue and ends at Erbes Road. It is recommended that another 1.7 miles of a Class 2 facility be added. It would begin at Avenida De los Arboles and ends at City Limit.

Moorpark General Plan

Circulation Element (May 1992)

The City of Moorpark's Circulation Element includes plans for equestrian facilities and bikeways. The equestrian facilities plan prescribes criteria for the development and design of such facilities. Figure 4 in the Circulation Element (as updated in September 1999), shows equestrian trails within city limits as well as possible trail linkages to surrounding communities. This map is reproduced below. Likewise, Moorpark's bikeway plan illustrates (as of May 1992) bike routes within the city and possible connections to surrounding communities.



LEGEND

- EQUESTRIAN TRAILS
- - - - - CITY LIMIT BOUNDARY

FIGURE 4
 CITY OF MOORPARK
 GENERAL PLAN CIRCULATION ELEMENT

EQUESTRIAN TRAIL NETWORK

September 1999

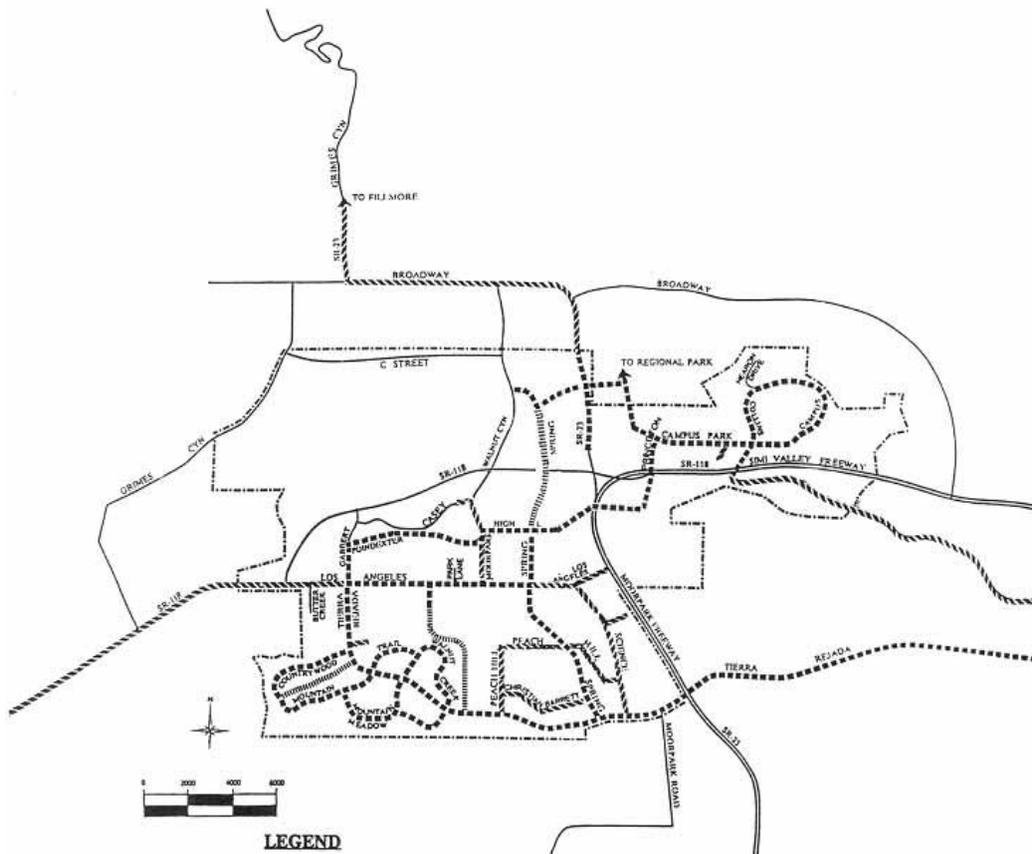
EXHIBIT F
GENERAL PLAN CIRCULATION ELEMENT
FIGURE 4, EQUESTRIAN TRAIL NETWORK

Moorpark Bicycle Transportation Plan (October 15, 2008)

This plan was developed as part of the Ventura Countywide Bicycle Master Plan process and serves as a guide to enhance and expand the City's existing network of bicycle facilities, connect gaps, address constrained areas, provide for greater local and regional connectivity, and encourage more residents to bicycle.

Chapter 2: Existing Conditions

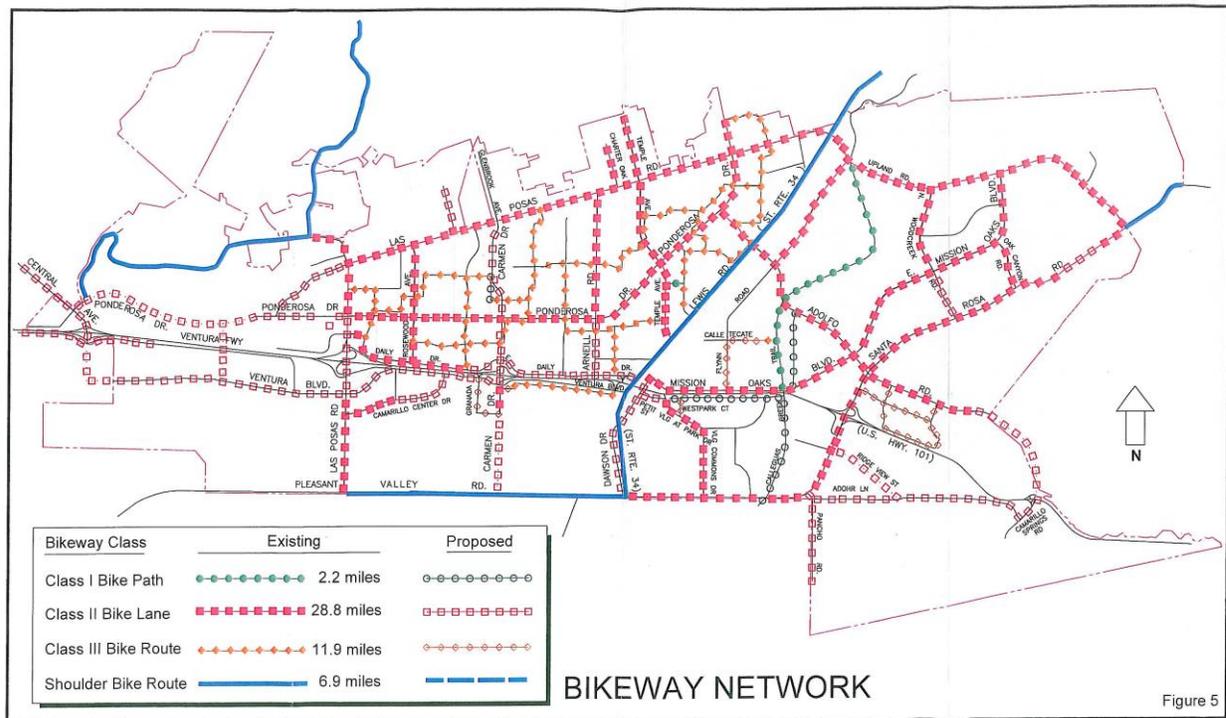
Existing bikeways within Moorpark have a total route mileage of 24.5 miles, including 18.3 miles of Class II bike lanes and 5.8 miles of Class III bike routes. As shown below, Figure BT-2 in the Moorpark Bicycle Transportation Plan presents existing bikeways in the city.



- LEGEND**
- CLASS I BIKEWAY (BIKE PATH)** - A facility designed for exclusive use by bicycles and physically separated from vehicular traffic by a barrier, grade separation or open space. Cross-owns by vehicles and pedestrians allowed but minimized.
 - CLASS II BIKEWAY (BIKE LANE)** - A paved area of a roadway designated for preferential use of bicycles. Pavement markings and signage indicate the presence of a bike lane on the roadway.
 - CLASS III BIKEWAY (BIKE ROUTE)** - A conventional street where bike routes are indicated by sign only, there are no special pavement walkways and bicycle traffic shares the roadway with motorized traffic. Only Class III facilities which connect the Moorpark sphere with the regional bikeway system are identified in the bikeway network. Roadways which are not designated with a Class II bikeway, but which serve as connections between Class II facilities or the regional bikeway system should be considered as Class III bikeways.
 - CITY LIMIT BOUNDARY**

City of Camarillo Bikeway Master Plan (April 27, 2011)

Camarillo's Bikeway Master Plan incorporates a mixture of Class I bike paths, Class II bike lanes, Class III bike routes, and shoulder bike lanes within the city. Shoulder bike are defined as having no bikeway designation signs but providing a continuous striped shoulder area of the street to improve safety and convenience for bicyclist and motorists. Figure 5 from the Bikeway Master Plan displays existing and proposed bikeways within city limits.



Neighboring Open Space Jurisdictions

COSCA Strategic Plan Beyond 2013 (June 2013)

COSCA's recent Strategic Plan sets a new mission, guiding principles, objectives, and implementation actions to be used in long-range planning. Having nearly completed its goal of securing a "ring of open space around the Conejo Valley," COSCA intends to transition from land acquisition to resource management and visitor services. Currently, COSCA manages approximately 140 miles of public multi-use trails within its open space lands.

Guiding Principle #4 in the Strategic Plan would continue COSCA's shared-use policy, providing "a well-maintained, interconnected system of natural surface, multiple-use trails that are respectfully shared by hikers, bicyclists, equestrians, and other trail users." In support of this principle, Objective 4.2 calls for informing trail users of etiquette to encourage safe, shared use.

According to Guiding Principle #7, this trail system should be continuous both within the Conejo Valley and with adjacent open space lands owned by other entities. Thus, Implementation Action 7.2 would involve communicating with partners such as Santa Rosa Valley Trails, Inc., and Pleasant Valley Recreation and Park District to discuss land acquisition strategies, trail linkages, and other potential partnerships.

Conejo Canyons Open Space Management Plan (COSCA)

(September 29, 2009)

The Conejo Canyons Open Space Management Plan seeks to conserve natural open space lands as well as provide compatible passive multi-use, trail based recreational activities. Wildwood comprised the largest open space in Thousand Oaks. It includes an extensive network of trails and contains several species of rare and endangered plants.

1.1 PURPOSE OF THE PLAN

The Management Plan provides a comprehensive guide for the long-term management of the Conejo Canyons' unique natural, cultural and scenic resources while providing for compatible passive multi-use, trail-based recreational activities. Specifically, the Management Plan is intended to:

- Create an inventory of the natural and cultural resources that exist within the plan area, including rare, endangered or sensitive plant and animal species;
- Identify key management issues and strategies needed to protect the area's resources, including habitat restoration, environmental monitoring, sensitive species protection, cultural resource stabilization and wildfire management;
- Create a priority-based list of resource management actions;
- Develop a public access plan that identifies existing and planned multi-use trails and trailheads;
- Develop a visitor improvement plan that identifies the locations of existing and planned improvements such as bridges, restrooms, picnic areas, benches and hitching posts; and
- Establish priority classifications for implementation of proposed recreational improvements based on public input and management capabilities throughout the COSCA open space system.

Section 4.6 Visual and Aesthetic Resources

Flanking the Conejo Canyons area to the southwest is a prominent ridgeline and mountainous terrain that overlooks the City of Camarillo and much of the Oxnard Plain. To the north is the Mount Clef Ridge, a dramatic volcanic ridge that is visible from many points within the City of Thousand Oaks, as well as from the Santa Rosa Valley to the north. "Lizard Rock", which resembles a lizard's head, sits at the westerly edge of the Mount Clef Ridge overlooking the Canyons West and Arroyo Conejo OSUs.

Section 5.4.1 Facilities

The plan identifies that work will be done with the Ventura County to create a shared use agreement with COSCA for a trail head at Santa Rosa Park.

Section 5.4.2 Trails and Emergency Access

Santa Rosa Road is closed to the hikers, bicyclists, and equestrians due to sharp curves, narrow travel lane widths and high volume traffic. However, it is open to official vehicles, and hikers, bicyclists and equestrians still use the road because there is no appropriate alternative route.

COSCA looks to partner with Ventura County Parks Department and the City of Thousand Oaks Public Works Department to construct bridges across the Conejo Creek directly west of Santa Rosa Park and directly north of the constructed wetlands.

Section 5.4.3 Public Education and Signage

Issue #2: Unauthorized off-road vehicle access

The entire Canyons West OSU, as well as a significant portion of the Arroyo Conejo OSU continues to be accessible to off-road vehicles that enter illegally from the Santa Rosa Valley using the Southern California Edison maintenance roads and transmission tower easements.

Environmental Review Documents

Wildwood Preserve, Draft Final Environmental (April 2009)

The Wildwood Preserve Environmental Impact Report was prepared pursuant to an application to rezone and conform to the 2005 Ventura County General Plan land use designation for the parcel and subdivision of a 133.2-acre lot on Santa Rosa Valley Road. The proposed project would develop the site with a new, gated residential community, including 18 lots for custom residential homes, a public equestrian trail, and a new bridge to cross the Arroyo Santa Rosa Creek.

Chapter 1: Executive Summary

Section 1.5.3 Proposed Project

Horsekeeping

A portion of the lots would be allotted to accommodate private, on-site equestrian stables, facilities, and grazing areas. The number of horses permitted per lot was determined based on a nitrate impact study prepared by the applicant and reviewed by the Watershed Protection District (WPD), due to the project's location within the nitrate impacted Arroyo Santa Rosa Groundwater Basin.¹¹ The study provides a determination that supports individual sewage disposal systems (ISDS) and animal-keeping activities (specifically horses) on each proposed lot (See Section 4.3.4 for further discussion of this study). Minimum lot sizes must be 2.875 acres to support ISDS. Lots 1-9 and 14 would not be allowed to board horses. Lots 10,12, 13, and 15 would each be allotted two horses. Lots 11 and 16 would each be allotted three horses, while lots 17 and 18 would each be allotted four horses.¹² Lots that are not large enough to allow horsekeeping uses would be subject to a restrictive covenant that would preclude these uses.

Public Equestrian Trail

The proposed project includes the dedication of an easement to a nonprofit equestrian organization that has yet to be determined) for the construction and maintenance of an equestrian trail for public use. The developer will construct the trail at the time that site/public improvements facilitated by the proposed project are installed. The trail would start from Santa Rosa Valley Road near its intersection with

Blanchard Road and would provide access to and along portions of the Arroyo Santa Rosa Creek. A total of 1.05 acres (3,820 linear feet) of public equestrian trail would be provided.

Section 1.5.4 Project Objectives

The Applicant submitted, among other objectives for the proposed development, the ability to provide a subdivision with a significant on-site equestrian element, situated near the new County Equestrian Center at Hill Canyon Road, and which is in harmony with the equestrian heritage of the Santa Rosa Valley and with current recreational pursuits of the local residents.

Project Redesign will enhance public recreational resources through the dedication of an easement to a non-profit equestrian organization for the construction and maintenance of public equestrian trail through the project site for public use.

Chapter 2: Project Description



Source: Jensen Design & Survey, October 15, 2007.

4.2.1 Existing Conditions

General Climate

The climate of the Santa Rosa Valley area of Ventura County, as with all of Southern California, is largely controlled by the semi-permanent high pressure center near Hawaii and the moderating effects of the nearby oceanic heat reservoir. Climatic conditions are characterized by cool summers, mild winters, frequent morning coastal stratus clouds, infrequent rainfall confined mainly from late fall to early spring and moderate onshore breezes. Unfortunately, the same conditions that create the desirable living climate also combine to severely restrict the ability of the local airshed to disperse the air pollutants generated by the large population attracted by the climate.

Baseline Air Quality

The Conejo Valley air quality monitoring station at 2323 Moorpark Road measures baseline levels of project area air pollution. This station is the closest to the project site and the Santa Rosa Valley area and has been monitoring particulate matter (PM) in the Conejo Valley since 1979, with limited sampling prior to that.

Section 4.5 Agricultural Resources

4.5.5 Cumulative Impacts

Land Use Incompatibility

The proposed project along with other residential and non-agricultural projects included in the analysis of cumulative impacts would increase the potential for land use compatibility issues with existing agricultural uses within the Santa Rosa Valley due to potential effects such as vandalism and chemical spraying. This is considered a potentially significant cumulative impact. The proposed project's land use compatibility impacts identified above are considered a significant contribution to this cumulative land use compatibility impact.

Section 4.6 Visual Resources and Glare

The proposed project along with other projects included in the analysis of cumulative impacts would increase the density of development within the Santa Rosa Valley area. Two projects – Tentative Tract Map Case No. TT-4410 (TT-4410) and the Santa Rosa Park Day-Use Equestrian Facility – are located within the Santa Rosa Road viewshed, and would at least partially alter viewsheds within the Santa Rosa Valley.4.6.6 Cumulative Impacts.

The Santa Rosa Park Day-Use Equestrian Facility would include the development of: two new riding arenas; one rectangular Trail Training Pen; one Round Training Pen; a 90 seat Covered Grandstand; a 875 square foot Restroom Facility; a 240 square foot Storage Container; a Judge's Booth (gazebo); a Host Trailer; a Manure Collection Bin; and, a graded unimproved parking lot for 30 vehicles plus 40 trucks with horse trailers. In addition, the existing Picnic Area will be relocated to better serve the Park facility. These new buildings and structures, along with the development of the proposed project, would further alter the southerly portion of the view shed for travelers along Santa Rosa Road. This portion of the viewshed has experienced a transition in its visual quality, as residential uses have replaced agricultural uses along substantial portions of the frontage along the south side of the roadway. In this context, the proposed project's impact on scenic views from Santa Rosa Valley Road is also considered a significant

contribution to cumulative impacts (Impact VR-3) on these views.

This project's light and glare impacts contribute to potential significant cumulative impacts resulting from this project as well as lighting associated with other projects within the Santa Rosa Valley area. As such, the impact described above is also considered a significant contribution to cumulative impacts (Impact VR-4).

Santa Rosa Valley Municipal Advisory Council (MAC)

Review of Meeting Minutes

Santa Rosa Valley Municipal Advisory Committee - Relevant Issues

1) Motorized vehicles on trails

Public comment: motorcycle activity on the trails at Santa Rosa Park is particularly bad on the weekends and on the new trails in the Western Plateau. Suggestion that Supervisor Parks ask County Parks and COSCA to work together to enforce no motorized vehicles on trails (from September 20, 2012 minutes).

2) Conejo Canyons Management Plan:

According to Mark Burley, a "high priority" item in COSCA's newly approved Canyon Management Plan is to connect the lower Santa Rosa trail with the upper trail. It could be completed within the year. Two new bridges will be built across the arroyo as well as a series of trails that lead to the Western Plateau. Santa Rosa Park is the proposed trailhead to Hill Canyon (from [January 21, 2010, minutes](#)).

The latest draft of the COSCA Canyons Management Plan was revised to include the Santa Rosa Connector Trail, which had been proposed by Santa Rosa Valley Trails Inc. The draft Plan also contains the proposal that Santa Rosa Park become the trailhead for COSCA trails in Hill Canyon. The trail system will be multi-use but will prohibit motorized vehicles. Mark Burley said he asked COSCA to include in the draft plan that COSCA will work with the City of Thousand Oaks to open the trails from Santa Rosa Valley across Thousand Oaks property to Santa Rosa Park. The other proposal would be a bridge from Santa Rosa Park over the arroyo so equestrians and hikers don't have to go through the creek (from [October 15, 2009, minutes](#)).

3) Equestrian trails in Wildwood Preserve project

According to representatives for Wildwood Estates, equestrian trails, including those that lead to Santa Rosa Park, are part of the project, and the trail will be dedicated to a management entity such as Santa Rosa Valley Trails Inc. The Wildwood Estates project consists of 133 acres, and the 80 mountainous acres will be untouched and be put into Open Space in perpetuity (from [June 25, 2009, minutes](#)).

4) Read Road bicycle connector

According to Tom Pizza, the bicycle trail will extend from Read Road to Olson Road, and all easements have been obtained from nearby landowners.

According to Char Virnig, signs should be installed to point cyclists to the Read Road trail (from [April 22, 2009, minutes](#)).

The Alternate Bicycle Route [alternate to Norwegian Grade] through Read Road and the former Olsen Road Treatment Plant now has the HOA approval and should be in place in a few weeks (from [October 16, 2008, minutes](#)).

5) Background on potential for widening Norwegian Grade

The City will not be widening the Norwegian Grade because the cost is too high. In addition, widening would require retaining walls and would environmentally impact the canyon (from [April 24, 2008, minutes](#)).

6) Rumble strips as impediment to bicycling on Santa Rosa Road

Jim Doane of the Conejo Valley Cyclists and Crusin' the Conejo race says that their Saturday rides incorporate Santa Rosa Road to Somis. He wanted the MAC to know that the rumble strips to the right of the fog line use up a lot of space and if cyclists ride on the strips they could lose their balance. He would like to see the rumble strips removed as well as regular street sweeping.

Several members of the community felt the rumble strips were important and should remain after resurfacing. Supervisor Parks' office distributed letters sent to her regarding the rumble strips from cyclists who feel the rumble strips are a hazard to riders.

According to Supervisor Parks, there may be enough easement to add some extra paving on the shoulders of the road, and the Board of Supervisors has directed staff to widen pavement where possible for bike lanes when paving roads. Adding the extra pavement could make up for the area of the bicycle lane lost to make the rumble strip area.

A local cyclist wanted the MAC to recognize that the rumble strips collect dirt and debris which can be hazardous to bicyclists.

MAC motion approved 4-0: "Our recommendation is that the rumble strips stay in place, but in consideration of bicyclists, that the County extend the pavement width of the bike lane on each side of the road, adding stenciling and signage to designate the area as a bike lane, provided this improvement does not delay the current overlay project. If possible, the County should put the rumble strips on the left side of the fog line."

(from [May 17, 2007, minutes](#)).

Project Area Stakeholders

The County and consultant team identified key project stakeholders early in the planning process in order involved them directly in development of the trail alignment and design features. The stakeholders include property owners within the project area, neighboring property owners and managers, and other special interest groups with direct social or economic ties to the project area. The active project stakeholders included:

Blanchard Acres HOA
Bridlewood HOA
Camelot Estates
County of Ventura
Hidden Meadows Estates HOA
Holiday Pines HOA
La Brisas Estates
Lexington Hill Property Owners Association
Rancho Santa Rosa Property Owners Association
Saddlebrook Estates
Santa Rosa Valley Estates
Santa Rosa Valley "Carriage Estates"
Santa Rosa Valley Trails, Inc.
Wildwood Ranch
Yucca Drive Improvement Association

Appendix B

Reference Information for Trail Design



Appendix B

Reference Information for Trail Design

Paved Trail Design Standards

As stated in the Trail Master Plan, all bicycle facilities should be consistent with and conform to the Ventura County Bicycle Plan of 2007. Any other bicycle facility information, contained within this appendix, shall be for reference purposes only.

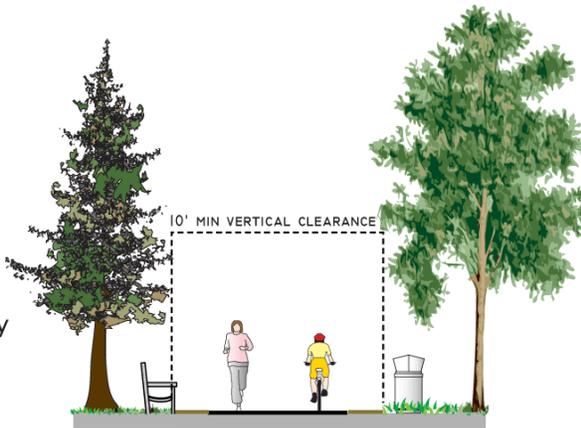
Bicycle Facility Typologies

The design guidelines use the generic terms shared-use path, bike lane and bike route. Basic layouts of these facility types are provided below:

SHARED-USE PATH



Provides completely separated right-of-way for exclusive use by bicycles and pedestrians with cross-flow minimized

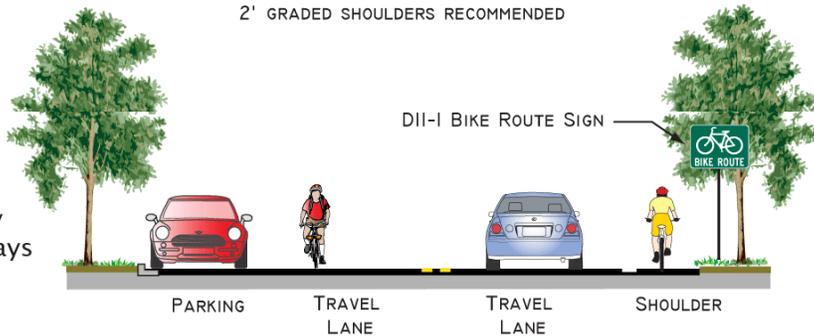


8' MINIMUM WITH
2' GRADED SHOULDERS RECOMMENDED

BIKE ROUTE



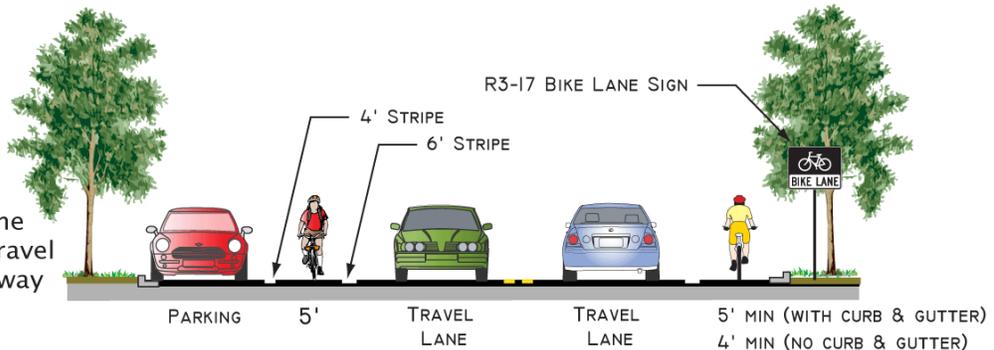
Provides for shared-use with pedestrians or motor vehicles, typically on lower volume roadways



BIKE LANE



Provides striped lane for one-way bike travel on a street or highway



Bike Routes

Bike Routes are defined as facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or with shoulders. Bike routes can be established along through routes not served by shared-use paths or bike lanes, or to connect discontinuous segments of bikeway (normally bike lanes). A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Bicycle Routes can employ a large variety of treatments from simple signage to complex treatments including various types of traffic calming and/or pavement stenciling. The level of treatment to be provided for a specific location or corridor depends on several factors.

General Design Guidance:

Width:

Varies depending on roadway configuration; see following pages for design examples.

Striping:

(If present) Line separating vehicle lane from shoulder bikeway (typically left sideline): 4 inches

Signing:

Use D 11-1 Bicycle Route Sign at:

- Beginning or end of Bicycle Route (with applicable M4 series sign below)
- Entrance to shared-use path - optional
- At major changes in direction or at intersections with other bicycle routes (with applicable M7 series sign below)
- At intervals along bicycle routes not to exceed ½ mile



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Pavement Markings:

Shared Lane Markings may be applied to Bicycle Routes per exhibits following.

Bike Route with Wide Outside Lane

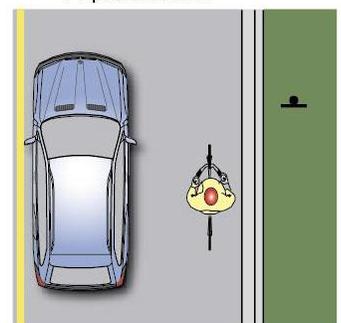
Lane Width:

Fourteen feet (14') minimum is preferred. Fifteen feet (15') should be considered if heavy truck or bus traffic is present. Bike lanes should be considered on roadways with outside lanes wider than 15 feet. This treatment is appropriate for residential streets, collectors, and minor arterials

Discussion:



14' preferred min



Wide Outside Lane

The wide outside lane provides adequate on-street space for the vehicle and bicycle to share the lane without requiring the vehicle to leave its lane to pass the bicyclist. This facility is frequently found with and without on-street parking.

Bike Route on Low Volume Street

Sign Placement:

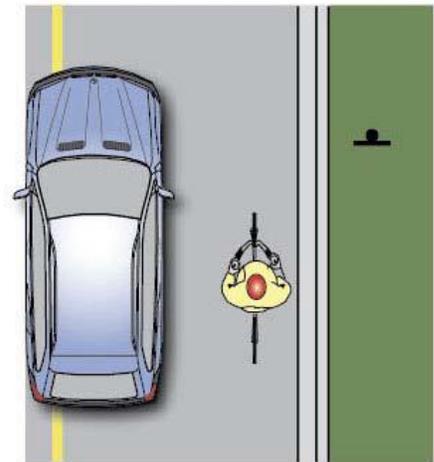
Bicycle Route signage should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

Discussion:

Bicycle routes on local streets should have vehicle traffic volumes under 1,000 vehicles per day. Traffic calming may be appropriate on streets that exceed this limit. Bicycle routes may be placed on streets with outside lane width of less than 15 feet if vehicle speeds and volumes are low.

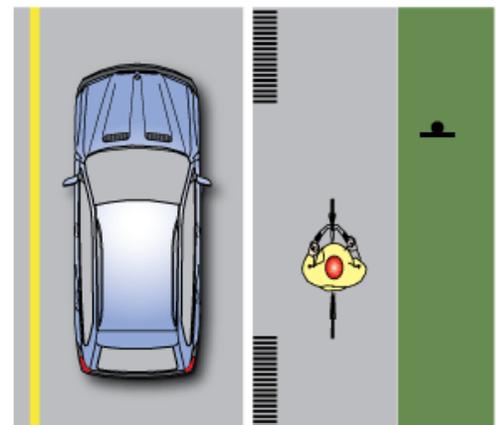


Local Street - Width Varies



12'

Varies



Shoulder Bike Route

Shoulder Width:

Shoulder width should be 4 feet wide minimum to accommodate a shoulder bike route. If a rumble strip is present (such as on a state highway) it is recommended to include a skip (or gap) in the rumble strip to allow bicyclists to cross from the shoulder to the travel lane when encountering debris. This skip pattern is recommended to be 12 feet in length with intervals of 40 or 60 feet between skips.⁴

Sign Placement:

Bicycle Route signage should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

Discussion:

Bicycle routes on rural arterials and state highways can offer a functional and less expensive option to the installation and maintenance of bicycle lanes. Major intersections should still have bicycle pockets (if applicable) and other treatments to make bicycle travel safer and more visible.

Shared Lane Markings (Sharrow)

Recommended Sharrow Placement:

Minimum of 11feet from edge of curb where on-street parking is present. If parking lane is wider than 7.5 feet the SLM should be moved further out accordingly. The width of the door zone is generally assumed to be 2.5 feet from the edge of the parking lane.

If used on a street without on-street parking that has an outside travel lane that is less than 14 feet wide, the centers of the SLM should be at least 4 feet from the face of the curb, or from the edge of the pavement where there is no curb.

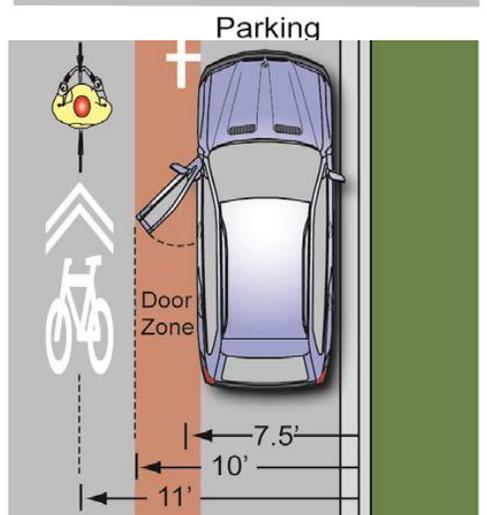
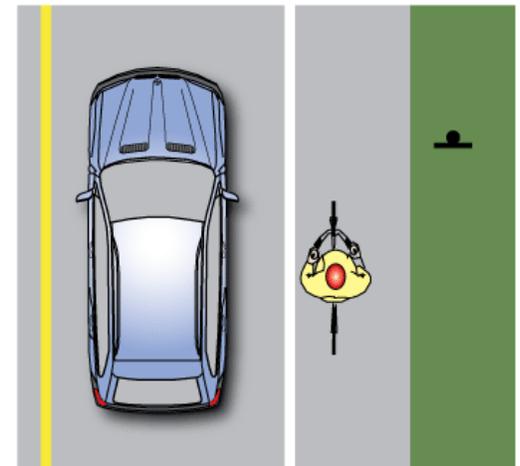
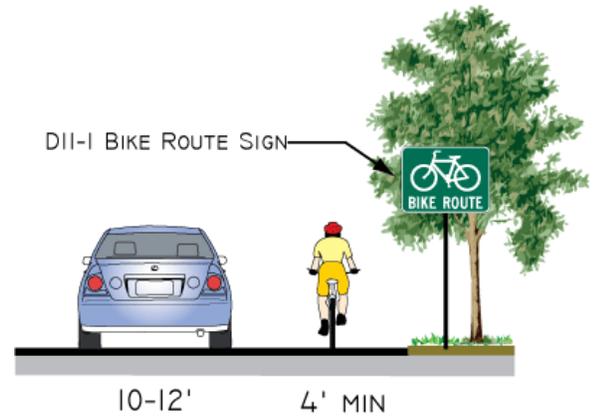
If used, the SLM should be placed immediately after an intersection and spaced at intervals not greater than 250 feet thereafter.

The SLM is not recommended on roadways with speeds above 35mph.

Discussion:

Sharrows have been introduced for use nationwide as an additional treatment for bike route facilities. The stencil can serve a number of purposes, such as making motorists aware of bicycles potentially in their lane, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent “dooring” collisions.

Though not always possible, placing the Sharrow markings outside of vehicle tire tracks will increase the life of the markings and the long-term cost of the treatment.



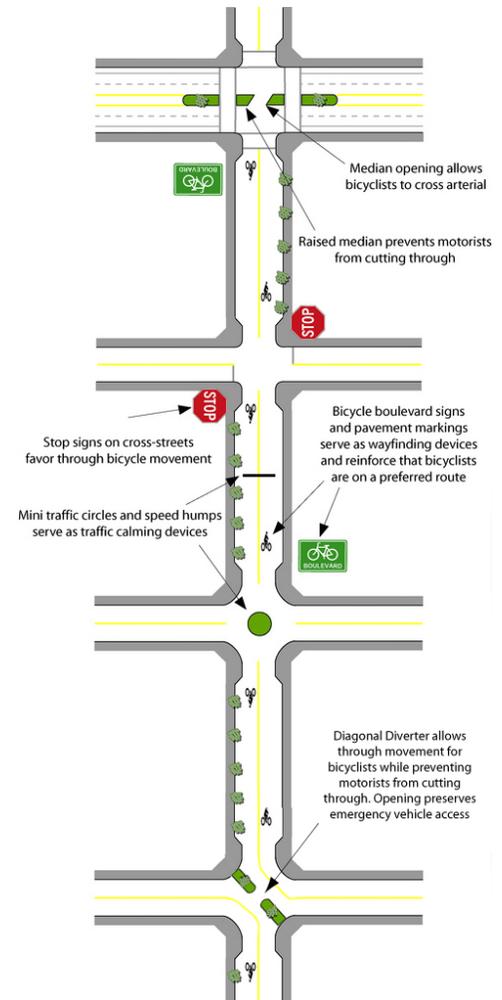
Bicycle Boulevards

Design Summary:

Bicycle Boulevards generally are installed on minor or local roadways.

Discussion:

On Bicycle Boulevards or bicycle routes it is important to provide a benefit to the bicyclist for choosing the route. Frequently this benefit is composed of reduced travel time by means of fewer stop signs, or more permeable barriers than selecting other available routes. Ideally, the bicyclist should not be making unnecessary stops. The bicycle boulevard or bicycle route should be watched closely following treatment to see if there is an increase in vehicle trips along the bicycle route as many motorists may take advantage of fewer stops thereby reducing the effectiveness of the facility for bicycles. If motor vehicle ADT increases, treatments may be considered such as diagonal diverters, one-way closures, chicanes, chokers and other applicable treatments to preserve bicycle permeability and limit through vehicle access.



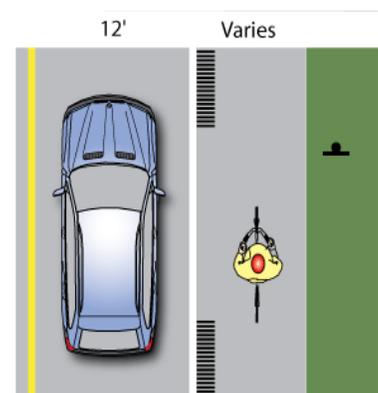
Class II Bike Lanes:

Width:

4' minimum when no gutter is present (rural road sections) and 5' minimum when adjacent to curb and gutter (3' more than the gutter pan width if the gutter pan is greater than 2'). When a rumble strip is present (such as on Santa Rosa Road) it is recommended to include a skip (or gap) in the rumble strip to allow bicyclists to cross from the shoulder to the travel lane when encountering debris. This skip pattern is recommended to be 12 feet in length with intervals of 40 or 60 feet between skips.

Recommended Width:

6' where right-of-way allows

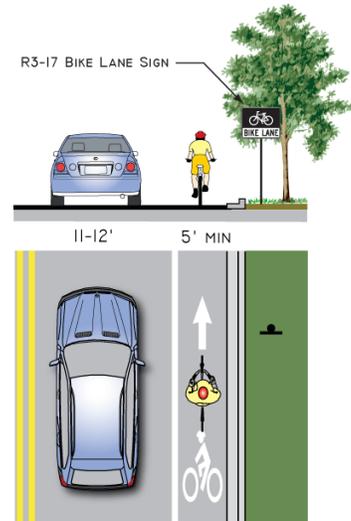


Maximum Width:

7' Adjacent to arterials with high travel speeds

Discussion:

Wider bicycle lanes are desirable in certain circumstances such as on higher speed arterials (45 mph+) where a wider bicycle lane can increase separation between passing vehicles and bicyclists. Wide bicycle lanes are also appropriate in areas with high bicycle use. A bicycle lane width of 6 to 7 feet makes it possible for bicyclists to ride side-by-side or pass each other without leaving the bicycle lane, increasing the capacity of the lane. Appropriate signing and stenciling is important with wide bicycle lanes to insure motorists do not mistake the lane for a vehicle lane or parking lane.



Striping:

Line separating vehicle lane from bike lane (typically left sideline):

6 inches

Line separating bike lane from parking lane (if applicable):

4 inches

Dashed white stripe when:

- Vehicle merging area
- Delineate conflict area in intersections (optional)

Varies

Length of conflict area

Signing:

Use R3-17 Bike Lane Sign at:

- Beginning of Bike Lane
- Far side of all intersection crossings
- At approaches and at far side of all arterial crossings
- At major changes in direction
- At intervals not to exceed ½ mile



R-317

Pavement Markings:

There are three potential variations of pavement markings for bike lanes allowed within the 2009 MUTCD. Most cities nationwide are moving to use the graphic representation of cyclist with directional arrow (pictured right), and as such this stencil is recommended here. This stencil should be used at:

- Beginning of Bike Lane
- Far side of all bike path crossings
- At approaches and at far side of all arterial crossings
- At major changes in direction
- At intervals not to exceed ½ mile
- At beginning and end of bike lane pockets at approach to intersection.



**Recommended
Bike Lane Stencil**

Road Crossings

Horse trails often cross roads or highways at grade--on the same elevation as the road. Ideally, the amount of motorized traffic in such areas is low, or the intersection has a traffic light with a push-button signal actuator that the rider can easily reach. Push-button signal actuators allow users to control the traffic light. When horse trails intersect with roads, safety is the most important factor. Road crossings must conform to legal requirements, and they require the expertise of transportation engineers. When designing trail crossings, it is wise to consult a designer familiar with the special requirements of riders and stock.

At-grade path/roadway crossings generally will fit into one of four basic categories:

Type 1: Marked/Unsignalized Unprotected crossings include trail crossings of residential, collector, and sometimes major arterial streets or railroad tracks.

Type 1+: Marked/Enhanced – Unsignalized intersections can provide additional visibility with flashing beacons and other treatments.

Type 2: Route Users to Existing Signalized Intersection - Trails that emerge near existing intersections may be routed to these locations, provided that sufficient protection is provided at the existing intersection.

Type 3: Signalized/Controlled - Trail crossings that require signals or other control measures due to traffic volumes, speeds, and trail usage.

Type 4: Grade-separated crossings - Bridges or under-crossings provide the maximum level of safety but also generally are the most expensive and have right-of-way,

Type 1: Marked/Unsignalized Crossings

A marked/unsignalized crossing (Type 1) consists of a crosswalk, signage, and often no other devices to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, path traffic, use patterns, vehicle speed, road type and width, and other safety issues such as proximity to schools. The following thresholds recommend where unsignalized crossings may be acceptable:

Maximum traffic volumes:

≤9,000-12,000 Average Daily Traffic (ADT) volumes.

Up to 15,000 ADT on two-lane roads, preferably with a median.

Up to 12,000 ADT on four-lane roads with median.



Type 1 Crossing

Maximum travel speed:

35 MPH.

Minimum line of sight:

25 MPH zone: 155 feet.

35 MPH zone: 250 feet.

45 MPH zone: 360 feet.

Discussion

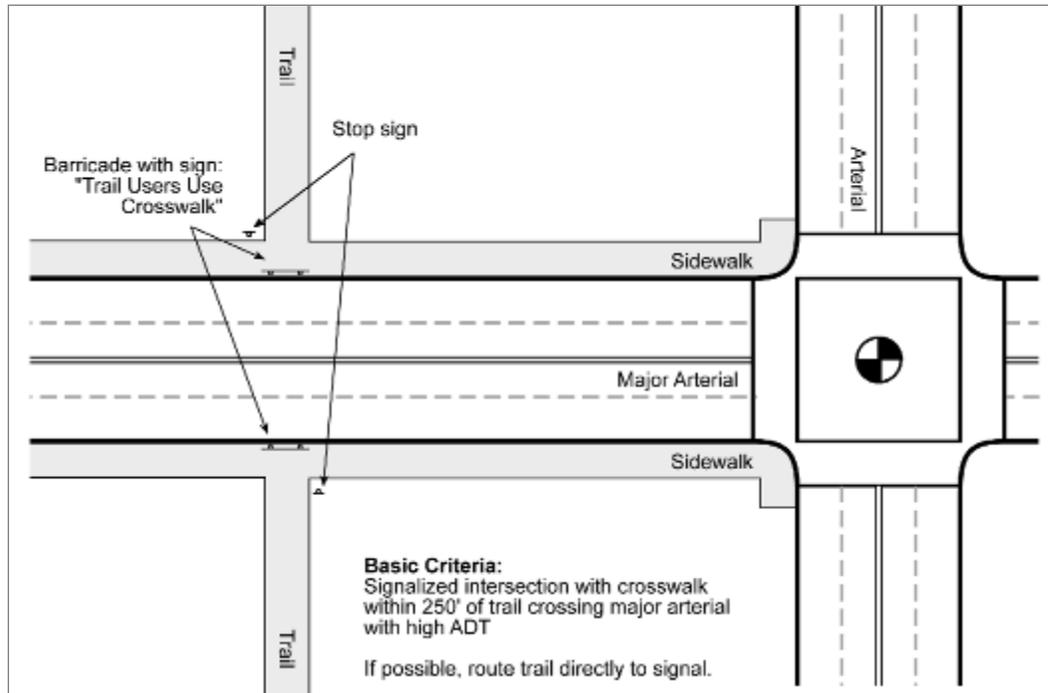
If well-designed, crossings of multi-lane higher-volume arterials over 15,000 ADT may be unsignalized with features such as a combination of some or all of the following: excellent sight distance, sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like flashing beacons or in-pavement flashers. These are referred to as “Type 1 Enhanced” (Type 1+). Such crossings would not be appropriate; however, if a significant number of schoolchildren used the path. Furthermore, both existing and potential future path usage volume should be taken into consideration.

On two-lane residential and collector roads below 15,000 ADT with average vehicle speeds of 35 MPH or less, crosswalks and warning signs (“Path Xing”) should be provided to warn motorists, and stop signs and slowing techniques (bollards/geometry) should be used on the path approach. Curves in paths that orient the path user toward oncoming traffic are helpful in slowing path users and making them aware of oncoming vehicles. Care should be taken to keep vegetation and other obstacles out of the sight line for motorists and path users. Engineering judgment should be used to determine the appropriate level of traffic control and design.

On roadways with low to moderate traffic volumes (<12,000 ADT) and a need to control traffic speeds, a raised crosswalk may be the most appropriate crossing design to improve pedestrian visibility and safety. These crosswalks are raised 3 inches above the roadway pavement (similar to speed humps) to an elevation that matches the adjacent sidewalk. The top of the crosswalk is flat and typically made of asphalt, patterned concrete, or brick pavers. Brick or unit pavers should be discouraged because of potential problems related to pedestrians, bicycles, and ADA requirements for a continuous, smooth, vibration-free surface. Detectable warning strips are needed at the sidewalk/street boundary so that visually impaired pedestrians can identify the edge of the street.

Type 2: Route Users to Existing Signalized Intersection

Crossings within 250 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection for safety purposes. For this option to be effective, barriers and signing may be needed to direct paved path users to the signalized crossings. In most cases, signal modifications would be made to add pedestrian detection and to comply with ADA.



Type 2 Crossing Treatment.

Type 3: Signalized/Controlled Crossings

New signalized crossings may be recommended for crossings that meet pedestrian, school, or modified warrants, are located more than 250 feet from an existing signalized intersection and where 85th percentile travel speeds are 40 MPH and above and/or ADT exceeds 15,000 vehicles. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

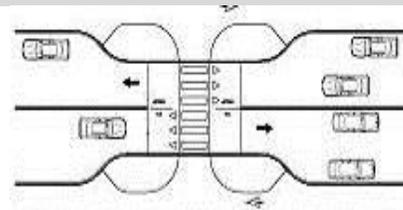


Type 3 Crossing.

Type 3: Signalized/Controlled Crossings

Mid-block Crosswalk

Mid-block crossings provide a crossing opportunity where there is no intersection. At controlled mid-block crossing locations, crosswalks are marked where there is a demand for crossing, and there are no nearby marked crosswalks. At uncontrolled crossing use FHWA report HRT-04-100 as guidance of when to mark a crosswalk. Mid-block crosswalks should always be accompanied with pavement markings and warning signs to inform drivers of the approaching crosswalk.



Mid-block crosswalk

Type 4: Grade-separated Crossings

Grade-separated crossings may be needed where existing bicycle/pedestrian crossings do not exist, where ADT exceeds 25,000 vehicles, and 85th percentile speeds exceed 45 MPH. Safety is a major concern with both overcrossings and undercrossings. In both cases, paved path users may be temporarily out of sight from public view and may have poor visibility themselves. Undercrossings, like parking garages, have the reputation of being places where crimes occur. Most crime on paved paths, however, appears to have more in common with the general crime rate of the community and the overall usage of the paved path than any specific design feature.

Design and operation measures are available which can address paved path user concerns. For example, an undercrossing can be designed to be spacious, well-lit, equipped with emergency cell phones at each end and completely visible for its entire length prior to entering. Other potential problems with undercrossings include conflicts with utilities, drainage, flood control, and maintenance requirements. Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope.



Type 4 Grade-Separated Undercrossing



Type 4 Grade-Separated Overcrossing

Crossing Locations

Where trails cross roads, the trail should be perpendicular to the road. The crossing generally should be on a straight segment of road. Locations where motorists might expect an intersection are good sites for trail crossings. Consistency in the placement and design of intersections allows all users to identify them more readily. Federal, State, or local regulations usually affect trails that intersect roads.

Appropriate tread surfaces at road crossings are critical to rider safety. Most asphalt and concrete road surfaces don't provide enough texture or traction for a horse.

Waiting Areas at Crossings

Riders generally ride in pairs or groups. When a trail group comes to a road crossing, riders may have difficulty keeping stock off the road. Solutions include trimming vegetation to provide a clear view farther from the road or providing a waiting area that allows stock to stand back from traffic until it is safe to cross. Consider expanding the width of the trail surface before it meets the road, forming a rectangular or fan-shaped waiting area.

Summary of Path/Roadway At-Grade Crossing Recommendations¹

Roadway Type	Vehicle ADT ≤ 9,000			Vehicle ADT > 9,000 to 12,000			Vehicle DT > 12,000 to 15,000			Vehicle ADT > 15,000		
	Speed Limit (mph)**											
	30	35	40	30	35	40	30	35	40	30	35	40
2 Lanes	1	1	1/1+	1	1	1/1+	1	1	1+3	1	1/1+	1+3
3 Lanes	1	1	1/1+	1	1/1+	1/1+	1/1+	1/1+	1+3	1/1+	1+3	1/3
Multi-Lane (4+) w/ raised median***	1	1	1/1+	1	1/1+	1+3	1/1+	1/1+	1+3	1+3	1+3	1+3
Multi-Lane (4+) w/o raised median	1	1/1+	1+3	1/1+	1/1+	1+3	1+3	1+3	1+3	1+3	1+3	1+3

***General Notes:** Crosswalks should not be installed at locations that could present an increased risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone **will not** make crossings safer, nor will they necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions), as needed, to improve the safety of the crossing. **These are general recommendations; good engineering judgment should be used in individual cases for deciding which treatment to use.**

For each pathway-roadway crossing, an engineering study is needed to determine the proper location. For each engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc. may be needed at other sites.

** Where the speed limit exceeds 40 mi/h marked crosswalks alone should not be used at unsignalized locations.

¹ This table is based on information contained in the U.S. Department of Transportation Federal Highway Administration Study, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations," February 2002.

*** The raised median or crossing island must be at least 4 ft (1.2 m) wide and 6 ft (1.8 m) long to adequately serve as a refuge area for pedestrians in accordance with MUTCD and AASHTO guidelines. A two-way center turn lane is not considered a median.

1= Type 1 Crossings. Ladder-style crosswalks with appropriate signage should be used.

1/1+ = With the higher volumes and speeds, enhanced treatments should be used, including marked ladder style crosswalks, median refuge, flashing beacons, and/or in-pavement flashers. Ensure there are sufficient gaps through signal timing, as well as sight distance.

1+/3 = Carefully analyze signal warrants using a combination of Warrant 4, Pedestrian Volume or 5, School Crossing (depending on school presence) and Equivalent Adult Unit (EAU) factoring (see MUTCD, Chapter 4). Make sure to project pathway usage based on future potential demand. Consider Pelican, Puffin, or Hawk signals in lieu of full signals. For those intersections not meeting warrants or where engineering judgment or cost recommends against signalization, implement Type 1 enhanced crosswalk markings with marked ladder style crosswalks, median refuge, flashing beacons, and/or in-pavement flashers. Ensure there are sufficient gaps through signal timing, as well as sight distance.

Intersection and Road Crossing Guides

Shared-use trails may intersect with roads or have segments that need to meet Federal, State, or local requirements. Many agencies adopt the standard references listed below as part of their own requirements. The references listed are updated frequently--consult the latest edition.

- *A Policy on Geometric Design of Highways and Streets* (AASHTO 2001a) can be ordered from the AASHTO online bookstore at https://bookstore.transportation.org/item_details.aspx?ID=110.
- *Guidelines for Geometric Design of Very Low-Volume Local Roads* (ADT ≤ 400) (AASHTO 2001b) can be ordered from the AASHTO online bookstore at https://bookstore.transportation.org/item_details.aspx?ID=157.
- *Roadside Design Guide* (AASHTO 2002) can be ordered from the AASHTO online bookstore at https://bookstore.transportation.org/item_details.aspx?ID=148
- *Manual on Uniform Traffic Control Devices* (FHWA 2004a) is available at <http://mutcd.fhwa.dot.gov>.
- *MUTCD Standard Highway Signs* (FHWA 2004b), a companion document to the MUTCD, is available at http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm.
- *Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclist and Pedestrians*. (2010)

Road Signs and Traffic Signals

Road signs are critical for the safety of riders and other trail users where trails cross roads. Consider standard equestrian crossing signs for all at-grade road crossings used by horses.

Bike Route Signage should be placed at regular intervals along routes with no designated bicycle facilities.

- In rural areas – every mile (Share the Road only).
- In urban areas – every ½ mile
- In downtown areas – every block.



'Share the Road' signs are intended to 'reduce motor vehicle/bicyclist conflict' and are appropriate to be placed on routes that lack paved shoulders or other bicycle facilities. They typically work best in rural situations, or when placed near activity centers such as schools, shopping centers and other destinations that attract bicycle traffic. In urban areas, many cities around the country have been experimenting with a new type of signage that encourages bicyclists to take the lane when the lane is too narrow. This type of sign is becoming known as BAUFL (Bikes Allowed Use of Full Lane). This can be quantified to lanes being less than 14 feet wide with no parking and less than 22 feet wide with adjacent parallel parking.

The 2009 update to the MUTCD recognizes the need for such signage and has designated the white and black sign at right (R4-11). The 2009 MUTCD states that Shared Lane Markings (which serve a similar function as Bikes May Use Full Lane signage) should not be placed on roadways that have a speed limit above 35 mph. Dedicated bicycle facilities are recommended for roadways with speed limits above 35 mph where the need for bicycle access exists.

Wayfinding signage acts as a "map on the street" for cyclists, pedestrians, and trail users. Signage and wayfinding is an important component for trail users. Visitors who feel comfortable and empowered will keep coming back to an area, and an effective wayfinding system is key to creating that comfort level. Wayfinding also plays an important role in trail use safety, connecting users with emergency services.

Wayfinding signs are typically placed at key locations leading to and along bicycle facilities, including where multiple routes intersect and at key bicyclist "decision points." Wayfinding signs displaying destinations, distances and "riding time" can dispel common misperceptions about time and distance while increasing users' comfort and accessibility to the bicycle network. Wayfinding signs also visually cue motorists that they are driving along a bicycle route and should correspondingly use caution. Note

that too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists and pedestrians, rather than per vehicle signage standards.



D11-1

If used, Bicycle Route Guide (D11-1) signs should be provided at decision points along designated bicycle routes, including signs to inform bicyclists of bicycle route direction changes and confirmation signs for route direction, distance, and destination. Bicycle Route Guide signs should be repeated at regular intervals so that bicyclists entering from side streets will have an opportunity to know that they are on a bicycle route.

- Similar guide signing should be used for shared roadways with intermediate signs placed for bicyclist guidance.
- Signage should be focused along major routes near key destinations.
- Signage should be oriented toward both commuter and recreational cyclists.

Push-Button Signal Actuators

Most push-button signal actuators are installed too low for equestrian riders to reach without dismounting. To solve the problem, install a second push button for equestrians. Most seated riders can operate a push button that is between 5 and 6 feet above the ground (see photo). Set the post far enough back from the road to keep stock out of the traffic lane.

Bicycle push buttons can also provide signal actuation and timing adjustments for bicyclists. Push buttons are recommended for use with shared-use paths or other unique interactions with bicycle facilities. Push buttons are generally unsuitable for conventional bike lane situations as the bicyclist would have to leave the roadway to activate the signal. An acceptable situation exists where a push button can be located closer to the bike lane if no vehicle right turn lane is present so that the bicyclist does not have to dismount to reach the signal.



R10-4



R10-24

Road Intersections

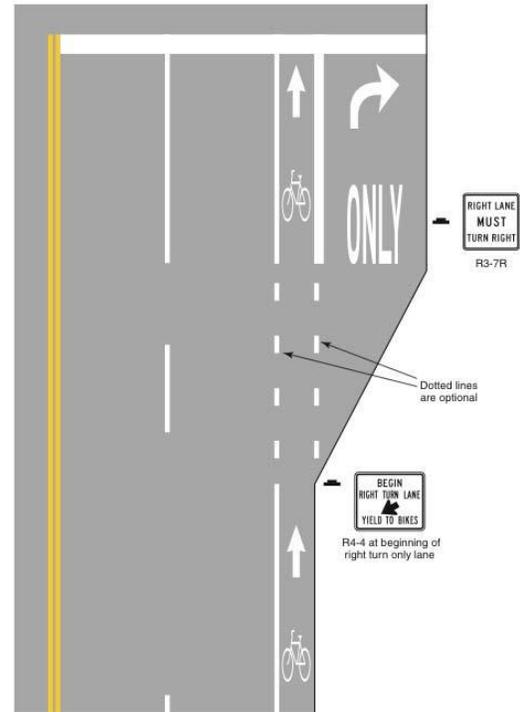
Bike Lane at Intersection with Right Turn Only Lane

Discussion:

A bicyclist continuing straight through an intersection from the right of a right turn lane would be inconsistent with normal traffic behavior and would violate the expectations of righthturning motorists. Specific signage, pavement markings and striping are recommended to improve safety for bicyclists and motorists.

The appropriate treatment for right-turn only lanes is to place a bike lane pocket between the right-turn lane and the rightmost through lane or, where right-of-way is insufficient, to drop the bike lane entirely approaching the right-turn lane. The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the merge area.

- Dropping the bike lane is not recommended, and should only be done when a bike lane pocket cannot be accommodated.
- Travel lane reductions may be required to achieve this design.



Some communities have experimented with colored bicycle lanes through the weaving zone.

Where the right turn only lane is separated with a raised island, the island should be designed to allow adequate width to stripe the bike lane up to the intersection.

Design Summary:

Bike Lane Placement

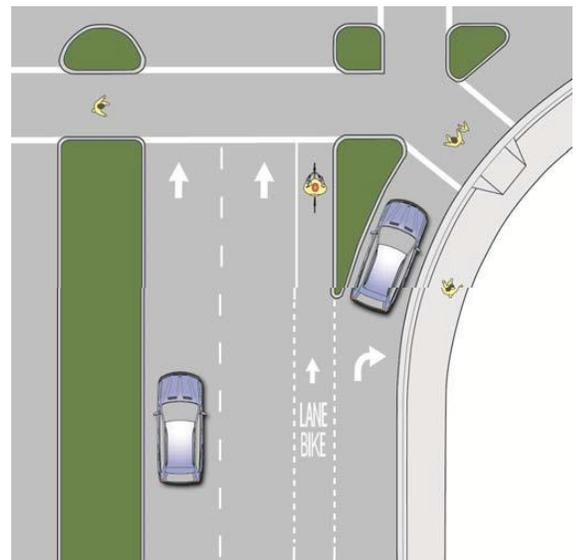
A through bicycle lane shall not be positioned to the right of a right turn only lane.

Bike Lane Width

Bike Lane through merge area should be 4 feet minimum in width; 5 feet is recommended.

Bike Lane Striping

When the right through lane is dropped to become a right turn only lane, the bicycle lane markings should stop at least 100 feet before the beginning of the right turn lane. Through



bicycle lane markings should resume to the left of the right turn only lane (MUTCD).

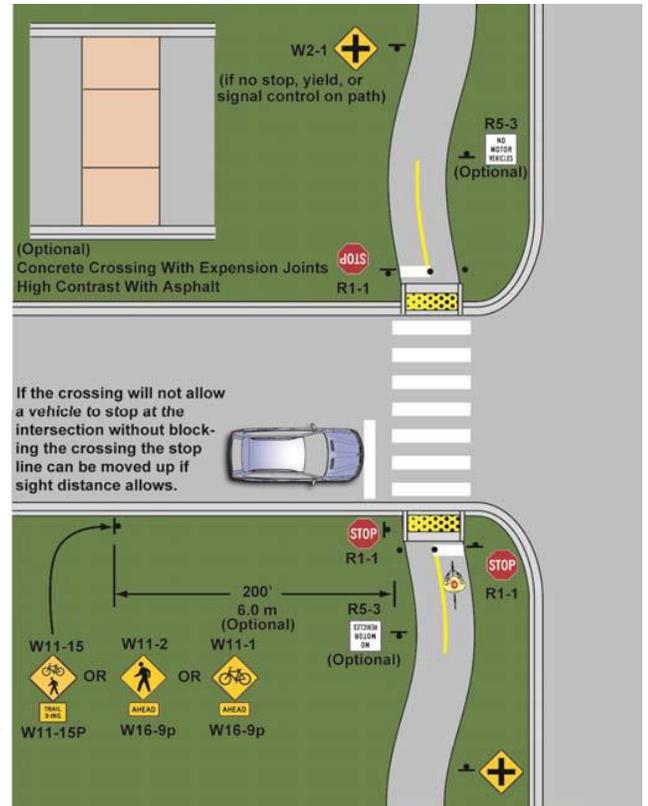
Where motorist right turns are permitted, the solid bike lane shall either be dropped entirely, or dashed beginning at a point between 100 and 200 feet in advance of the intersection. A dashed line across the right-turn-only lane should not be used on extremely long lanes, or where there are double right-turn-only lanes. For these types of intersections, all striping should be dropped to permit judgment by the bicyclists to prevail.

Pavement Markings

If used, the bicycle lane symbol marking shall be placed immediately after an intersection and at other locations as needed (MUTCD).

Signage

If the BIKE LANE or symbol pavement markings are used, bicycle lane signs (R3-17) shall also be used, but the signs need not be adjacent to every symbol to avoid overuse of the signs (MUTCD). Where motor vehicles entering an exclusive right-turn lane must weave across bicycle traffic in bicycle lanes, the BEGIN RIGHT TURN LANE YIELD TO BIKES (R4-4) sign may be used to inform both the motorist and the bicyclist of this weaving maneuver (MUTCD). A Bicycle Crossing (W11-1) sign may be used to warn motorists of the potential for bicyclists crossing their path.



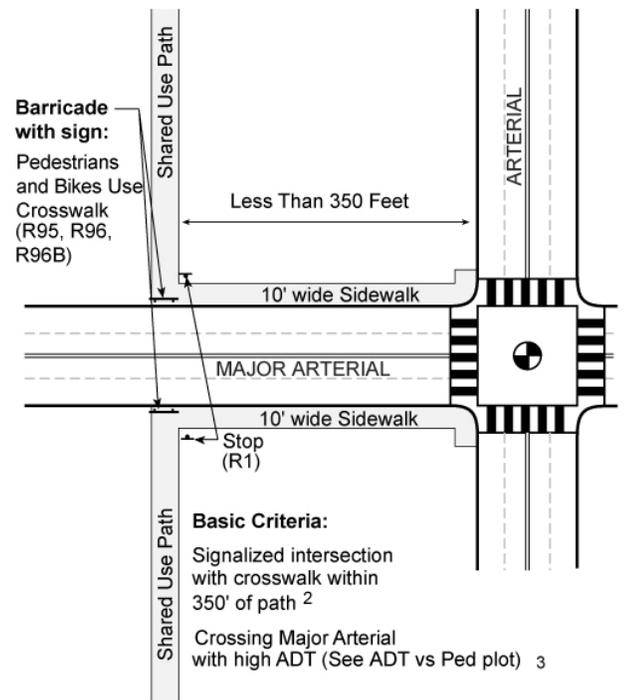
Shared Use Path Crossing at Intersection

Discussion

The evaluation of a roadway crossing involves analysis of vehicular traffic and trail user travel patterns, including speeds, street width, traffic volumes (average daily traffic, peak hour traffic), line of sight, and trail user profile (age distribution and destinations).

When engineering judgment determines that the visibility of the intersection is limited on the shared-use path approach, Intersection Warning signs should be used.

A path should cross at a signalized intersection if there is a signalized intersection within 350 feet of the path and the crossroad is crossing a major arterial with a high ADT.



Sources:

1. California MUTCD, 2007
2. Institute of Transportation Engineers, Transportation and Land Development, 1988
3. Investigation of Exposure Based Accident Areas: Crosswalks, Local Street, and Arterials, Knoblauch, 1987

Experimental Treatment

A Toucan crossing (derived from: “two can cross”) is used in higher traffic areas where pedestrians and bicyclists are crossing together.

Design Summary

Warrants

Section 4C.05 in the MUTCD describes pedestrian volume minimum requirements (referred to as warrants) for a midblock pedestrian-actuated signal.

Pavement Markings

Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication

Pedestrian Facility Design

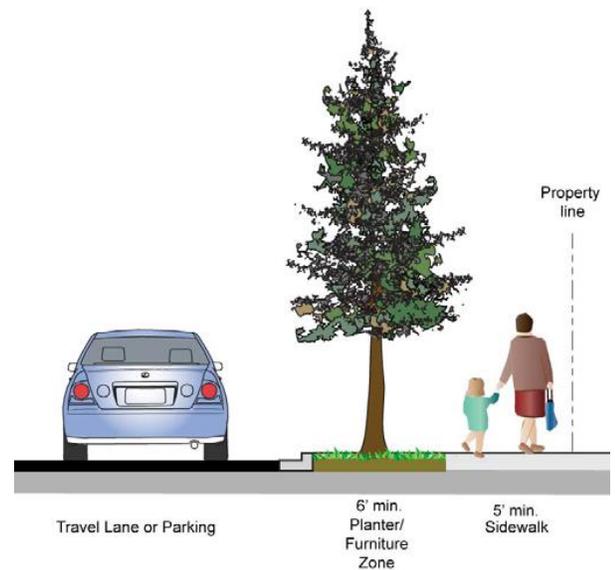
Discussion

Medium to high-density pedestrian zones located in areas with commercial or retail activity provide excellent opportunities to develop an inviting pedestrian environment. The frontage zone in retail and commercial areas may include seating for cafés and restaurants or extensions of retail establishments. The furnishings zone may include seating, transit shelters, newspaper racks, water fountains, utility boxes, lampposts, street trees and other landscaping. The medium to high-density pedestrian zone should provide an interesting and inviting environment for walking and window shopping.

Design Summary

Width Considerations

Walkway width recommendations in current transportation industry guidelines generally exceed the 36-inch minimum needed for accessible travel under the Americans with Disabilities Act. The Institute of Transportation Engineers (ITE), in its 1998 recommended practice publication, “Design and Safety of Pedestrian Facilities,” recommends planning sidewalks that are a minimum of 5 feet wide with a planting strip of 2 feet on local streets and in residential and commercial areas.



Minimum Sidewalk on Arterial/Major Collector

Pedestrian Intersection Design

Intersections designed for pedestrian activity are a critical element of the pedestrian network. Utah law states that the operator of a motor vehicle shall yield the right-of-way by slowing down or stopping if necessary to a pedestrian crossing the roadway within a crosswalk. Crosswalks may be striped—a marked crosswalk—or they may be unstriped—an unmarked crosswalk. Pedestrians are legally allowed to cross at a crosswalk, whether it is unmarked or marked, as long as there are no signs prohibiting crossing.

A well designed intersection with pedestrian elements can reduce potential conflicts between the many users of the intersection. There are several methods used to enhance pedestrian crossings. This section provides intersection design guidelines built upon existing Orem practices, local and national best practices, and state and federal regulations. All designs should conform to the Manual on Uniform Traffic Control Devices (MUTCD), as appropriate.

Recommended pedestrian intersection designs outlined on the following pages include:

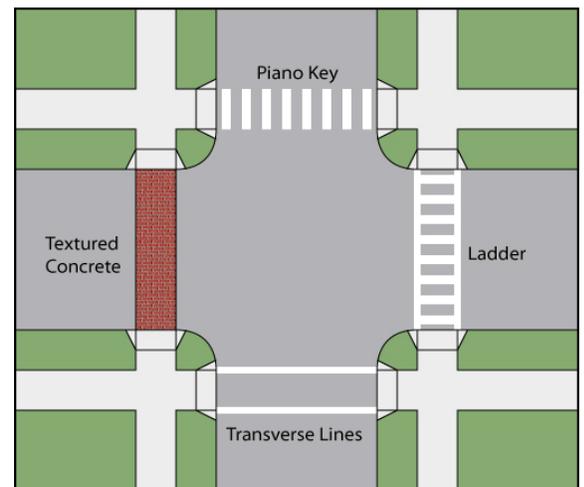
- Crosswalk design
- Crosswalk placement
- Mid-block and uncontrolled crossings
- Signage
- Signalized pedestrian crossings

Pedestrian Crosswalk Design

Discussion

Crosswalks should be used:

- At signalized intersections, all crosswalks should be marked.
- At unsignalized intersections, crosswalks should be marked when they
 - help orient pedestrians in finding their way across a complex intersection, or
 - help show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts, or
 - help position pedestrians where they can best be seen by oncoming traffic.
- At mid-block locations, crosswalks are marked where
 - there is a demand for crossing, and
 - there are no nearby marked crosswalks



In certain circumstances, it may be desirable to prohibit pedestrian crossings across one or more legs of a signalized intersection. Prohibiting pedestrian crossings may be justifiable for safety if there are large volumes (typically multilane) of conflicting vehicle right or left turns. Such treatments should only be implemented if absolutely necessary, as pedestrian out-of-direction travel can be time consuming and

perhaps discourage walking.

Design Summary

Ladder or piano key crosswalk markings are recommended for most crosswalks in the Santa Rosa Valley region, including school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and where the crosswalk crosses a street not controlled by signals or stop signs.

- A piano key pavement marking consists of two foot wide bars spaced 2 ft apart and should be located such that the wheels of vehicles pass between the white stripes. School Zone crosswalks may have yellow bars alternating with white ones.
- A ladder pavement marking consists of two foot wide bars spaced 2 feet apart and located between one foot wide parallel stripes that are 10 ft apart.
- Transverse lines consist of one foot wide bars spaces not less than 6 ft apart.

Crosswalk markings should be located to align with the through pedestrian zone of the sidewalk. Marked crosswalks indicate to pedestrians the appropriate route across traffic, facilitate crossing by the visually impaired, and remind turning drivers of potential conflicts with pedestrians.

Mid-Block Crosswalks

Discussion

Designated midblock crossings can help supplement the crossing needs within an area; particularly where intersections are placed relatively far apart or where substantial pedestrian generators are located between intersections. Designated midblock crossings should not be installed where sight distances or sight lines are limited for the motorist or pedestrian.

Design Summary

Warning Signs

The 2009 MUTCD Update requires yield lines and “Yield Here to Pedestrians” signs at all uncontrolled crossings of a multi-lane roadway.



R1-5



R1-5a

Guidelines for Signage

Discussion

The color of all pedestrian crossing signs should be "Fluorescent Yellow-Green" (FYG) (see photo below) per the MUTCD. The National MUTCD requires school area signs to be FYG, while CAMUTCD allows this as an option. Both manuals allow FYG as an option for all other bicycle, pedestrian or trail warning signage.

Warning signage should be placed on existing signposts if possible to reduce visual clutter.

Design Summary

- Pedestrian warning signage should accompany all pedestrian crossings. Pedestrian warning signage may be placed on existing signposts (if appropriate) to reduce visual clutter.
- If yield lines are used in advance of an unsignalized marked midblock crosswalk, Yield Here To Pedestrians (R1-5 or R1-5a) signs shall be placed 20 to 50 feet in advance of the nearest crosswalk.
- The In-Street Pedestrian Crossing (R1-6) sign should be used to remind users of laws regarding the right of way at an unsignalized pedestrian crossing (CA and NV). These paddles are installed at the center stripe of the roadway on the leading edge of the crosswalk. Approaching motorists are warned to yield to crossing pedestrians.
- The W11-2 supplemented with the W16-7 should be used to alert road users of pedestrians at crossings.
- The S1-1 sign supplemented with W16-7b and W66B should be used at crossing adjacent to schools.



Guidelines for Signalized Pedestrian Crossing

Discussion

At locations where pedestrian crossings are infrequent and pedestrian signal phasing is not warranted on a full-time basis, the use of pedestrian-actuated signals (i.e., push button detectors) may be justified.

Signal Operation Types

The two general types of signal operation are pre-timed and traffic-actuated. Traffic-actuated operation can be further classified as full traffic-actuated or semi-traffic-actuated. With full-traffic actuated operation, all traffic movements or phases are provided with detectors. In semi-traffic-actuated operation, certain phases (usually the coordinated phases) do not have detectors (2009 MUTCD 4D.01).

When pedestrian actuation is used, pedestrian pushbutton detectors should be capable of easy activation and conveniently located near each end of the crosswalks. At locations with pre-timed traffic control signals or non-actuated approaches, pedestrian pushbuttons may be used to activate accessible pedestrian signals (2009 MUTCD Section 4E.08 Pedestrian Detectors).

Research indicates there are no significant differences in crash rates for traffic signals with no pedestrian signals and those with concurrent pedestrian signal phasing. Therefore, the installation of standard-time pedestrian signals should not necessarily be expected to improve pedestrian safety at signalized intersections. At intersections with fewer than 1,200 pedestrians per day, research shows that there is no significant difference in pedestrian crashes between exclusive pedestrian signal phasing, concurrent pedestrian phasing and no pedestrian signals.

Special Pedestrian Phases

Special pedestrian phases can also be used to provide more crossing time for pedestrians at certain intersections.

- Leading Pedestrian Interval (LPI) – At intersections where there are conflicts between turning vehicles and pedestrians, pedestrians are given a “walk” designation a few seconds before the associated green phase for the intersection begins.
- Protected Left Turns – Intersections with protected vehicle left turns reduce potential of conflict.

ADA Compliance

General guidelines have been created in response to the American with Disabilities Act (ADA) for accessible trails. A summary of those guidelines include:

Travel ways shall be a minimum clear tread width of 3 feet.

- Tread obstacles should be no more than 2 inches high (maximum and up to 3 inches high where running and cross slopes are 5% or less).
- Cross slope should not exceed 5%.
- Passing space should be provided at least every 100 feet when the trail width is less than 5 feet.
- Signs shall be provided indicating the length of the accessible trail segment.
- Slopes typically should not exceed 5%. However certain conditions may require the use of steeper slopes, with no more than 30% of the total trail length exceeding a running slope of 8.33%. For those conditions exceeding a 5% slope, the recommendations are as follows:
 - Up to an 8.33% slope for 200 feet (maximum) run may be used, however, landings or resting intervals must be provided at minimum of 200 feet.
 - Up to a 10% slope for a 30 feet maximum run, with resting intervals spaced at 30 feet minimum.
 - Up to 12.5 % slope for 10 feet maximum run, with resting intervals spaced at 10 feet minimum.

The trail surface shall be firm and stable. The Forest Service Accessibility Guidelines defines a firm surface as a trail surface that is not noticeably distorted or compressed by the passage of a device that simulates a person who uses a wheelchair. Where rights-of-way are available, paths can be made more accessible by creating side paths that meander away from a roadway that exceeds a 5% slope.

At roadway crossings and curbs, curb ramps shall be provided. It is also a best management practice to provide tactile warning strips at roadway crossing of high visual contrast to the surrounding surface. Auditory crossing signals help those with site impairments safely negotiate roadway crossings.