REGIONAL PARK TRAIL GUIDELINES

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The OVRP Trail Guidelines establishes guidelines for development of a multi-use trail system from the San Diego Bay, along the Otay River and around the perimeter of Otay Lake Reservoirs that will:

- provide connections to existing and proposed park and recreation facilities,
- create links to adjacent trail systems, and
- avoid adverse effects on environmentally and culturally sensitive areas.

Trail Plan

This document sets criteria for alignment of a future trail system on both sides of the Otay River that will be comprised of three components:

- a regional trail corridor that provides a looping trail system through the Otay River Valley and around the Reservoirs,
- connector trails that provide access to recreational areas, overlooks, and adjacent trail systems, and
- narrow spur trails that provide access from the regional trail corridor to points of natural, historic or cultural interest.

Trail Guidelines

This document also contains guidelines to aide in selection of the trail route and implementation of the trail system. Guidelines fall into four categories:

1. *Trail alignment guidelines* reflect the goal of the Concept Plan - to develop a continuous trail that highlights a wide variety of recreational and interpretive experiences.

2. *Financial guidelines* are designed to minimize financial impacts to the public.

3. *Development guidelines* underscore the importance of creating a trail which is accessible to the widest possible range of trail users and which is designed to respect the natural or cultural environments through which it passes. Guidelines for environmental and cultural resources are compatible with Federal, State and local environmental regulations.

4. *Management guidelines* define a structure for successful oversight and maintenance of the trail system.

Section I: Introduction

As shown in Figure 1, below, the Otay Valley Regional Park (OVRP) is located in the southern portion of San Diego County, four miles north of the United States/Mexico International Border. It is a 13 mile linear park with more than 8,000 acres. The Park crosses three jurisdictions: City of San Diego, City of Chula Vista and the County of San Diego. It encompasses the core of Otay River Valley from South San Diego Bay to the Otay Lake Reservoirs. It is under private, semi-private and public land ownership. Existing land uses within the Valley include agriculture, surface mining and recreation. Surrounding the OVRP is an urbanized area with a variety of residential, commercial, and industrial land uses. The OVRP provides significant open space and recreational opportunities for citizens of the region.

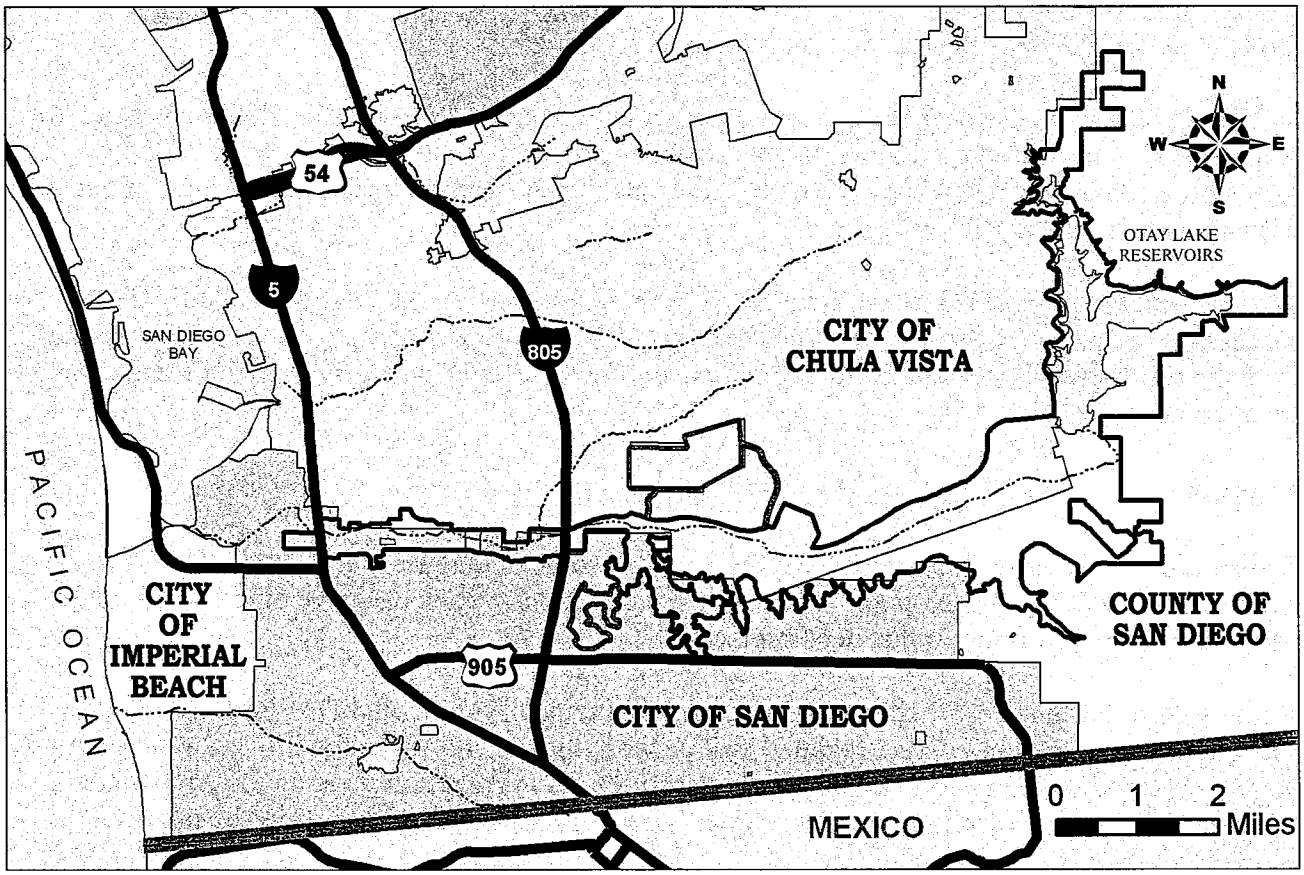

Figure 1: Location Map

Planning Background

Like the other river parks of the region, the Otay Valley area has experienced an increase in development. This has resulted in reduction of open space and destruction of natural and cultural resources. To protect and preserve the Otay River Valley, a multi-jurisdictional planning effort was formed between the City of Chula Vista, the City of San Diego and the County of San Diego. A Joint Exercise of Powers Agreement (JEPA) was implemented to plan and acquire property for the Regional Park.

The JEPA recognizes a three-member policy committee (PC), consisting of one elected official from each participating jurisdiction. To advise the PC on matters related to planning, the JEPA established a thirty-member Citizens Advisory Committee (CAC) comprised of ten individuals from each jurisdiction representing community organizations, property owners, and special interest groups. In order to coordinate and implement this planning effort, staff members from each jurisdiction were appointed to a Joint Staff team.

In 2001 the OVRP Concept Plan[1] was approved by the three jurisdictions. The Plan identified three major goals: 1) protect sensitive cultural and natural resources; 2) provide a mix of active and passive recreational opportunities, including trails, and; 3) provide opportunities for environmental education and/or interpretive programs.

The focus of this proposal is on the development of the trail system in the Regional Park. The success of this system depends on continued support from the participating jurisdictions as well as from the residents, who understand the importance of experiencing nature through trails and open space preservation.

Purpose

Trails offer a wide variety of outdoor experiences for people of all ages and abilities. Trails improve quality of life and increase property value. If designed properly trails can have minimal impact on natural and cultural resources that need protection.

A trail system for the OVRP will not only be a self-contained system within the Regional Park but will be an integral part of a larger regional trail network that extends from the Silver Strand through the Otay Valley, ultimately connecting to the California Riding and Hiking at its eastern boundary. Other existing or proposed trail systems, which are connected to and/or influenced by the OVRP, include the Chula Vista Greenbelt, Sweetwater River Park, Jamul/ Dulzura Trail system, Eastlake Community Trails, and the Otay Ranch Neighborhood Trails.

This document will provide guidelines for development, management and maintenance of the OVRP trail system. It strives to meet trail goals and objectives as established by surrounding communities. These design guidelines are consistent with other planning efforts to provide recreational opportunities while protecting the natural and cultural elements within the park. A list of related planning efforts can be found in Appendix 6.

[1] See Appendix 2 for the Concept Plan.

This document divides the park into five segments[2] in order to clearly illustrate the geographic and demographic complexities within and around the park. The five segments are:

- South San Diego Bay to Interstate 5,
- Interstate 5 to Interstate 805,
- Interstate 805 to Heritage Road,
- Heritage Road to Lower Otay Lake Reservoir, and
- Otay Lake Reservoirs Vicinity.

The trail system should be aligned and constructed in phases as circumstances permit using the following objectives:

1. Provide a system of safe "non-motorized" trails that meets the needs of hikers, bicyclists, and equestrians.

2. Provide connections with important sites, such as parks, transit facilities, access points, adjacent trail systems, and points of interest.

3. Encourage trail routes that highlight the Otay River Valley's recreational and educational resources, including natural, scenic, cultural, and historic resources without compromising sensitive resources.

[2] See Figure 2.

Section II: Background Information

Existing Conditions

Existing conditions in the OVRP that may influence trail planning, design, implementation and/or management issues are identified in this section.

Topography

Near the river/bay interface in the western portion of the Park several salt ponds and fresh water ponds have been carved out of the South San Diego Bay and Otay River floodplain for commercial purposes. This area is mainly flat with slopes of less than ten percent. The land climbs gently to the east. To the north are gentle low slopes. To the south are steeper, higher slopes, with some being greater than 25 percent. Thirteen miles to the east and north, the topography reaches an elevation of 600 feet.

Hydrology

The river flows east to west from the Lower Otay Lake Reservoir to South San Diego Bay and was once a perennial stream. Because of the diversion of water within the watershed due to the construction of Savage Dam, it now flows only intermittently during and immediately after rains. However, significant flows have occurred as a result of spills from the Lower Otay Lake Reservoir during heavy rains. Consequently, the overall flow regime is one of little or no flow over long periods, interrupted by larger episodic flows.

Damming, development and in-stream surface mining have created conditions that result in erosion and the movement of sediment along the river.

Biological Resources

Several vegetation communities exist within the OVRP and serve as habitats for a variety of birds, mammals, reptiles and amphibians, including sensitive, rare and endangered species. However, the quality and integrity of biological resources in the valley have been fragmented and disturbed by a variety of human activities, that includes salt mining, sand and gravel extraction, agriculture, surrounding urban development and damming of the river.

Cultural Resources

People have occupied the Otay River Valley and Otay Mesa during for the last 9,000 years. Over 280 cultural resource sites have been identified including prehistoric and historic archaeological sites. Two large prehistoric village complexes provide important information about prehistoric and historic use of the Otay River Valley. The sites also include evidence of the arrival of non-indigenous people in the Valley, beginning with the Spanish missionaries in the late 1700s and continuing until the present day.

Land Use

There are numerous commercial, private recreational, and agricultural operations inside the Park. Therefore, implementing the Design Guidelines will partially depend on working with or around current land uses. Planning will also be influenced to a lesser extent, by commercial, industrial and residential users adjacent to the park but outside its boundaries.

Lands west of Heritage Road have been generally put to more urban uses while east of Heritage Road they retain a more rural, agricultural flavor. In the western region uses include two asphalt and concrete batch plants, plant nurseries, and private recreational facilities such as the Palms Golf Center, Fun Farm Go Karts and Arcade, Knotts Soak City U.S.A. Water Park, and Coors Amphitheater. In addition, ponds and a significant amount of debris remain from past sand and gravel extraction operations.

In the eastern region of the Park uses include Rock Mountain Quarry, recreation boat launches on Lower Otay Lake Reservoir, an airpark and the R.J. Donovan and George Bailey Correctional Facilities.

Opportunities and Constraints

The first phase of this process included a detailed analysis of opportunities and constraints within the OVRP. Opportunities provide direction for planners and influence choice of locations for Park facilities and features such as trails, interpretive centers, viewpoints/overlooks, and recreation areas. Natural, cultural and other trail-related data was collected, converted to an electronic format and analyzed utilizing Geographic Information System (GIS) software. Then, all opportunities and constraints were ranked, combined and displayed in two final exhibits, an Opportunity Exhibit (Appendix 3) and a Constraints Exhibit (Appendix 4). These two exhibits directly influenced trail planning methodology, design and alignment. The collected data served as the platform for developing the trail system. As an example, the cultural, historical and archaeological significance of the Park combined with its rich wildlife and vegetation communities supply excellent opportunities for education and interpretation, but can also present a constraint when required preservation of these resources may limit access to them.

Existing land uses on private property can be a constraint. Future trail locations through private property may require cooperation and coordination with the landowners, agreements to use existing utility easements, purchasing land or negotiating new easements.

Physical elements within the OVRP can influence trail planning and alignments. For example, hydrological considerations could impact poorly located trails during flood conditions. Different soil types are subject to erosion. Slope can be an important constraint, especially in areas with highly erosive soils and trail guideline limitations.

Section III: Trail Plan

Phasing Plan

This Trails Plan was developed as a team effort with a large emphasis on community input. Because of the Park's long linear configuration, past planning efforts, and land ownership issues, this document describes the OVRP in five segments. Dividing the OVRP into segments allows for focused studies and planning efforts that can address the various issues within each segment. Trail segments will be aligned and constructed for each segment as sufficient land is acquired for public use. Figure 2[1] shows the locations of the five segments, from west to east. They are:

- South San Diego Bay to Interstate 5,
- Interstate 5 to Interstate 805,
- Interstate 805 to Heritage Road,
- Heritage Road to Lower Otay Lake Reservoir, and
- Otay Lake Reservoirs Vicinity.

Due to land ownership in other areas of the Park, only the segment from Interstate 5 to Interstate 805 has been aligned. Because a majority of the land between I-5 and I-805 is publicly owned this is the only segment that has had a trails alignment prepared as part of this process. The phasing of the other four segments has no specific timeline, since the availability of public lands for purchase or easement access varies with the consent of landowners.

The proposed phasing plan may be fine tuned based on future circumstances. The completion of the trails system will only be possible through a partnership between property owners, developers and the Joint Staff. The following guidelines for trail alignment will help to ensure this partnership:

1. During the planning process, coordinate with landowners affected by trail alignments. Policies and trail design measures shall be utilized that protect the landowner by providing privacy, security, and indemnity agreements.
2. Secure trail routes across private lands through purchase, easements, and dedication, or by other means from willing property owners and sellers.
3. Seek to provide indemnity to persons granting trail easements and landowners adjacent to trails in order to encourage voluntary dedications and landowner support for efforts to implement trails.
4. Discourage non-consenting public use of private trail systems through restricting connections, staging area locations, and trail map publications.
5. When appropriate, encourage private developers to incorporate trail routes within their development.

[1] Map legend items are defined in the Glossary in Appendix 1.

Trail Plan Segments

South San Diego Bay To Interstate 5

This most western segment of the OVRP includes a special study area, a major regional trail connection to the Bay Shore Bikeway, a habitat connection to the South San Diego Bay Unit of the San Diego National Wildlife Refuge (SSDB Unit), a proposed recreational area, various viewpoints and interpretive opportunities.

Figure 2 identifies a regional trail linkage that would pass under Interstate 5 and connect to an existing bicycle trail that bisects the SSDB Unit and will ultimately provide a connection to the Bayshore Bikeway.

Figure 2 also shows a Recreation Area[2], which will be developed by the City of San Diego. The U.S. Fish and Wildlife Service is currently preparing a comprehensive Conservation Plan for the SSDB Unit that will include discussions of the process for developing trail linkage within this National Wildlife Refuge. Detailed trail planning, design and implementation within this segment will require coordination and approval from the Service if the trail is to be aligned through the SSDB Unit.

Interstate 5 To Interstate 805

Most of this Park segment is publicly owned. For this reason, it was the logical place to begin the first phase of the trail planning process, including trail design, alignment, and implementation. With the help of the Citizen's Advisory Committee, the trails system has been identified and mapped for this segment (see figure 3).

This segment of the OVRP is surrounded by urban development, and includes about 400 acres of publicly owned land. A variety of terrain, native and disturbed habitat, sensitive species, wetlands, ponds, habitat monitoring sites, mitigation sites, vegetation enhancement/restoration sites and unauthorized trails are present in this area. Utility easements with access roads traverse both public and private lands.

Interstate 805 To Heritage Road

This segment of the OVRP is severely constrained by residential development to the south and business/commercial development and public improvements such as the widening of Otay Valley Road to the north. The natural streambed has been impacted by sand and gravel extraction from upstream gravel operations. Two Recreation Areas are proposed in this segment as well as an alternative boundary, which includes most of Dennery Canyon.

A trail corridor running along both sides of the river that includes a trail through Dennery Canyon to connect to a possible trail extending south.

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[2] See Appendix 1 for a definition of "Recreation Area".

Heritage Road to Lower Otay Lake Reservoir

Much of this segment falls within the planned Otay Ranch Preserve. As part of the Otay Ranch development, a Resource Management Plan that identifies Preserve Owner Management will be implemented to protect and restore the vast open space located in this segment. The eastern half of this segment is located within the approved acquisition boundary of the San Diego National Wildlife Refuge (NWR).[3]

A special study area within the segment is Rock Mountain, a quarry operation. Rock Mountain is expected to continue as a working quarry for the next 50 years. Once completed, the quarry site will be considered for possible inclusion in the OVRP.

The Concept Plan proposes trail corridors on both sides of the river and will continue offsite, connecting to Bureau of Land Management (BLM) property and to proposed regional trails adjacent to Salt Creek Canyon. Trails will connect with an interpretive center along with approximately 400 acres of recreation.

Otay Lake Reservoirs

This segment of the OVRP contains both the Upper and Lower Otay Lake Reservoirs, and offers numerous recreational opportunities. It includes public and commercial recreational facilities, such as the Otay Lakes County Regional Park, a developed recreational facility; the City of San Diego's public boat launch and picnic area; Arco Olympic Training Center's boat launch; picnic/fishing around the Harvey Arm of Lower Otay Lake Reservoir; and land leased by the City of San Diego to a private operation for gliders, ultra-light aircraft and parachutists. Most of this segment has been designated as Open Space/Preserve Area and is included within the acquisition boundary of the San Diego NWR. Trail corridors are proposed around the lakes and continue off site to BLM trails and other regional trails.

Phase I Trail Alignment: Interstate 5 to Interstate 805

As the first phase in the trail alignment process, this segment serves as a model for later phases. During this planning effort the Citizen's Advisory Committee Trails Subcommittee played a strategic part as members of the planning team. This dedicated "hands-on" group of volunteers was responsible for in-field data gathering, initial trail alignment proposals, final trail alignment verification, and gathering feedback related to trails from other local community members and special interest groups. Their role will continue as subsequent phases of the Plan are completed.

The CAC identified the locations of Type A Trails (see section IV for a detailed description of trail types). Type A trails will be used to form the regional trail corridor, which is the backbone of the trails system. In later phases, Type B and C trails will be constructed to form a network of connector and spur trails that connect with the regional trail and provide access to points of interest within the

[3] No properties have been acquired in this area for inclusion in the NWR to date. Should properties be acquired by San Diego NWR, existing trails, and any future routes, will be managed in accordance with NWR policies as detailed in the forthcoming San Diego NWR trails management plan.

Park. Figure 4 is an example of what the trail system might look like after the alignment of several trail types (Type A, B, and C) as well as defining a regional staging area. This is an example only, and is intended to provide insight concerning future planning efforts that are required to fully develop a trail system within this section of the OVRP.

Several trail alignment guidelines were used to identify trails within this segment. These guidelines will also be used for future phases:

1. Consider long-range regional trail "connectivity" from west to east on both sides of the Otay River as the principal planning element of the OVRP trail system.
2. One continuous (Type A) regional trail corridor shall be aligned and implemented on public lands, which may cross the Otay River. Where possible, the Type A Trails should be aligned on both sides of the river.
3. Utilize areas designated for vegetation removal as high priority for future trail locations.
4. Identify, dedicate, and improve trails and pathways where the OVRP Trail system coincides with the required land dedication or improvements from a proposed development.
5. Minimizing significant impacts to natural and cultural resources by prioritizing trail segments that avoid sensitive environmental resources, which have not been designated or identified for recreational, educational or interpretational opportunities.
7. Utilize temporary alignments where necessary.

Financial Impact

The following list may serve as a guide for approximating trail construction costs derived from 2003 dollars. These are probable costs only and may vary due to material selection and availability, on-site conditions, accessibility, labor source, use of mechanical equipment and economic inflation.

Facility	**Probable Cost**
New 8' Wide Trail	$26 l.f.
Improved 8' Wide Trails	$14 l.f.
New 4' Wide Trail	$12 l.f.
Improved 4' Wide Trails	$7 l.f.
Bridge 8' Wide	$100 s.f.
Fencing	$20 l.f.

Financial impacts to the public could be minimized by utilizing the following guidelines:

1. Identify, dedicate, and improve lands for trails and pathways where trail connections may be made with dedication/improvement requirements of proposed developments.
2. Offer incentives to private landowners to voluntarily dedicate trail easements, or to donate land for trails.
3. Utilize transportation-related funds to develop pathways within or adjacent to road right-of-ways.
4. Encourage non-profit organizations to seek funding from citizens, philanthropists, and environmental groups by partnering with non-profits on grant proposals.

5. Review tax default properties and other properties being sold, or easements vacated, for potential opportunities to secure trail routes.
6. Seek trail opportunities through easements, dedications, license agreements, or joint-use agreements with public and semipublic agencies including utility districts, water districts, transportation agencies, and parks and open space agencies.
7. Locate trails along existing non-designated paths, roads, and utility easements, drainage channels, flood plains, excess street right-of-ways, and major utility right-of-ways.
8. Implement regional trails and their associated features and facilities above the 100-year floodway where appropriate.

OVRP management should establish funding priorities for OVRP trails system annually. Potential funding includes Coastal Conservancy grants, State Parks and Recreation grant, and possible future State bond initiatives, operating budget and/or community group fundraising. Funding may be secured for the following trail related elements:

1. *trails* – planning, design, management, implementation, and maintenance;
2. *additional trail facilities* - overlooks, bridges, fords, fencing signage and interpretive displays;
3. *programs* – interpretive, educational, research, and volunteer; and
   land acquisition.

Section IV: Development Guidelines

These guidelines address a range of typical trail planning, design and implementation issues. However, when physical or environmental constraints in a specific situation prevent their application, these guidelines may be modified to achieve trail goals. All proposed deviations from these development guidelines require the approval of OVRP operations management.

These guidelines supplement but do not replace existing codes, regulations regarding land management, and permitting agencies. Although these guidelines were developed for the OVRP they may be utilized by development adjacent to the OVRP for consistency of design.

Education

The public will benefit from experiencing environmentally sensitive habitats and resources with cultural and historic significance. Trails will be designed to take advantage of these special environments, while providing interpretive features and appropriate environmental protection. Interpretive and educational programs should be organized around central concepts, themes or stories. Interpretive themes for the OVRP may include:

- history,
- dependence on water,
- biological and cultural resources, and
- restoration.

Important sites and self-guided trails should be chosen to best tell the story of the Otay River Valley. Interpretive signs along the trails will provide educational elements of the story. Interpretive centers should include signage, interactive exhibits and a place for park rangers to provide information on the Valley. Interpretive trails and specific interpretive locations shall be included in the Park signage and orientation program, utilizing kiosks, trail booklets or similar facilities located at main trail access points, nature centers and other key locations.

In addition to fostering an appreciation for local habitat, educational programs will be used to teach habitat protection. A balance between public exposure to sensitive habitat and the need to protect it can be achieved by incorporating programs as an educational resource.

Habitat Restoration

Trail construction may need to mitigate for environmental impacts. Areas designated for restoration may include trails that have been closed, disturbed areas adjacent to a trail pathway, cut or fill slopes, and areas of non-native invasive plant material. Restoration may include transplanting or seeding native plant species typically found in the area. See Appendix 5 for native plants recommended for restoration. Criteria for selecting native plant materials include: whether the species is indigenous to the area, habitat value, fire resistance, resistance to pests and diseases, aesthetic characteristics, ability to provide shade, and ease of maintenance.

Community Involvement

The community provided input through every phase of this planning effort. The primary vehicles of community input were the Policy Committee (PC), Citizens Advisory Committee (CAC) and CAC Trails Subcommittee. The CAC Trails Subcommittee members represent a cross section of the local community and special interest groups. In addition, the CAC hosted two public outreach workshops, which were conducted to gather information from the local community. Each workshop was publicly advertised and open to all community members.

Design and Layout

Trail locations may cross various types of terrain, land uses, drainage patterns, microclimates and vegetation as well as private and public property. This presents opportunities and constraints when selecting trail location as discussed earlier. These guidelines have been developed to balance a high-quality user experience with protection of natural and cultural resources. These guidelines shall be considered during the planning, design and construction of trails and facilities.

The guidelines listed below reflect the Western OVRP Natural Resource Management Plan. Their application will help minimize future maintenance, operation problems, user conflicts, and impacts to cultural and natural resources.

1. Use existing access roads or existing unauthorized trails.
2. Locate equestrian trails away from sensitive natural resources. Locate equestrian staging areas 300' to 500' from riparian and Coastal, Sage Scrub.
3. Avoid endangered or sensitive plant species and wildlife breeding habitats. When possible, site new trails on north facing slopes in chaparral, away from the Coastal Sage Scrub habitat (usually found on south-facing slopes) and all other sensitive habitat. Be sensitive to the surrounding natural resources when considering trails with south-facing slopes. Avoid routing trail alignments parallel to habitat ecotones.
4. Consider alternative surface materials for erosion control including gravel, fiber matting, polymer-based compounds, and mulching with organic or non-organic materials. Trails and maintenance/emergency roads shall not be paved unless otherwise specified.
5. Trails, erosion control devices, fences or other barriers, exotic species removal, and signage are allowed within the established 100' buffer zones surrounding sensitive biologic resources (based on current local and State requirements).
6. Use earth berms or walls to reduce noise and visual impacts adjacent to recreational areas. Incorporate noise reduction measures adjacent to breeding areas.
7. Landscaping shall not include invasive exotic species. Only locally native vegetation should be planted in natural areas. Refer to Appendix 5 for an approved plant list.
8. Optimum trail widths and other conditions shall be determined on a case-by-case basis.
9. Avoid construction of switchbacks and climbing turns in favor of gaining elevation by maximizing long contour trail sections. Where switchbacks cannot be avoided, they should be designed to take advantage of natural barriers that discourage shortcutting.

Accessibility

Accessibility shall be considered in the decision-making processes for planning, design, construction, maintenance and management of trails within the OVRP. Current State and Federal regulations concerning the Americans with Disabilities Act (ADA) shall be applied to provide access to a wide range of user capabilities where it is deemed appropriate.

Aesthetics

Sight distance, views and the overall visual quality of the surrounding environment are important to the human experience and the more practical applications of safety and environmental protection. The following are guidelines concerning sight distances and views:

1. Design trails to blend in with the surrounding environment while providing various views of the surrounding area.
2. Screen views of the trail from adjacent landowners who may not want to view the trail from their property.
3. Align trails to avoid creating permanent, noticeably visible lines on the existing landscape.
4. Ensure the existence of native soils to support restoration of natural vegetation or provide amended soils of similar soil structure.
5. Align trails on cross-slopes of less than 45 percent.

Conflicts

Trail use conflicts and user safety are critical issues on multi-use trails. Collisions, near misses, reckless and irresponsible behavior, poor user preparation and/or judgment, as well as unsafe trail tread may result from combining pedestrians, cyclists, and equestrians on the same trail. Methods to consider for preventing potential user conflicts include:

- separating user types at trail heads and along the first, most crowded stretches of trail;
- providing adequate sight distances;
- building trails wide enough to accommodate expected levels and types of use[1];
- building and maintaining trails wide enough for safe passing and/or provide periodic turnouts;
- designing trails to control speeds where necessary by varying the trail surface and avoiding long, straight, downhill stretches;
- providing adequate trailhead facilities for all user types; and
- providing physical barriers for traffic/speed control.

[1] Impacts on biological resources should always be considered when designing trail widths.

Erosion Control

Erosion control is high priority in trail design, especially for soft-surface, multi-use trails. Trails designed for multiple user groups may need additional maintenance attention due to higher use and the potential for higher levels of erosion, associated runoff and silt.

Proper drainage of surface water is the most important factor in design, construction and maintenance of trails. Surface erosion resulting from improper drainage will have a detrimental impact on the trail surface and will increase maintenance requirements. The potential for erosion depends on three factors: soil type, velocity of water on the trail, and the distance water travels down the trail. The following guidelines should be considered to reduce soil erosion and ensuing trail damage:

1. No large-scale grading will be used for trail construction (minimizing large scale grading at any time is most important).
2. Grades along trail treads should be held to a minimum and occasional fluctuations in grade should be considered to facilitate proper drainage.
3. Water bars, level breaks constructed with wooden or rubber members laid perpendicular to the path of travel may be needed to allow trails to climb through steeper terrain. At least one water bar per 100 feet of trail is recommended when slopes are ten percent or greater. If site conditions allow, grade dips are preferred over water-bars.
4. The degree of cut allowed on a slope depends on the soil type and surrounding natural resources. Ultimate cuts will be contoured to blend with the natural slopes. Earth, rock or wood used for retention of the outside of the trail may be necessary. Limited terracing or building steps to avoid large-scale grading is acceptable to address steep areas.
5. Steps must be reinforced with stone or wood.
6. In order to reduce erosion and maintenance problems, disturbance of the soil surface will be kept to a minimum. Only those rocks, stumps and roots that interfere with safe passage, will be removed. Surface water will be diverted from trails by sloping the trail tread between one percent and three percent where feasible. Where necessary, willow ditches or water bars will be used to divert water on slopes greater than five percent.
7. Where a potential for significant soil erosion exists along a trail alignment, a Registered Civil or Soils Engineer will develop specific erosion control plans as part of the trail construction documentation. The criteria to be used in determining the erosion potential include: slope, soil type, soil composition and permeability, and the relative stability of the underlying geologic formation.
8. Existing drainage patterns of the surrounding area, such as concentrated drainage channels, must be maintained.

Trail Components

A trail is made of several components that shape trail construction, maintenance and use. Trail components may also influence trail facilities, amenities and structures. The following are brief descriptions of these components.

Trail Width

The width of a trail or its "tread" is determined by type of use, field conditions such as topography, and the presence of sensitive resources.

Grade

The grade of a trail is the degree to which it rises or falls over a linear distance. Grade is influenced by existing topography. It is an important factor in determining trail length, level of difficulty, appropriate use, and drainage and maintenance requirements. Generally, an overall trail grade of 10 percent or less is sustainable. However, there may be steep places where this grade can't be achieved. Trail tread grades can be as high as 15 percent as long as the trail's overall grade doesn't exceed 10 percent.[2]

Trails should have gentle trail grades and grade reversals. As the trail traverses a hillside, a subtle left or right turn creates undulations - grade reversals that help divert water off the trail. A contour trail on a steep slope may need grade reversals every 20 to 50 feet, depending on soil type and rainfall. Steeper grades require more grade reversals. To reduce the need to build water-diversion structures later, the original design should encourage smooth water runoff through subtle grade changes.

During construction, disturbance of the soil surface should be minimized to reduce erosion and associated maintenance problems. Trail designs should comply with current drainage and storm water pollution Best Management Practices.

Cross Slope

The cross slope (the slope of the tread surface perpendicular to the longitudinal slope) is a critical factor in the design, construction, and maintenance of trails. Cross-slopes allow surface water to drain off the side of the trail rather than along the longitudinal slope. The three primary types of cross slope are: out-slope, in-slope, and crowned. Out-slope and in-slope surfaces typically occur on trails that traverse the side slope of a hill. Crowned surfaces are typically found on trails across relatively flat ground.

Out-slope is the most common type of cross slope used on trails that traverse the side slopes of a hill. Out-slope occurs when the trail surface slopes downward from the uphill to the downhill edge of the trail.

In-slope is the most infrequent variety of cross slope used on hillsides, and occurs when the trail surface slopes toward the uphill side of the slope. In-sloped trails are discouraged and are not recommended except as a component of switchback turns. In-slopes must be used in conjunction with rock-lined swales that collect the water and channel it away from the trail. The improper use of

[2] See the International Bicycling Association's publication "Building Better Trails for more information.

an in-sloped trail surface will result in extreme erosion to the trail surface and the surrounding environment, and therefore it should not be built unless necessary.

Crowned slopes are most commonly used on trails that traverse relatively level ground. A crowned trail surface slopes downward from the centerline to each outside edge in order to prevent surface water from pooling on the trail surface.

Surface Material

Trail surfaces should permit a variety of recreational uses and be easily maintained. Trail surfaces shall be constructed from materials that provide a firm, smooth surface and comply with ADA guidelines, where applicable. Native soil, decomposed granite or other alternative environmental friendly trail surface material may be permitted where appropriate.

Horizontal and Vertical Clearance

The primary goal of horizontal and vertical clearance is one of balance, providing the specified clearance, while preserving the maximum amount of vegetation and natural setting. Vegetation should be cleared, brushed and pruned to meet optimal limits specified in the Trail Design Guideline Matrix.

When branches need to be removed, they should be cut as close to the main trunk as possible, without cutting into the branch collar. Chemical sealants should not be applied to native trees. Plants that must be completely removed should be cut as close to the ground surface as possible. Dispose of all removed vegetation in an appropriate manner so it is not clearly visible from the trail. Visible evidence of trail construction should be confined to the horizontal vegetation clearance limit.

Trail Types

This document identifies four trail types: A, B, and C as well as pathways[3], which are designated as Type D. Each type has guidelines for tread width (i.e., width of the trail), slope, clearance, etc., for use in designing a new trail or bringing an existing trail into conformance (refer to Table 1).

The anticipated volume of traffic on a trail is directly related to choice of width and is also important when determining future trail types.

Trail Classification (Typical)

A specific trail or pathway type (A, B, C or D), and a specific user designation (hiking, biking, or equestrian) shall classify each section or segment of trail in the OVRP. All trails are intended to be multi-use, where possible. There may be a need, determined by OVRP operations management, to restrict use based on demonstrated conflicts or other problems, such as user safety, collisions, near misses, reckless and irresponsible behavior, poor user preparation or judgment

[3] Pathways are defined in Appendix 1.

Type A Type A trails are intended for intensive use. They are generally associated with regional trails or trails that connect to major facilities or destinations. Type A trails are typically multi-use. They are given the widest tread so they may function for recreation and enjoyment as well as maintenance access. Type A trails are generally associated with regional trails.

Type B Type B trails are intended for the heavy to medium use associated mostly with recreational functions. They may be multi-use or geared to specific users.

Type C Type C trails are intended for medium to low use. They have the smallest tread and are intended to function as low impact, low use recreation, or as connector trails where steep terrain and a remote location may limit accessibility. Type C trails may not be suitable for all persons or user groups.

Type D Type D pathways are designated for high volume use. Located within a public road right-of-way along or in place of a sidewalk, these pathways are generally intended for transportation (bicycle, pedestrian or equestrian). Slope and accessibility depend on the slope and grade of the road right-of-way. This may impede accessibility to trail uses under industry standards.

Specialized Trails

Under certain specialized conditions trail types may be specialized to provide focused opportunities for:

- unique loop experiences,
- access opportunities for disabled persons,
- wildlife or habitat interpretation, and
- unique types of recreation that call for single use or restricted use.

TRAIL DEVELOPMENT GUIDELINE MATRIX

GUIDELINES	TYPE A	TYPE B	TYPE C	TYPE D
Tread Width (1)	6' - 8' (2)	4' - 6'	2' or 4'	8'
Function	Recreation, Maintenance, Emergency	Recreation, Maintenance, Emergency	Remote Recreation	Limited Recreation, Maintenance, Transportation
Grade (3)	5%	7.50%	15%	See Text
Cross Slope (4-6)	2%	2%	1 - 8%	2%
Surface Material (7)	D.G. or Native Soil	D.G. or Native Soil	D.G. or Native Soil	D.G.
Anticipated User Volume	High	Medium	Med - Low	High
Horizontal Clearance (8-9)	2' Beyond Tread Edge	2' Beyond Tread Edge	1' Beyond Tread Edge	2' Beyond Tread Edge
Vertical Clearance	12'	12'	12'	12'

Notes:

1. Where multi-use trail tread is less than 6 feet occasional passing areas or turnouts shall be added at gentle slopes or as approved by the OVRP Operations Management. Tread width of specialized trails will be influenced by site-specific conditions on a case-by-case basis, and they may vary from the suggested guidelines.
2. Trails located within utility easements may be improved to a maximum tread width of 12'.
3. The optimum grade ranges described in the Trail Design Guideline Matrix are advisory. Grades of 15% or less are preferred but may not be feasible in some locations. Where grades exceed 10%, long, gradual switchbacks will be used. Rest areas or landings will be provided when grades exceed 5%. The OVRP Operations Management may consider varying these limits in order to provide a different level of user experience.
4. In level areas, the trail surface shall be crowned. On slopes, trails shall be graded with cross slopes.
5. Standard out-slopes range from 1% to 10%, depending on trail classification.
6. For all crowned trails, the slopes from the centerline to each edge should be 1% to 5%.
7. Binding agents may be required for a particular trail situation from the perspective of responsible management.
8. "Clearance" refers to vegetation removal - see legend call outs on trail profiles in the design guidelines for details.
9. Horizontal clearance width varies by trail type but should generally be a minimum of 2 feet between the outer edge of a trail and any physical obstructions. Vertical clearance from overhanging branches or fixed structures depends on Trail Type and anticipated users. Trails for equestrians and/or bicyclists should maintain a minimum vertical clearance of 12 feet, while trails for hikers only can have less.

Table 1 - Trail Development Guideline Matrix

Trail Facilities and Amenities

Benches

Benches provide a place for resting and viewing and should be placed at regular intervals along the trail. They should be placed within a half-mile of Regional Staging Areas, and at the end of a long uphill trail.

Water

Potable water for trail users should be provided at Regional Staging Areas and throughout the Park along the trail system at strategic points such as recreation areas, local staging areas and other appropriate areas when feasible.

Comfort Stations

Comfort stations should be located at Regional Staging Areas, and at other trail facilities where feasible and appropriate.

Picnic Areas

Picnic areas may be strategically located along the trail system for ease of access by the user and maintenance staff. Locations can include but not be limited to both regional and local staging areas. They should include trash receptacles [4], benches and tables.

Viewpoint and Overlook Areas

Viewpoint and Overlook Areas provide sites for short- and long-range views and they are generally located at the edges of the Park. Some are designated outside of the Park boundary at other public facilities or along public roads. They will be used for passive enjoyment of the Park and may include minimal seating and interpretive signage.

Staging Areas

Staging areas, both regional and local, are the main OVRP public access points. Planning them involves considerations such as:

- projected volume of use;
- type of user; or
- avoiding conflict with residential areas.

Staging areas and other facilities shall be easily accessible and barrier free. Parklands, school campuses, or other semi-public facilities with large parking areas should be explored for shared

[4] Trash receptacles should be designed and located so as not to attract pests or domestic animals.

staging area use. Equestrian staging areas should be sited at appropriate and sufficient distance from riparian or coastal sage scrub habitat. These distances should be determined on a case-by-case basis following an environmental analysis.

Regional Staging Areas

Regional staging areas are designed to serve a large community base and need to have proper support features.

Regional staging facilities may include:

- entry drive to accommodate "extended" vehicles such as horse trailers,
- parking spaces for cars (approx. 20),
- parking spaces for horse trailers (approx. 8),
- equestrian accommodations,
- bicycle racks,
- signage,
- comfort station,
- trash receptacles,
- gates and fencing,
- potable water,
- telephones,
- security lighting, and
- entry monuments.
- shade structures,
- picnic areas with table and benches,
- landscaping,
- ranger facilities, and
- nature center.

Local Staging Areas

Local staging areas are designed for a small community base of trail users. These facilities may include:

- parking spaces for cars (approx.10),
- bicycle racks,
- gates and fencing,
- signage, and
- trash receptacles.

Staging area parking may not be paved, but should utilize materials that reduce dust, such as the addition of a binding agent to the paving material.

Signage

A successful signage program provides regulatory, interpretive (educational) and directional information.

Regulatory

Regulatory signage is used to identify the rules and regulations of the OVRP. It should be placed in strategic access points such as staging areas and trailheads and may include:

- hours of park operation,
- appropriate use and activity information, and
- park restrictions.

Interpretive

Interpretive signage is used to identify and educate about topics such as natural and cultural resources. It should be placed in strategic areas such as staging areas, viewpoints and other features of interest. Interpretive signage can include: identification and description of key plant and tree species including habitat; use by wildlife and humans; description of common wildlife behavior such as foraging, sleeping, and mating; animal tracks; local habitats as part of the ecosystem; Native American and other historic and cultural information; education about resource degradation (public misuse, urban runoff, exotic plant invasion, overuse, trash, feral animals, etc.); and castings of animals, animal tracks, or animal droppings as part of an interpretive display.

The format for presenting this information is a small structure such as a kiosk-type shelter as shown in Figure 11, Typical Signage Detail.

Directional

Directional signage is used to identify location, direction, distance and places of interest for trail users. Markers should be placed at strategic intervals such as every one-quarter of a mile or at strategic areas such as viewpoints and intersections. Directional signage should: indicate trail name, designation and length; and provide trail user location. The structural format for presenting this information is a trail marker such as shown in Figure 11, Typical Signage Detail.

Road

Road signs inform motorists of trail system access points or provide warnings at trail crossings.

Trail Structures

Bridges

Trails crossing rivers, streams, creeks or drainage may require a bridge, but these should be kept to a minimum and carefully designed to avoid habitat impacts. Approaches to bridges should be level

and straight, and at least 100 feet long. Bridge widths should correspond to the trail's tread width. On multi-use trails, crossings should be structurally suitable for maintenance vehicles. Bridges should be designed to accommodate all trail user groups. When bridge railings are required they should meet current jurisdictional standards. Gaps between planking should be oriented perpendicular to the direction of travel to avoid trapping bicycle tires and causing injury to cyclists. Bridge footings should be constructed outside the top of the stream bank.

River Fords

Ford crossings are shallow stream crossings without the aid of additional structures such as bridges or puncheons. It may be a natural streambed crossing or the stream may be stabilized with various construction techniques. Either way, ford crossings should provide solid footing and be of equal depth from one bank to the other.

Fords shall be located in wider, shallow sections of the river where possible. The approaches shall climb a short distance above the typical high water line so water is not channeled down the tread. Avoid locations where the stream turns. Water will undercut approaches on the outside of a turn. Tread in the ford should be level. Medium-size gravel is ideal. Water flow should be regulated in the ford so gravel-size material is not washed away.

Underpass

At times a trail may be required to pass under a highway bridge. It is important to provide sufficient vertical and horizontal clearance for the trail type it is accommodating. Trail underpasses may require approval by the appropriate department or agency to address site-specific conditions.

Puncheons

A puncheon is a wooden walkway used to cross over marshes or deep bogs, to bridge boulder fields, or to cross small streams. Puncheons consist of a deck or flooring made of sawn, treated timber, or native logs placed on stringers to elevate the trail across wet areas.

Switchbacks

A switchback is a reversal in trail direction with a relatively level constructed landing. It is used on hillsides steeper than 15-20% to gain elevation.

Turnpikes

Turnpikes elevate the trail above wet ground. The technique uses fill material from side ditches or off-site to raise the trail base higher than the water table. Practical up to a 10% trail grade, turnpikes can provide a stable trail base in areas of high water table and fair- to well-drained soils.

Barriers

Gates, bollards, boulders, and logs, etc., may be used to prevent motorized vehicles from entering trails at public road crossings and staging areas.

Grade Dips

Grade dips reverse the grade to force water off the trail without requiring additional structures. There are several types, including terrain dips, coweeta dips, and swales. Most grade dips function best when installed during the original construction.

Water-bars

Water-bars direct the flow of surface water off the bottom edge of a trail. They are typically anchored to the trail tread and extend above it, usually at a 45-degree angle to the flow of traffic. Water-bars are obstacles, and tend to create interference, especially with bicyclists. Special care shall be taken if they are used.

Fencing

Fencing should be used to delineate a trail or public use area and control public access (see Figure 13). A natural barrier such as wild rose (Rosa californica), blackberry (Rubus ursinis), cactus (Opuntia sp.), or logs from fallen trees may be used in conjunction with, or as an alternative to, a fence. Refer to Figure 12, Fencing Detail, for specifications on size and material. Segments of the trail system that pass through the National Wildlife Refuge will require approved fencing along the perimeter of the trail to discourage off-trail activities.

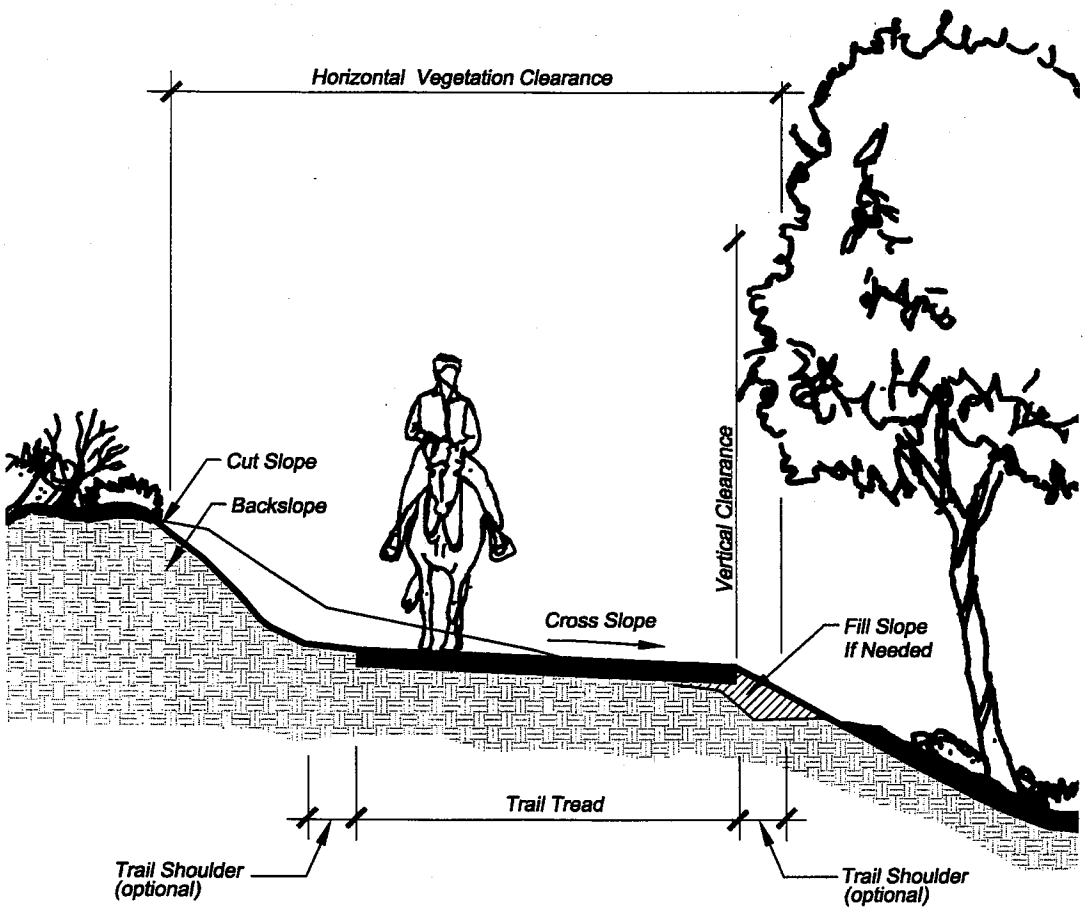
Federal and State Agency Permits and Agreements

Each jurisdiction should be the lead environmental review agency for projects within its jurisdictional boundaries. Federal and State agencies will be notified during the public review process of all proposed projects affecting natural resources and which may require additional Federal or State permits. These agencies could include the California Department of Fish and Game (CDFG), California Coastal Commission (CCC), United States Fish and Wildlife Service (Service), Regional Water Quality Control Board (RWQCB), and/or the Army Corps of Engineers (ACOE). Mitigation plans and mitigation monitoring reports, when required for individual projects, will also be submitted to these agencies for their review and comment.

In some instances, another agency may be the lead agency. These lead agencies would then consult with other resource agencies for review and comment on the proposed project and mitigation plan, if one were required. This is the case when a specific permit must be obtained from CDFG for streambed alteration or erosion control. When pursuing a permit for any deposition of fill or other material into waters of the United States, the ACOE is required to be lead environmental agency.

TRAIL STRUCTURE TERMINOLOGY

ALL TRAIL TYPES



Notes:

1. *Trail shoulders optional depending upon clearing width, grading limits and trail surface material.*

NOT TO SCALE

Figure 5: Trail Structure Terminology

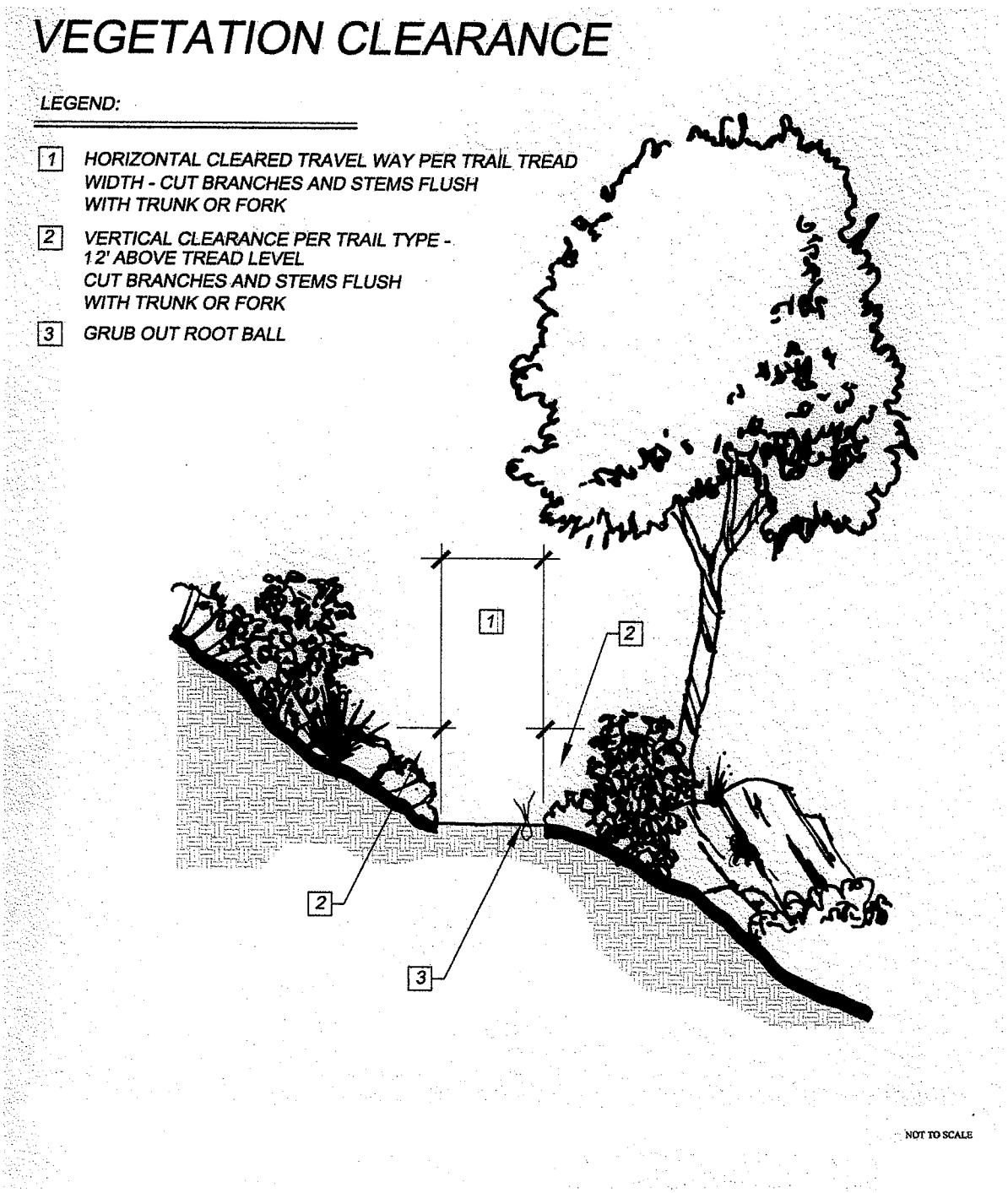
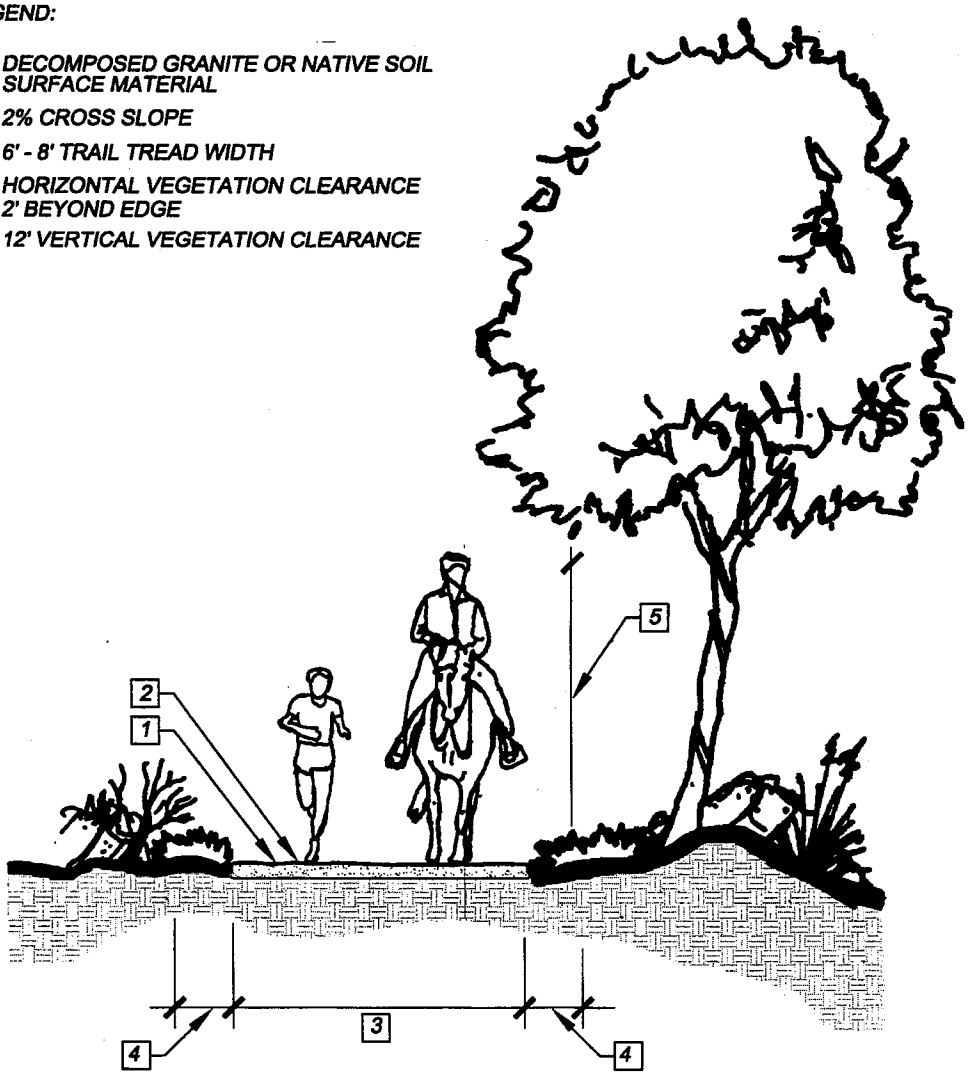


Figure 6: Vegetation Clearance

TRAIL TYPE " A "

LEGEND:

1. *DECOMPOSED GRANITE OR NATIVE SOIL SURFACE MATERIAL*
2. *2% CROSS SLOPE*
3. *6' - 8' TRAIL TREAD WIDTH*
4. *HORIZONTAL VEGETATION CLEARANCE 2' BEYOND EDGE*
5. *12' VERTICAL VEGETATION CLEARANCE*



Notes:

1. *Refer to the design guidelines Trail Matrix for optimums.*
2. *Refer to the Trail Structure Terminology Detail for proper cross slope direction.*

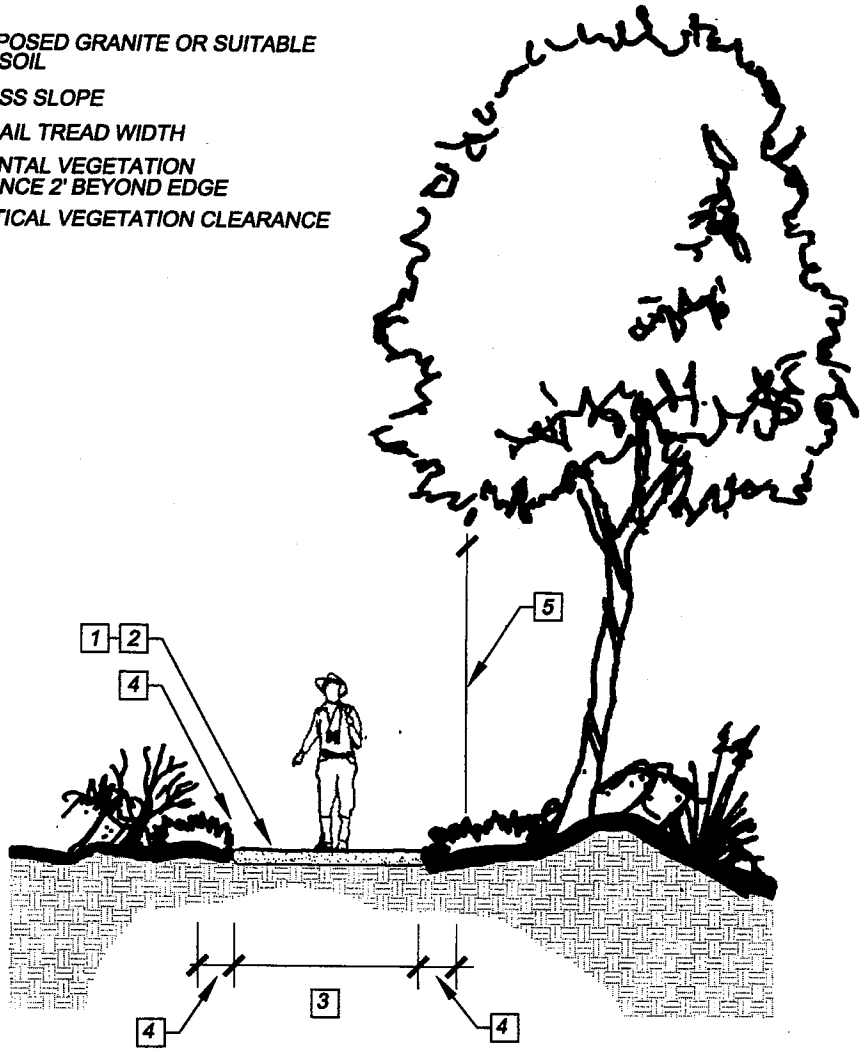
NOT TO SCALE

Figure 7: Type A Trail Profile

TRAIL TYPE " B "

LEGEND:

1. *DECOMPOSED GRANITE OR SUITABLE NATIVE SOIL*
2. *2% CROSS SLOPE*
3. *4' - 6' TRAIL TREAD WIDTH*
4. *HORIZONTAL VEGETATION CLEARANCE 2' BEYOND EDGE*
5. *12' VERTICAL VEGETATION CLEARANCE*



Notes:

1. *Refer to the design guidelines Trail Matrix for optimums.*
2. *Refer to the Trail Structure Terminology Detail for proper cross slope direction.*

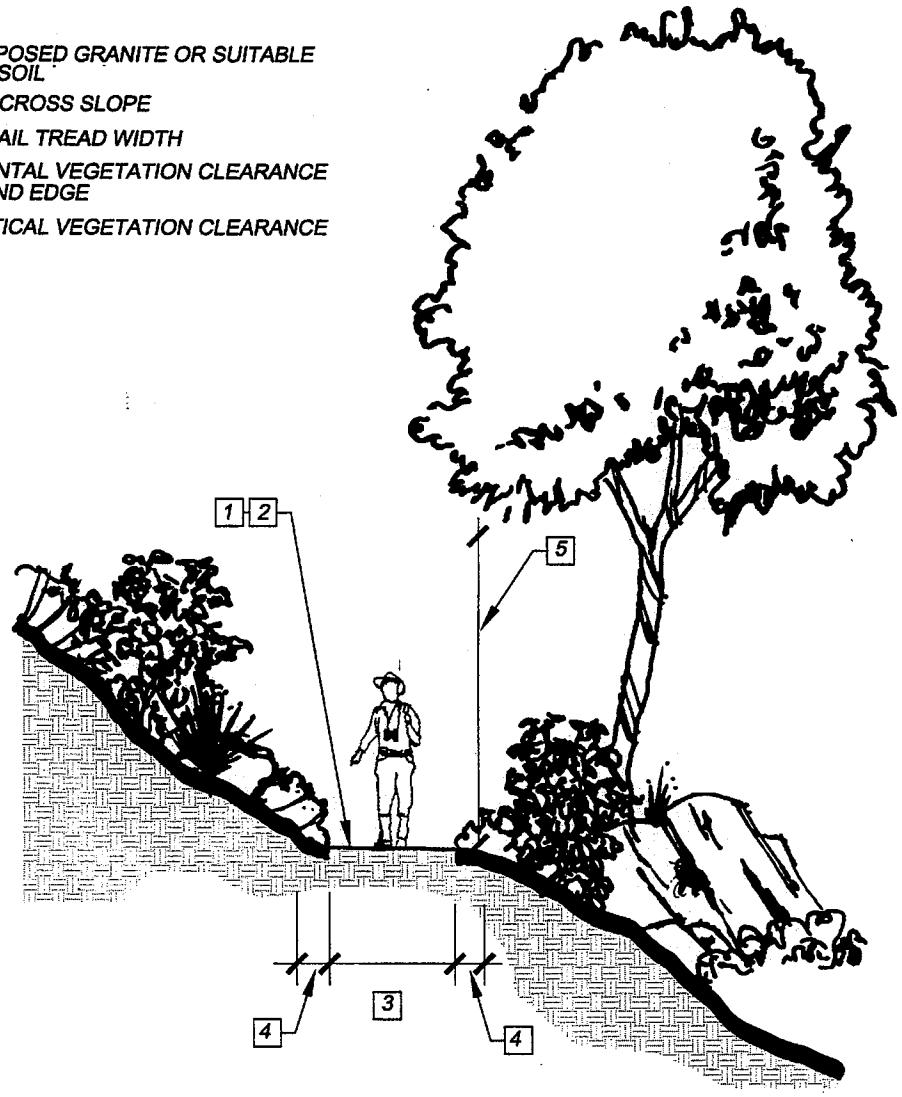
NOT TO SCALE

Figure 8: Type B Trail Profile

TRAIL TYPE " C "

LEGEND:

1. *DECOMPOSED GRANITE OR SUITABLE NATIVE SOIL*
2. *1% - 8% CROSS SLOPE*
3. *2' - 4' TRAIL TREAD WIDTH*
4. *HORIZONTAL VEGETATION CLEARANCE 1' BEYOND EDGE*
5. *12' VERTICAL VEGETATION CLEARANCE*



Notes:

1. *Refer to the design guidelines Trail Matrix for optimums.*
2. *Refer to the Trail Structure Terminology Detail for proper cross slope direction.*

NOT TO SCALE

Figure 9: Type C Trail Profile

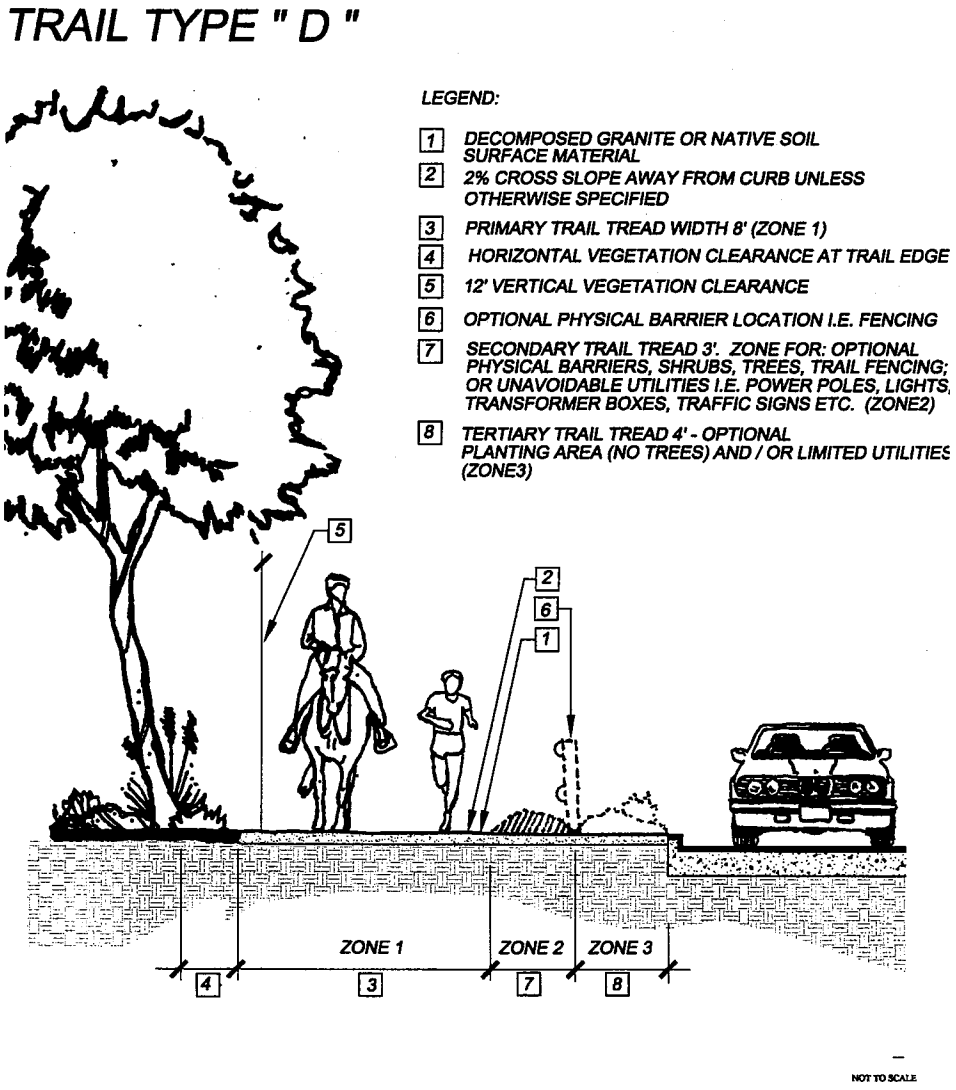
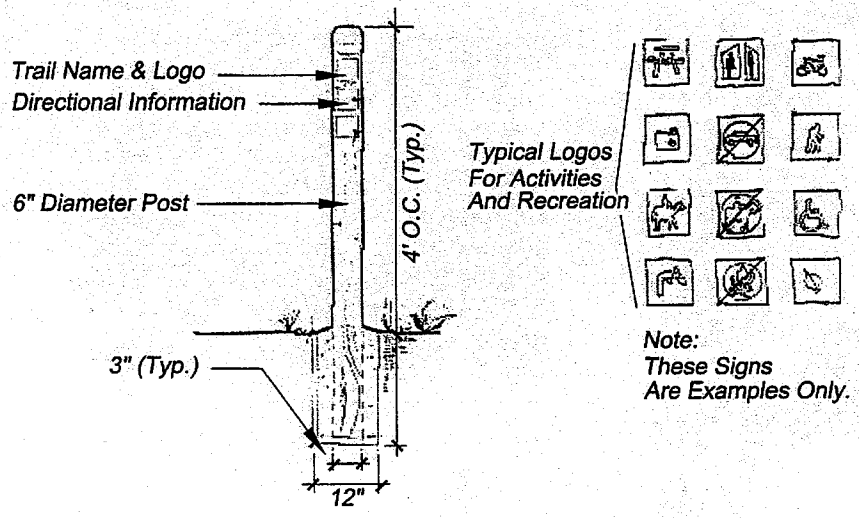


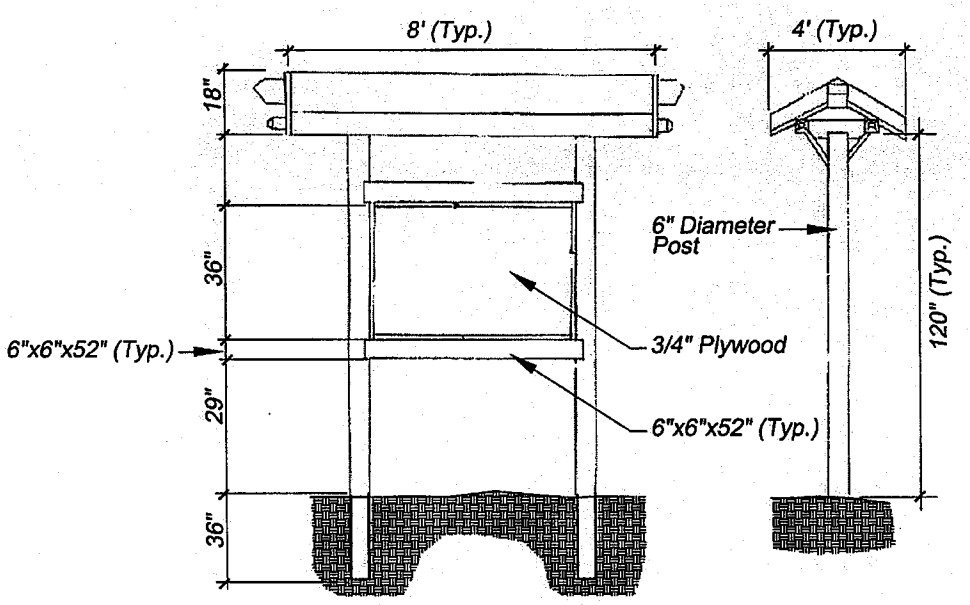
Figure 10: Type D Trail Profile

SIGNAGE DETAIL

ALL TRAIL TYPES



TYPICAL TRAIL MARKER



TYPICAL KIOSK

Notes:

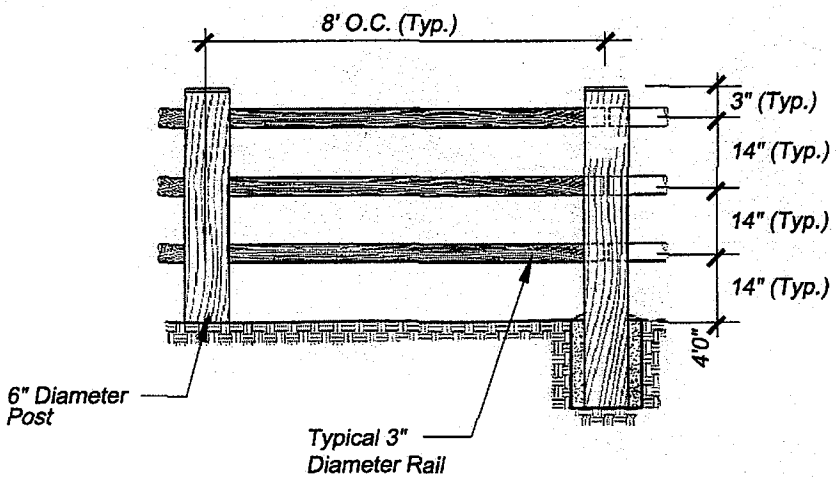
1. *Signage shall be built with high quality materials, vandal and weather resistent*
2. *Other trail markers such as a flexible dual sided, support post, or boundary marker may be used in the park.*

NOT TO SCALE

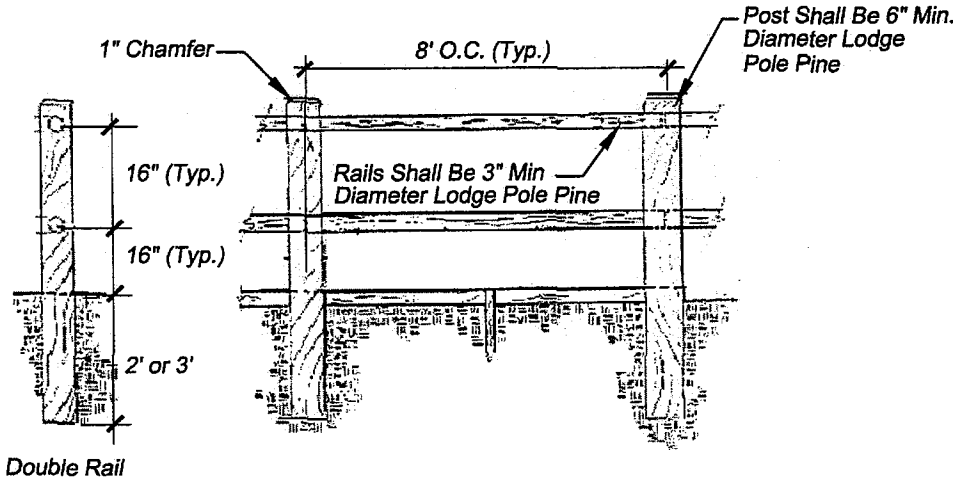
Figure 11: Signage Detail

FENCING DETAIL (TYPICAL)

ALL TRAIL TYPES



TYPICAL ELEVATION FOR GRADES MORE THAN 8%



TYPICAL ELEVATION FOR GRADES LESS THAN 8%

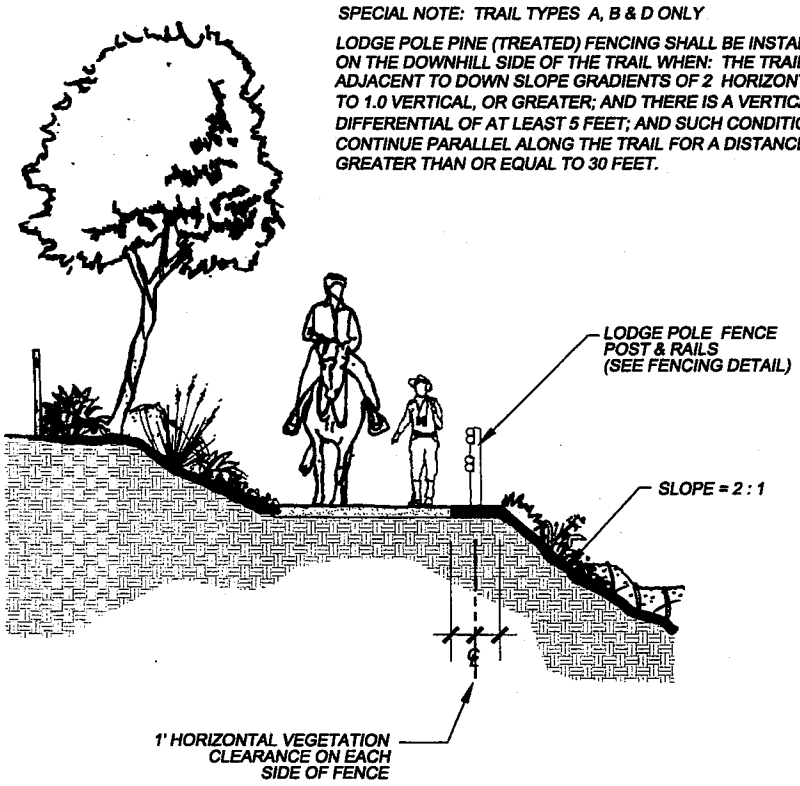
Notes:

1. *Fencing should follow the natural grades along the trail*
2. *Single or double rail fence may be used at the descretion of the trail manager.*

NOT TO SCALE

Figure 12: Fencing Detail

FENCING LOCATION



ELEVATION OF FENCING LOCATION (TYP.)

Notes:

1. Parking Lots, Street Crossing, Railroads, and Pathways are additional areas that safety fencing may be an option.

NOT TO SCALE

Figure 13: Fencing Location Detail

Section V: Management Guidelines

This section provides guidance to OVRP operations management, volunteers, contractors and others who share in the responsibility of managing the Park. Private property owners, semi- or quasi-public agencies and others are encouraged to use these guidelines as part of their trail program.

Responsibilities

Because the OVRP is a multi-jurisdictional Park, a Memorandum of Understanding (MOU) between the three jurisdictions is being prepared to address management issues. Issues that need to be addressed within the Memorandum of Understanding (MOU) for trail management will include, but not be limited to:

- police and fire protection,
- trail patrols (volunteer and ranger),
- annual maintenance, and
- management agreements with other agencies.

Each jurisdiction has a limited park ranger staff. Upon increasing ranger staff hours or providing additional staff, the following responsibilities should be addressed:

- opening and closure of trails,
- enforcing trail use regulations,
- taking actions needed to prevent unauthorized off-trail activities,
- taking actions needed to prevent unauthorized use of trails, and
- maintaining trail access through the removal of illegal encroachments and obstacles on the trail corridor.

In addition to the responsibilities shared by the three jurisdictions, the community plays an important role in Park management. Community groups assist staff in the management and maintenance of parks. The following are specific ways a community group could support management and maintenance of the Park:

- *conduct fundraising activities* for enhancement and educational and/or interpretive efforts,
- *provide volunteers* for needed improvements, environmental education, patrols, and some maintenance activities, primarily for trash cleanup on trails, and
- *input public views and comment* on city or other proposed projects affecting the park.

Use

Trails shall be designated as multi-use where possible, providing opportunities for pedestrians, bicyclists, and equestrians. Sections of trail may be designated for specific use. No motorized vehicles except authorized maintenance and emergency vehicles shall be allowed on trails. Maintenance, renovation, or other management needs may limit or change trail use designations

from time to time. Environmental degradation, conflicts with private properties, or trail use conflicts may be avoided with the following regulations:

- no cutting of switchbacks,
- enforce one-way travel on certain trails,
- direct bicyclists to walk their bikes in congested or conflict-prone areas or during congested times,
- close trails or trail sections during sensitive breeding seasons and under wet conditions.
- designate appropriate places to hitch or coral horses,
- require an event or use permit for group activities,
- direct users to stay on the trails, and
- close certain sections, areas, or types of trails (e.g., no mountain bikes on crowded single track trails).

The key to maintaining successful park use involves creating and updating an accurate and clear trail map marked with the appropriate facilities. The location and status of access points, forms of access available, easements, trail classifications, land ownership patterns, and MSCP/open space preserve should be inventoried and reflected in trail maps on a regular basis. This should allow OVRP operations management a greater understanding of the rules and regulations applying to specific trail segments and their access points, and acts as a reference tool for other local officials such as police and firefighters to become more familiar with the area and layout.

Safety

Unsafe situations or conditions caused by trail users may keep visitors from deriving the maximum benefit from their experience in the Park. Some of these include:

- collisions and near misses among users;
- reckless and irresponsible behavior;
- poor user preparation or judgment;
- unsafe conditions related to trail use (e.g., deep ruts, exposed roots, etc.);
- unsafe conditions not related to trail use (e.g., obstacles, terrain, weather, river crossings, etc.);
- poor trail design, construction, maintenance or management; and
- other hazards (e.g., flooding, dense vegetation and lines of sight, cliffs and steep terrain, etc.).

To help maintain user safety on trails the OVRP operations management may attempt to control or influence important factors, including the following:

- user speed (often has more to do with speed *differential* than the speed itself);
- mass of user and vehicle (if any);
- sight distances;
- trail width;
- trail surface;
- congestion (e.g., number of users per mile);

- trail difficulty (obstacles, terrain, condition, etc.) ;
- user skill level and experience;
- user expectations and preparedness (e.g., walkers who understand they may see bicycles on a particular trail can better prepare themselves for possible encounters);
- maximize visibility where vehicle crossings occur at trail intersections;
- emergency procedures; and
- on-site management presence.

Enforcement

Upon adoption of the OVRP Trail Guidelines a series of use regulations should be implemented. Gaining compliance with necessary regulations may be challenging. Appropriate enforcement guidelines are listed below.

1. Inform users of the regulations.
2. Post regulations at trailheads and include them in trail brochures and on maps communicating how the regulations will be enforced and what the applicable penalties are.
3. Signage programs shall be used to communicate appropriate locations and use.
4. Communicate the *reasons* for regulations to the users affected. For example, communicating to mountain bikers that "up trail and down road" rules for travel directions are enforced to reduce speed and skidding may improve compliance.
5. Enforce rules and regulations consistently to assure that there is no perception of discrimination among different user groups.
6. Employ a variety of on-site enforcement personnel if possible and appropriate such as: Peer policing programs (e.g., peer pressure); Volunteer trail patrols; uniformed enforcement officers and cooperative agreements with local law enforcement and fire protection agencies.
7. Communicate emergency procedures for users and emergency personnel.
8. No motorized vehicles shall be allowed on or off any trail or public use area, except the Border Patrol, Police vehicles, authorized utility crews, emergency vehicles, OVRP operations management, or maintenance personnel.
9. Border Patrol and Police Patrol shall restrict vehicle use to existing access roads when possible.

The purpose of enforcement is to:

- provide protection against unreasonable risks associated with trail use,
- provide protection from criminal activity,
- prevention of unauthorized vehicles on trails and staging areas,
- enforcement of limited use designation where applicable, and
- prevent trespassing, vandalism, and off-trail activities resulting in disturbance to natural resources.

Trail Patrol Information

OVRP operations management has responsibility for patrolling trails, whether by staff, by contract or approved volunteer groups. OVRP trails will be patrolled to assure that they are safe and usable. The objectives of trail patrols will be safety and security, adjacent private property security, code enforcement, visitor information and education, litter control and minor maintenance. To the extent feasible, volunteers may assist in certain aspects of trail patrol such as trail safety and security, litter control, information and education guides.

Management should also develop a trail-monitoring program to evaluate trail conditions and determine whether or not new trails or trail management programs are effective in addressing user conflicts, safety issues and environmental impacts.

The trail system should be set up to be responsive to the general population, communities and visitor needs. Implementing a periodic survey process will help OVRP operations management to be certain that trails are provided in a fair manner to various user groups.

Participating jurisdictions should ensure that their safety and enforcement standards are not in conflict as they relate to the trails in the Park. Jurisdictions will contribute to police patrols and Park rangers who patrol trails in their jurisdiction. Trails on private property are the responsibility of the owner for security and maintenance unless a public access easement has been acquired.

Restrictions

Several trail restrictions have been developed for the Park that complement both natural resources and recreational goals, these include:

1. Users shall remain on designated trails and in appropriate areas.
2. All undesignated trails are closed to Park users.
3. Domestic animals shall be on leash at all times including on trails and in public use areas.
4. Except during bird breeding season, no restriction shall be placed on temporary construction noise (see Trail Closures below).
5. Gates should be provided where possible, and signs posted to inform users of operating hours.
6. OVRP staging areas should have limited hours of use, typically from sunrise to sunset.

Speed Limits

Controlling speed on trails is essential for user safety as well as the peace of mind of other users. Although education can be effective in this regard, speed regulations are sometimes necessary. However, speed limits should be used only as a last resort since they require consistent, ongoing enforcement, may not improve real or perceived safety on the trail, and may discourage bicyclists from using trails for commuting. For instance, in mountain biking speeds must allow riders to stop

in one-half the distance they can see, so a single speed limit for an entire trail may be unreasonable; speed limits should be based on sight distances and other trail features.

Trail Closures

Notice of trail closures should be posted at all trail entrances and staging areas. Barriers will be used if feasible. Reasons to close a trail may include, but are not limited to:

- trail construction or repair,
- dangerous conditions that threaten either the user or habitat,
- special events, and
- high fire or flood conditions.

Right-of-Way

A person operating a bicycle or other wheeled apparatus except wheelchairs on an OVRP trail will yield to all equestrians and hikers who are crossing the trail. When approaching equestrians or hikers from the rear, the person on wheels will audibly warn of his or her presence. In addition, they will exercise due care when passing. Users who operate a bicycle or other non-motorized wheeled vehicle on an OVRP trail should adhere to the appropriate regulations, i.e., bicycle helmets.

Regulations on who must yield to whom are helpful. For example, the International Mountain Bike Association (IMBA) "Triangle" (Figure 14) could be enforced, whereby bicyclists yield to pedestrians, and pedestrians and bicyclists both yield to horseback riders.

Figure 14: Right-of-Way Sign

Natural Disaster Preparedness

OVRP operations management will review available water sources at staging areas and/or along trail routes to allow fire suppression equipment access to emergency water supplies.

Trail closure signs will be posted on affected trailheads during heavy rains. A database will be maintained by the OVRP operations management of the trails most likely to be flooded during the rainy season.

Maintenance Guidelines

Preventive maintenance reduces hazards and future repair costs. Where practicable and feasible, OVRP operations management is encouraged to maximize the opportunity to improve accessibility on trails through trail maintenance and repair activities. Maintenance guidelines need to address protection of natural resources while providing trail safe trail access.

Prior to maintenance activity, a site shall be surveyed by a Park Ranger, Natural Resource Planner, or qualified biologist to determine the areas present biological resources and the presence of any sensitive species. If a maintenance activity should result in direct or indirect impacts to surrounding habitat or sensitive resources, the maintenance areas shall be coned or flagged by a Park Ranger, Natural Resource Planner, qualified biologist and/or archaeologist, keeping the impact confined to the work area. Parking or driving of maintenance and ranger vehicles under all large native trees, especially oak, shall not be permitted in order to protect the tree root system.

Nesting seasons vary among species and may become protracted if conditions are favorable, thus construction and maintenance projects should be reviewed prior to initiation and contractors should be bounded with time constraints. If work crews find an unidentified, potentially sensitive plant, nest or burrow in the maintenance area, the Project Biologist shall be contacted to determine the appropriate action to avoid or minimize impacts prior to resuming work.

Trail closures should be instituted to: allow native vegetation to recover; facilitate wildlife movement; protect archaeological sites and biologically sensitive species or areas; allow added protection for sensitive species during breeding season; provide erosion control; ensure public safety; and allow for trail maintenance. Such closures may be temporary or permanent depending on the need. In addition to trail closures, fencing of trails may be needed to keep people on the trails and out of sensitive areas.

For proposed maintenance activities or new development projects adjacent to the South San Diego Bay Unit of the San Diego National Wildlife Refuge at the far western end of the Park, management of the Refuge should be contacted for review and comment on the proposed activity. Mutual cooperation between Refuge and Park management is important in providing a seamless open space system.

Erosion on access roads shall be minimized using appropriate measures, such as water bars. All maintenance activities should use best management practices or erosion control at the work site.

Whenever possible, maintenance and/or patrol vehicle activity should be minimized when soils are wet to avoid degradation of trails.

Prior to conducting any maintenance activity that disturbs substrate, a site check for archaeological resources shall be conducted by a qualified archaeologist. If, after review by the proper City of Chula Vista, City of San Diego, and County of San Diego offices, it is determined that direct impacts are likely, the project should: try to avoid the area, minimize impacts, and develop and implement a plan for recovery of resources subject to approval by city contacts.

In addition to protecting natural and cultural resources, the following guidelines should be implemented to provide a clean, safe, enjoyable environment for trail users:

1. All applicable City, State, and/or Federal permits shall be obtained prior to conducting any maintenance activity.
2. Trail access should be maintained for emergency and maintenance vehicles. Access maintenance should be limited to clearing or thinning brush and smoothing the surface within the existing access way.
3. General maintenance on trails and trail facilities such as trash collection, litter control, clearing of manure/pet feces will require a weekly schedule and in some cases manual labor. Appropriate trash receptacles shall be provided at strategic public use area.
4. All fences and gates shall be kept in good repair and, when necessary, promptly replaced.
5. Poison oak, stinging nettle and other native human nuisance plant species should be controlled only around highly used public areas, such as restrooms, open trails, parking lots, historic points of interest, and interpretive displays. In other areas they should be allowed to remain as part of the natural system.

OVRP operations management should develop a system (maintenance log) to track trail maintenance costs to be reviewed on an annual basis. This system will help with acquiring funding and allocating future resources needed to meet the OVRP trail guidelines. Proper trail maintenance will ensure that the trails do not become a hazard or a liability and remain an asset to the community.

Appendix 1: Important Definitions

Adopted	To accept formally and put into effect – usually done by a governing body or board of elected officials.
Aesthetics	The study or theory of beauty and the psychological responses to it, or as being sensitive to art or beauty.
Alignment	See definition for *general trail alignment* below.
Alternate Boundary	See definition for *boundary* below.
Backslope	The excavated, exposed area of the trailway above the tread surface.
Boundary	The Concept Plan established a boundary for the Regional Park, which provides for both recreation and protection of sensitive resources. It includes an *alternative boundary*, which identifies significant opportunities for additional open space or recreation areas.
Climbing Turn	A reversal in direction that maintains the existing grade going through the turn without a constructed landing (15-20 percent and above). Climbing turns take skill to locate and are expensive to construct and maintain.)
Connectivity	The State of being functionally connected by movement of organisms, materials, or energy.
Corridor	Narrow continuous areas of favorable land that allow the movement of people, animals, and plants along them.
Easement	An interest in land owned by another that entitles its holder to a specific limited use or enjoyment.
Fencing	Barrier intended to prevent escape or intrusion or to mark a boundary; such as a barrier made of posts and wire or boards.
Fillslope	The area of the trail below (down slope from) the tread surface.
General Trail Alignment	The term "general alignment" is a planning term used to identify the location of a future trail. It is intended to describe the trail location within a designated area or buffer so that the specific alignment can be determined as the construction project proceeds. This term is especially useful in planning so that property owners and responsible parties have flexibility in determining the final and precise trail location.

Grade	The degree of inclination of a road or slope.
Multiple-Use	Multiple-use, or multi-use trails are the most common type of non-motorized trail facility. Multi-use trails are not restricted to a single user group; there are a variety of users including pedestrians, bicyclists and equestrians.
Open Space/Preserve Area	Lands within the OVRP that are part of the Multiple Species Conservation Program (MSCP). These lands are intended to protect sensitive natural and cultural resources and include most of the Otay River floodway and floodplain as well as most of the adjacent slopes.
Pathways	Pathways are non-motorized transportation facilities located within or adjacent to existing road rights-of-way. They can range from a separated, soft-surface, single track adjacent to a rural road to a widened decomposed-granite shoulder intended for bike, hiking, and equestrian use. Pathways are intended to serve both circulation and recreation purposes.
Public Access	The existing transportation infrastructure surrounding and within the OVRP makes the Park accessible to almost everyone via a major freeway, road, trolley, bus, horse, bicycle or walkway. Access points can include local and regional staging areas; trail heads, and emergency and maintenance access points.
Public Trail	A trail to which the public has permanent legal access.
Puncheon	A wooden walkway used to cross over marshes or deep bogs, to bridge boulder fields, or to cross small streams. It can be used where uneven terrain or lack of tread materials make turnpike construction impractical. It consists of a deck or flooring made of sawn, treated timber, or native logs placed on stringers to elevate the trail across wet areas.
Recreation Areas	Areas suitable for a variety of active or passive use. Recreational areas are identified in the OVRP Concept Plan. They are located outside of environmentally sensitive areas and may be either public or private.
Regional Trails	Trails with features that include: long linear distances; crossing of multiple communities, municipalities, or jurisdictional boundaries; the provision of a wide range of trail experiences; functioning as a prime arterial or corridor with regional significance. These trails generally have more prominence and public recognition because access is typically available to a broad distribution of users. Long-range

planning of these trails is based primarily on issues of connectivity rather than population-derived numerical baselines.

Restricted Use — Single use or restricted use trails typically accommodate a single user type and/or restrict a user type from a trail. Single use trails for hikers have the smallest tread width and typically would be the least expensive trail type to construct.

Retaining Walls — Designed to keep soil and rock in place. They are useful for keeping steep slopes from sliding down and destroying the trail tread, for keeping streams from eroding abutments, and for keeping traffic out.

Right-of-Way — The strip of land over which is built a public road or trail. A precedence in passing accorded to one vehicle or individual over another by custom, decision, or statute.

Single Use/ Staging Areas — Parking area that provides access to the Park. They may provide access to the trail system or to support facilities. Signage with Park maps, history and other support facilities are located in staging areas.

Strategic Plan — Sometimes referred to as a comprehensive plan or business plan. The purpose of the strategic plan is to establish a preferred course of action and to position agencies in the environments in which they best operate.

Switchback — A reversal in trail direction with a relatively level constructed landing. Usually used in steep terrain (15-20% and above), they take skill to locate and are expensive to construct and maintain.

Trail Alignment — The plan of a trail segment in distinction from the grades or profile.

Trail Corridor — A zone that includes the trail tread and the area above and to the sides of it. Trail standards typically define the edges of this area as the "clearing limits."

Trail Easement — An "easement" is a term for the allowed use of property, the ownership of which is retained by the property owner, rather than deeded to the County. Trails are frequently located on tracts of land with easements that were dedicated for purposes such as drainage, flood control, public or private utilities, etc. These easements will be considered for use as public trails when possible, especially in areas with land-use constraints such as private property or of environmental sensitivity. There are also semi-public landowners within and adjacent to the park who require access to their land or associated easements such as school and water districts. Coordinating trail access,

	connections or use of easements shall require dealing directly with each owner on a case-by-case basis. Shared use of easements will be pursued as an option for developing and connecting trails to the maximum extent possible.
Trail Head	Trail heads function as starting points and an orientation point for Park users. They serve as access points for people entering the Park. They will usually have a sign, Park map with the trailhead location, and a brief Park description.
Trails	Trails are non-motorized paths, typically away from vehicular roads, that are primarily recreational in nature but can also serve as an alternative mode of transportation.
Tread	The surface of the trail (natural soil, decomposed granite, etc.).

Appendix 2: Concept Plan

Appendix 5: Native Plants Recommended for Restoration Projects within Otay Valley

The following list of recommended native plants is cited directly from Appendix D in the Western Otay Valley Regional Park Resource Management Plan (WOVRP). The following list is provided as guidance in choosing plants for remedial or enhancement planting in the various botanic communities found in the WOVRP. Any re-vegetation plan will require approval by City of San Diego and/or City of Chula Vista, as appropriate, prior to implementation. The use of endangered, threatened, or sensitive species is encouraged where appropriate.

Diegan Coastal Sage Scrub/Maritime Succulent Scrub Components

Acacia farnesiana (forma minuta) - sweet acacia
Adolphia cal{fornica - California adolphia
Ambrosia chenopodiifolia - San Diego bur-sage
Atriplex confertiflora - four-wing saltbush
Atriplex pacifica - Pacific saltbush
Artemisia californica - California sagebrush
Baccharis sarothroides - broom baccharis
Dudleya variegata - variegated dudleya
Encelia californica - California encelia
Eriophyllum cobnfertiflorum - golden yarrow
Erodium texanum - desert filaree (coastal seed only)
Euphorbia misera - cliff spurge
Fagonia laevis - desert fagonia (coastal seed only)
Ferocactus viridescens - San Diego barrel cactus
Isomeris arborea - bladderpod
Malosma laurina -laurel sumac
Mammillaria dioica - fish-hook cactus
Nassella lepida - foothill stipa
Opuntia californica var. californica - snake cholla
Opuntia littoralis - coastal prickly pear
Opuntia oricola .. shrubby prickly pear
Opuntia prolifera - coastal cholla
Physalis crassifolia forma greenei - San Diego ground cherry
Rhamnus crocea -- redberry
Rhus integrifola - lemonadeberry
Rosa minutiflora - small-leaved rose
Salvia apiana - white sage
Senecio aphanactis - rayless ragwort
Simmondsia chinensis -- jojoba
Viguiere lacinata1 - San Diego County viguiera
Yucca schidigera - Spanish bayonet

Native Perennial Grassland

Achnatherum diegoensis - San Diego County needlegrass
Allium praecox - early onion
Astragulus trichopodus - coast locoweed
Bloomeria crocea - common goldenstar
Calochortus splendens - splendid mariposa lily
Clarkia purpurea - purple clarkia
Convolvulus simulans - clay bindweed
Deinandra conjugens - Otay tarplant
Dichelostemma capitatum - wild hyacinth
Dichondr(l occidentalis - western dichondra
Erodium macrophyllum - large-leaf filaree
Eschscholzia californica - California poppy
Fritillaria biflora - chocolate lily
Harpagonella palmeri - Palmer's grapplinghook
Holocarpha virgata - graceful tarplant
Isocoma menziesii var. decumbens - decumbent goldenbush
Lupinus bicolor - dove lupine
Muilla clevelandii - San Diego goldenstar
Nassella pulchra - purple needlegrass
Plagiobothrys acanthocarpus - adobe popcornflower
Sisyrinchium bellum - blue-eyed grass-iris
Uropappus lindleyi - silver puffs

Riparian Habitats

Anemopsis californica - lizard-tail
Artemisia douglasiana - Douglas' mugwort
Artemisia palmeri - San Diego sagewort
Baccharis salicifolia - mule fat
Eleocharis montevidensis - spike-sedge
Epilobium ciliatum - willow herb
Ericameria palmeri - Palmer's goldenbush
Euthamia occidentalis - western goldenrod
Hymenoclea monogyra - desert fragrance
Iva hayesiana - San Diego marsh elder
Juncus acutus - southwestern spiny-rush –
Juncus bufonius - toad rush
Juncus dubius - mariposa rush
Juncus mexicanus - Mexican rush
Oenothera elata ssp. hirsutissima - great marsh evening primrose
Platanus racemosa - western sycamore
Populus fremontii - Fremont cottonwood
Pluchea Odorata - marsh fleabane

Pluchea sericea - arrow-weed
Quercus agrifolia - coast live oak
Rosa caIifornica - California rose
Rubus ursinus - California blackberry
Salix exigua - narrow-leaf willow
Salix gooddingii - Goodding willow
Salix laevigata - red willow
Salix lasiolepis - arroyo willow
Salix lucida ssp. lasiandra - lance-leaf willow
Sambucus mexicana - elderberry
Verbena menthifolia - mint-leaved vervain

Vernal Pool

Due to the high level of regional endemism and individual character of vernal pools, a detailed plan specific to the pools in question is required to be developed in consultation with City staff.

Bergia texana - bergia
Callitriche marginata - water-starwort
Centunculus minimus -- chaffweed
Crassula aquaticcl - water tillaea
Crassula solieri - vernal pool tillaea
Deschampsia danthonoides - annual hairgrass
Elatine brclchysperma -- elatine
Eryngium aristulatum ssp. parishii - San Diego button-celery
Isoetes howellii - Howell's quillwort
Isoetes orcuttii - Orcutt's quillwort
Lilclea scilloides - flowering quillwort
Marsilea vestita - hairy cloverfern
Mimulus latidens - broad-tooth monkeyflower
Myosurus minimus - little mouse-tail
Navarretia,fossalis - spreading navarretia
Orcuttia californica - California orcutt-grass
Phalllclris lemmonii - vernal pool canary grass
Pilularia americum -- pill wort
Pogogyne nudiuscula - Otay Mesa mint
Psilocarphus brevissimus - woolly marbles

Appendix 6: Other Relevant Agency Plans and Studies

This section identifies other agency plans and studies that were relevant to trails planning in the OVRP. These agencies and plans were considered during the development of this report. They have been listed here for convenience and future reference.

Local

City of San Diego

- City General Plan
- Otay Mesa Community Plan
- Otay Mesa–Nestor Community Plans
- Multiple Species Conservation Program Subarea Plan
- Dennery Ranch Precise Plan
- California Terraces Precise Plan
- Hidden Trails Precise Plan, Robinhood Ridge Precise Plan
- Riviera Del Sol Precise Plan
- Otay Corporate Center Precise Plan
- Western Otay Valley Regional Park Resource Management Plan (WOVRP-NRMP)

City of Chula Vista

- Chula Vista General Plan
- Chula Vista Parks & Recreation Master Plan
- Chula Vista Greenbelt Master Plan
- Chula Vista Multiple Species Conservation Subarea Plan
- Montgomery Specific Plan
- Otay Valley Road and Southwest Redevelopment Plans
- The Otay Ranch General Development Plan
- Phases I and II of the Otay Ranch Resource Management Plan
- Western Otay Valley Regional Park – Resource Management Plan (WOVRP-RMP)

Regional

County of San Diego

- County of San Diego General Plan
- County of San Diego Regional Trail Plan
- County of San Diego Community Trails Master Plan
- County of San Diego Trails Needs Assessment
- Otay Ranch GDP (also part of Chula Vista)
- Phases I and II of Otay Ranch Resource Management Plan (also part of Chula Vista)
- Otay River Valley Resource Enhancement Plan
- Multiple Species Conservation Program (MSCP)
- Multiple Habitat Planning Area (MHPA)

Unincorporated Community Trails

- Jamul Dulzura Trail System

State

State Trails

- California Riding and Hiking Trail

California Department of Fish and Game (CDFG)

- California Endangered Species Act
- CEQA
- Stream Bed Permit

California Department of Transportation (Caltrans)

- SR-125

California Coastal Commission (CCC)

- California Coastal Act of 1976

California Water Quality Control Board

- National Pollutant Discharge Elimination Permit

California Department of Parks and Recreation

- OVRP Trail Easements

Federal

U.S. Fish and Wildlife Service

- South San Diego Bay Unit of the San Diego National Wildlife Refuge
- San Diego National Wildlife Refuge

Bureau of Land Management

- Otay Wilderness Area

U.S. Army Corps of Engineers

- Clean Water Act – Section 404-Wetlands

National Trails

- Pacific Crest Trail

Appendix 7: Sources

In preparing these Design Guidelines, existing, relevant trail information was gathered from various sources and considered for the OVRP. These sources were developed by a wide variety of public agencies and trail related groups. Many of the sources have developed similar guidelines and arrived at similar conclusions.

Careful consideration and cross comparison of these sources helped establish, basic trail information and organizational features helped to establish a basic industry standards for trail terminology, categorization, and guidelines.

This document utilized these basic "industry standards" by customizing them to meet the special conditions, needs and requirements in the OVRP.

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