

Tapia Spur Multi-Use Trail Improvements

April 21, 2011

Malibu Creek State Park

Angeles District



Prepared by

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Tapia Spur Trail Multi-Use Trail Improvements

Project Description

Tapia Spur is multi-use trail from Tapia Park on the south and west of the Malibu Creek group camps. (Map fig #1) This trail provides access for equestrian, mountain bike and pedestrians from the regional trail network to public lands to the south. In the 1990's this trail was reconstructed and rerouted to accommodate multiple trail uses. Traversing a sideslope alignment the trail ascends and descends a low pass in the topography between the two use areas. The trail alignment has a very sinuous and curvilinear alignment (fig #2) that takes advantage of the dendritic topography. Parts of the trail were constructed with sweco dozer.

Over the years the trail has brushed in and slough and berm has reduced the original design widths and clearances.(fig #3) The trail is placed on higher capability soils and is full bench construction.(fig #4 and #5) Surface tread shows minor erosion impacts from use and/or hydrologic run off. The original construction widths ranged from 48 to 60 inches, but with lack of maintenance the trail tread has been reduced and sight distances are not optimal. In recent years there has been a higher level of user complaints with multi-user conflict.

Upon review of the trail in the fall of 2010, it was recognized the trail lacked adequate multi-use design features to reduce the incidence of user conflict. Initial assessments identified the lack of the brush maintenance; minor drainages not decoupled from the trail prism (fig #6, loss of tread width from lack of slough and berm maintenance (fig #7 and #8) and no speed controls on areas lacking sight distance. In one stretch of trail that is poorly aligned with the topography and needing a minor reroute to increase sight distance and eliminate a section of fall line trail.

In the fall of 2010 the Angeles District began brushing the trail back to original standards. In the winter of 2011 there was a request to remove mountain bike use from trail. In April of 2011 a thorough work log was developed to address lack of multi-use design. The work log (fig #14) is included in this report. It includes the various multi-use design parameters of the California State Parks. These design qualities are listed below:

Multiple Trail User Design Parameters

Multi-use trails are designed to accommodate a variety of user groups on one trail tread. For a trail to be considered multi use it must have designated use for mountain bikers, equestrians and pedestrians. Since trails that are specifically designated for Mountain Bike or Horse usage also allow pedestrians as a secondary use this combination of mountain bike/pedestrian or horse/pedestrian are not considered multiuse. It is assumed that pedestrians will utilize all types of designated trails in California State Parks. Many trails will have individual or shared use designations for use by equestrians, mountain bikers and hikers. Specific design parameters shall be incorporated into the layout, construction and reconstruction of the multiple use trails to reduce user conflict. These include sight distance, sinuosity, pinch points, firm and stable surfaces, textured surfacing and no abrupt grade changes. These multiple use design parameters are used in conjunction with each other and trail alignment to topography.

Sight Distance

Different types of users need to see oncoming or approaching trail users to react with the suitable trail etiquette. Sight distance is paramount to taking appropriate actions to safely allow the user to respond appropriately. This requires adequate brushing and trail alignment during layout. User speed affects the length of sight distance required.

Sinuosity (fig #2)

Sinuosity is the trail weaving in and out of the topography to create a curvy alignment. Sinuosity slows the mountain biker down by putting the user's concentration on steering the bike and reducing speed to stay on the trail. Because of this slowing effect, sinuosity reduces the distance needed for sighting oncoming or approaching trail users.

Pinch Points (fig #9 and #10)

Pinch Points are the placement of items such as rocks or logs that create a perceived narrow point in the trail corridor. These items should not be placed opposing each other on the opposite sides of the trail, as placement directly across from each other would create a narrow tread width. Instead, they would be placed "off set" from one another on opposite sides of the trail, giving the approaching trail user the horizontal vision of a perceived narrow spot or pinch point. In reality, the bike user would need to slow in order to proceed past the point as they weave or turn between the two opposing constrictions of trail tread. Since this technique slows the bike user, it also reduces the sight distance needed to react to oncoming or approaching trail users. Pinch points are best placed at locations where a user with ability to gain speed will not surprise or startle an oncoming trail user. They are typically placed at blind corners to slow users for approaching traffic from the other direction.

Firm and Stable Surfaces

Placement of trail alignments on soils and geology consisting of a tough matrix of rock and soils will better sustain mechanical wear. In places of lower soil capability, where trail grade and sheet drainage will not prevent entrenchment and subsequent rutting, a stable aggregate cap is recommended: if this is not feasible, explain why. This will facilitate year round use, as well as provide a safer surface for multiple users and a more uniform tread to sheet drain water.

Textured Surfaces (fig #11)

This is the placement of materials on the tread surfaces that produce a roughened tread. Textured surfaces require additional attention by a user desiring to go fast (mountain bikes, trail runners, equestrian galloping) not negotiate the rougher surface. These surfaces can compose of a rip rap or cobble placed stones to roughen the tread. Careful placement is required to insure natural drainage is not inhibited

Abrupt Grade Changes (fig #12)

All users exert more effort to climb or brake when the trail grade changes abruptly, which decreases sustainability and increases erosion of the trail tread and the protective aggregate cap.

When laying out trails, the gentle transition between grades minimizes the force applied by trail users.

Areas of Retreat (fig #13)

When two users meet on a trail alignment there is the standard yield protocol established with multi-use trails. Bikes yield to all other users and pedestrians yield to equestrians. Yielding occurs when two users meet each other, but sight distance plays a pivotal role in yielding locations. In yielding situations there needs to be adequate trail width or sufficient lower gradient side slope and firm ground for the yielding user to retreat to. Since equestrian users request that all yielding users be on the lower side of the horse, special thought needs to be considered for these locations. If adequate trail width is lacking and the adjacent side slope lacks appropriate characteristics, then widened areas of trail need to be designed.

Enforcement (fig #14 and #15)

Multi-use trail design cannot design out the rogue or inconsiderate trail user. We have to acknowledge that all user groups have such individuals. No design will account for such users and standard trails etiquette is required all trail use as impacts (safety and resource) occur with pedestrian, equestrian and mountain bikes users. This lack of respect for the park resources and the safety of fellow users is an enforcement issue and adequate patrol is required. It is also responsibility of the user groups to develop collaborative user organizations to educate and self control the actions of such discriminate users.

Figure #1 Trail Map

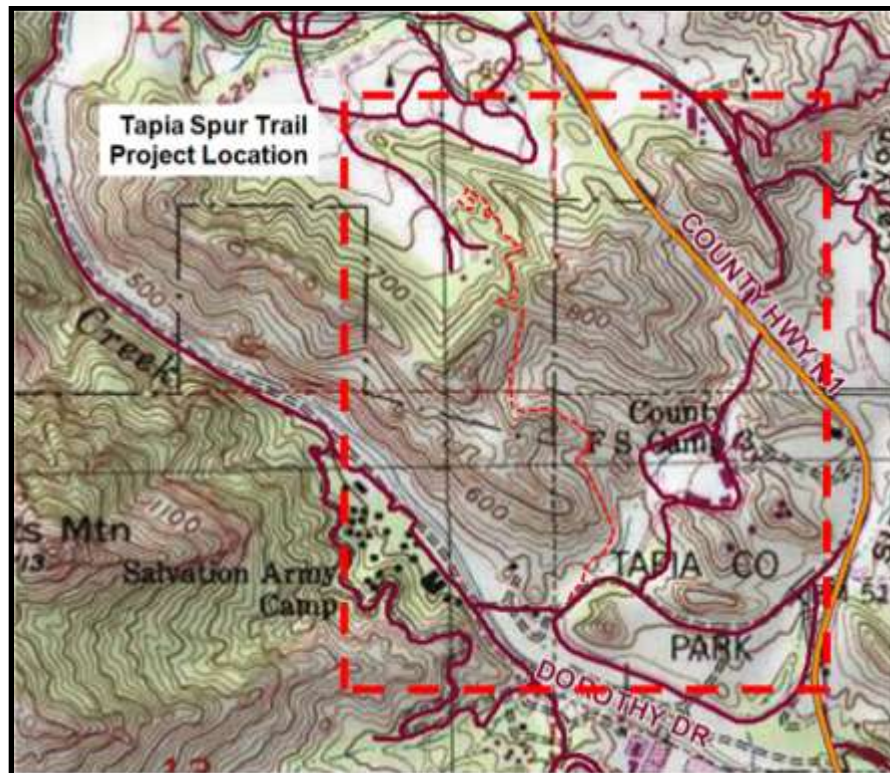


Figure #2 Trail Sinuosity and Curvilinear Alignment

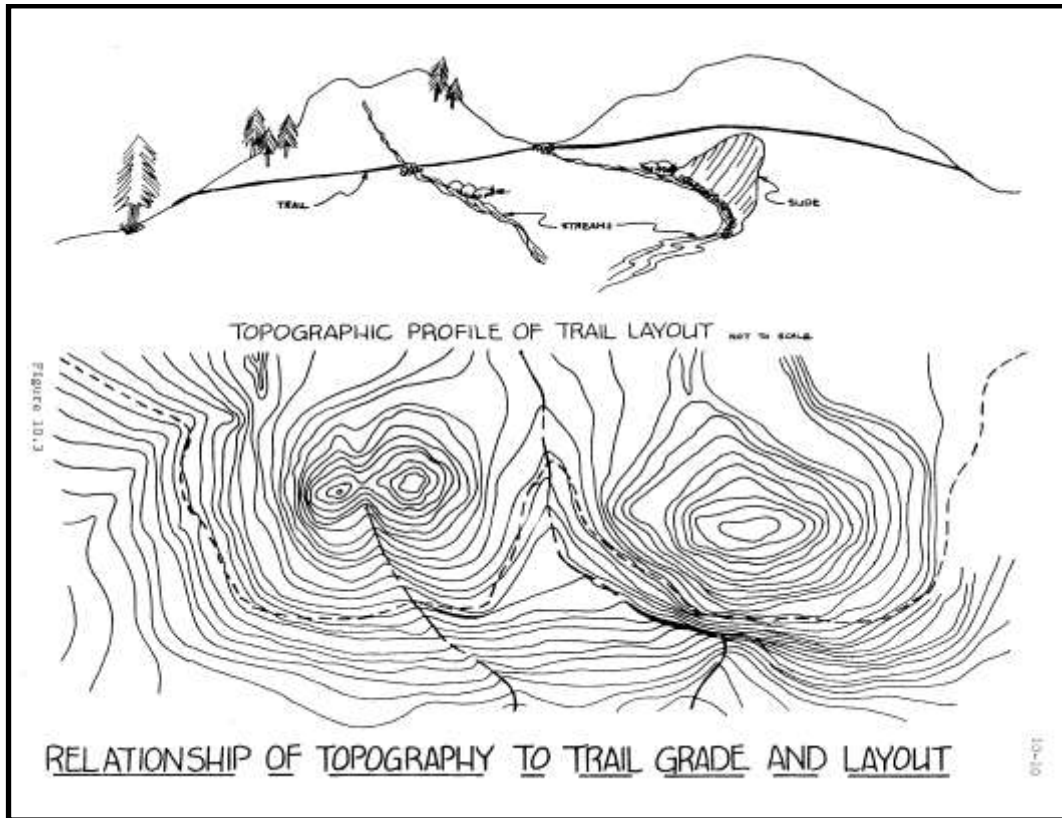


Figure #3 Brushing Diagrams

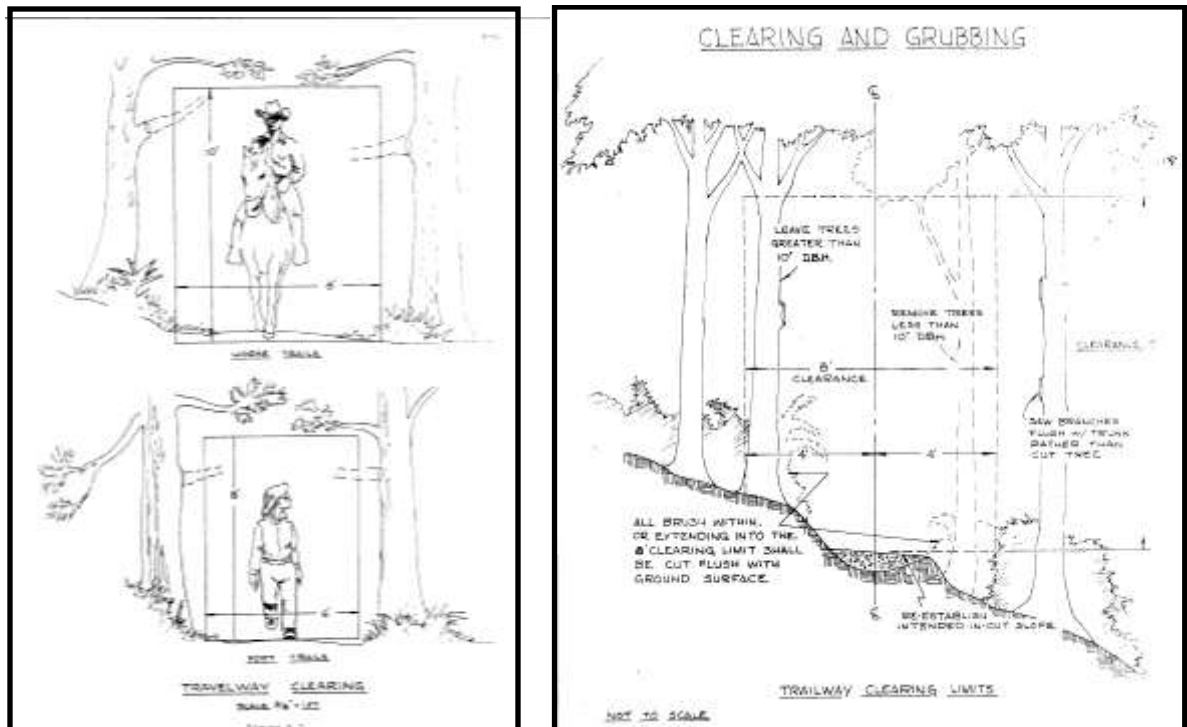


Figure #4 Full Bench Construction

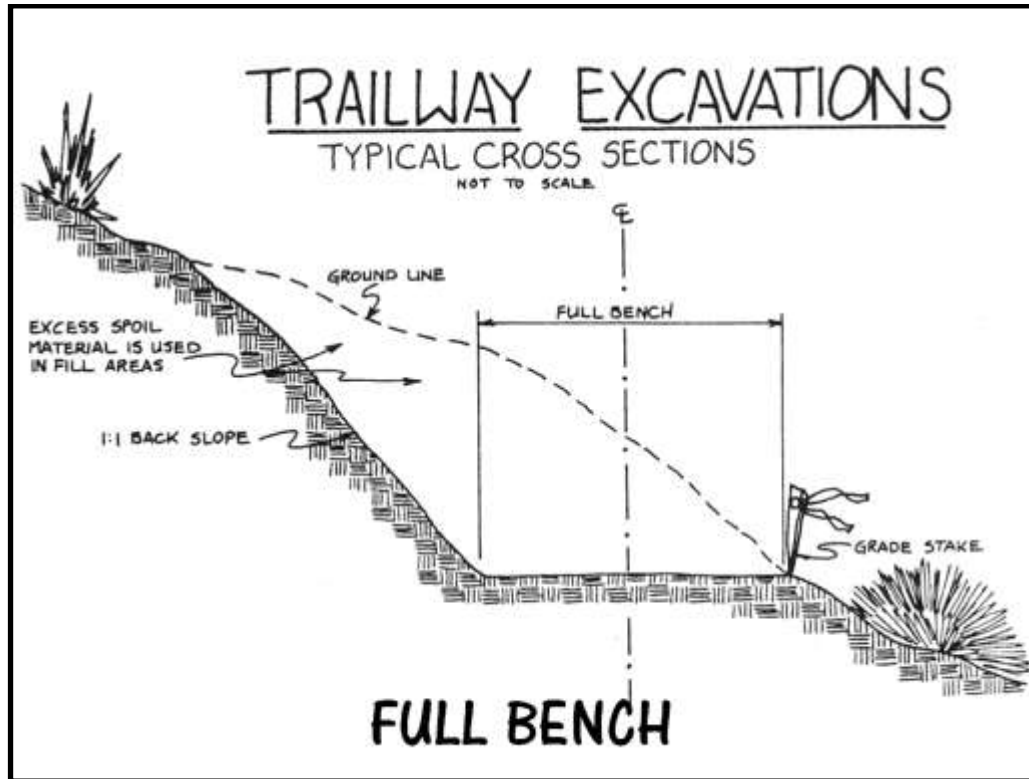


Figure #5 Partial Bench Construction

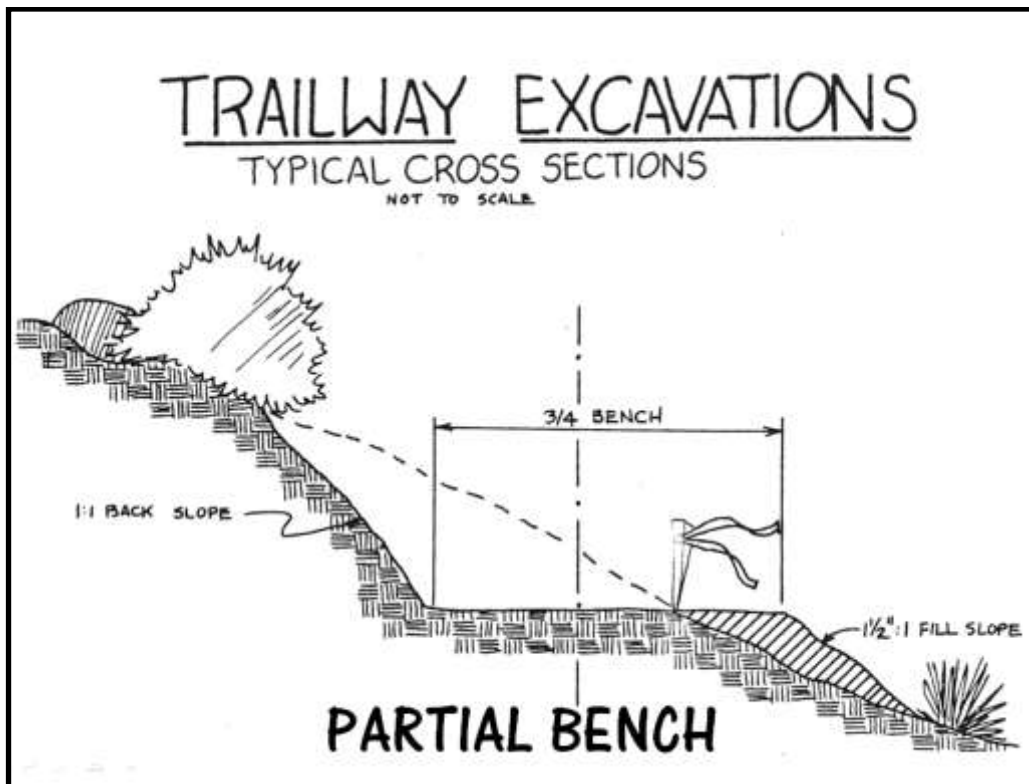


Figure #6 Drainage Crossings Decoupled from Trail Prism



Figure #7 Slough and Berm Maintenance Before

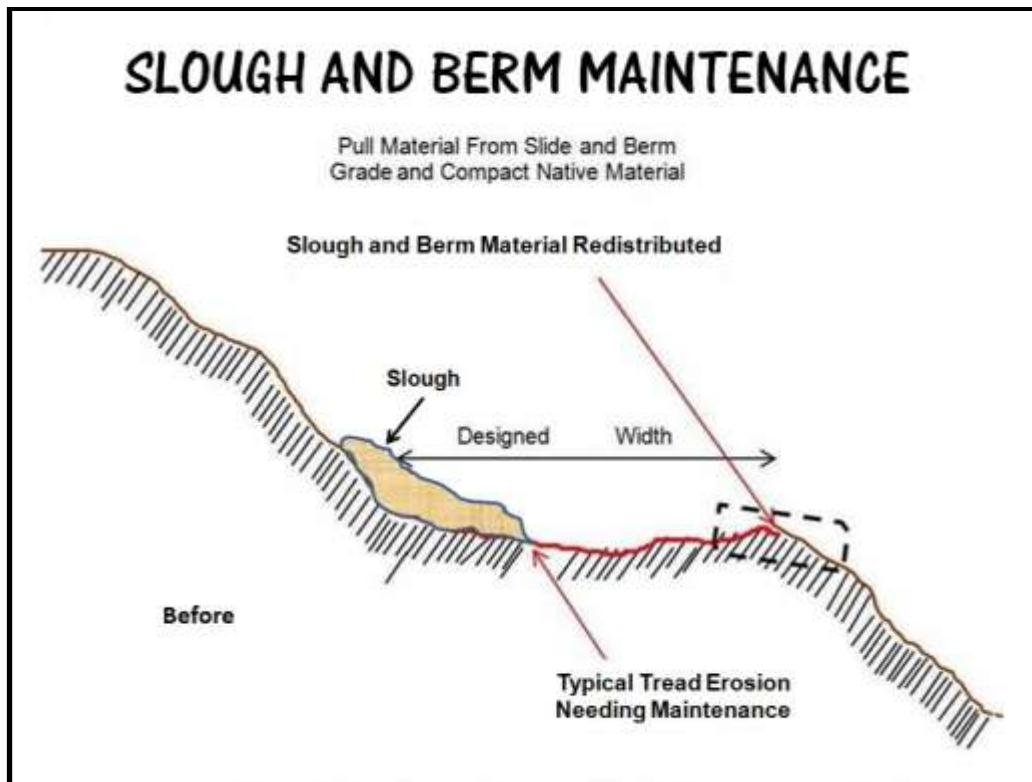


Figure #8 Slough and Berm Maintenance After

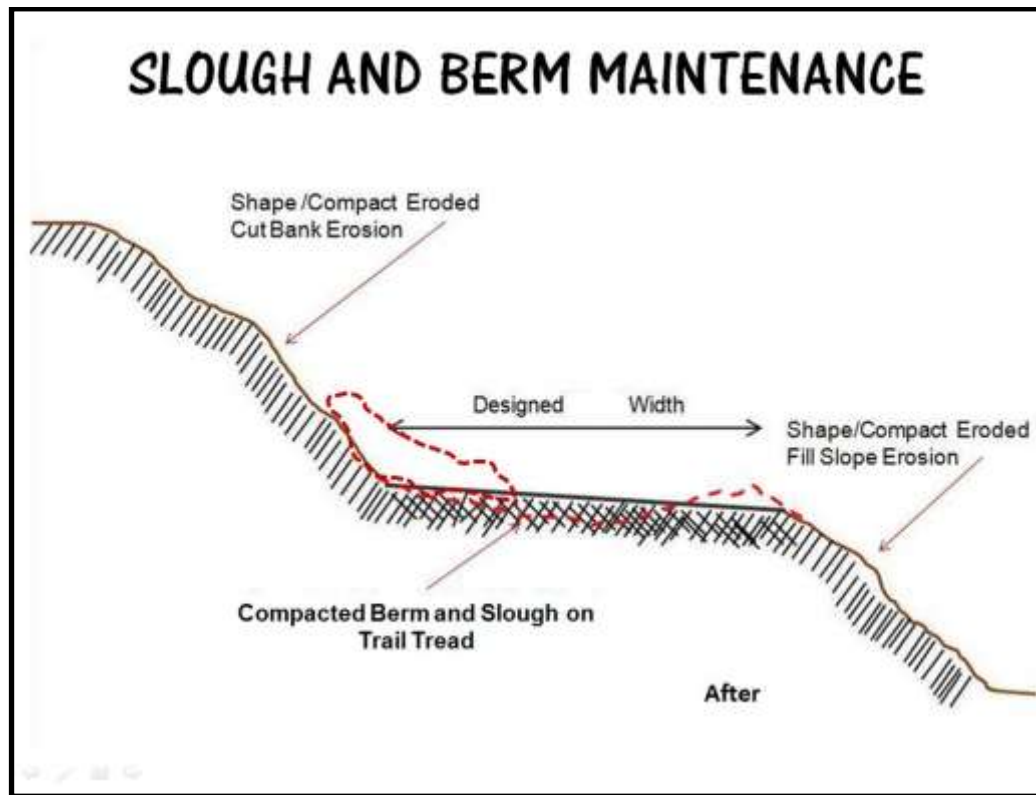


Figure #9 and #10 Pinch or Choke Points

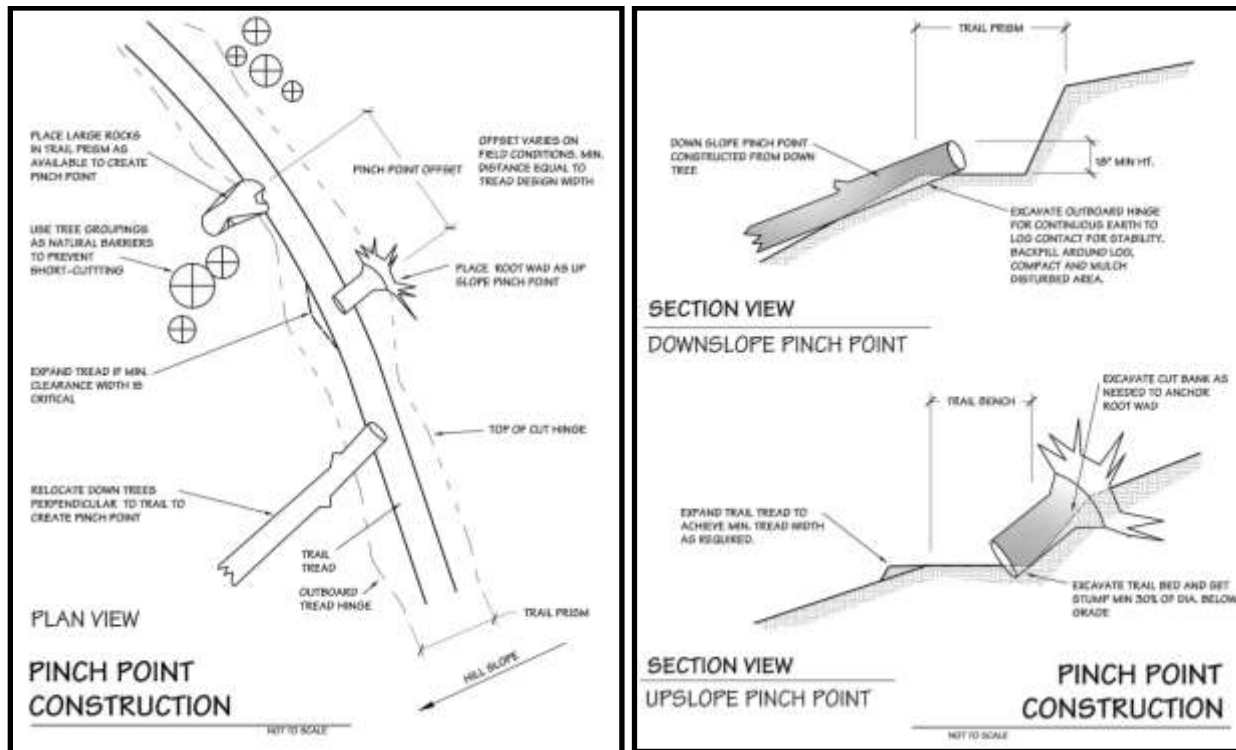


Figure #11 Textured Surfaces/Hardened Drainage Crossings



Figure #12 Abrupt Grade Changes



Figure #13 Areas of Retreat



Figure #14 and #15 Enforcement and Etiquette



Figure #16 Trail Work Log (prescriptions)

Trail:		Tapia Spur		Date: April 12, 2011											
Segment		Tapia Park to Malibu Creek Group Camp		Land Unit: Malibu Creek State Park											
Begin Feet	End Feet	Action	Feature	Feature Attribute	Tread Width	Mechanized	Accessible	Wood / Plank	Size/Qty			Units	Comment	Total	
									L	H	W				
0	5836	Perform	Trail Reconstruction		4				5836.0				lin ft	Trail to original tread widths and provide outslope, drainage swales, reshape tread profiles, remove slough and berms Visual Barrier to deter mechanized use on trail	5836.0
15			Log Barrier												
15	108	Import	Trail Entrenched						930	1.5	8.0		cu ft		
15	108	Import	Fill Material	Distance <300'					930	1.5	8.0		cu ft	material from road edge work at Tapia Park	
90		Install	Pinch Point	Log					1.0				ea		
90		Import	Log Barrier	Distance <300'											
239	397	Import	Trail Entrenched						1580	3.0	6.0		cu ft		
239	397	Import	Fill Material	Distance <300'					1580	3.0	6.0		cu ft	material from road edge work at Tapia Park	
338		Install	Pinch Point	Rock and Log					1.0				ea		
397		Install	Pinch Point	Rock									ea		
757		Import	Rock Barrier	Distance >300'<800'											
757		Import	Log Barrier	Distance >300'<800'											
440		Construct	Armored Swale Crossing						100	1.5	8.0		cu ft	Rock Crossing to have textured surfacing to slow bike use	
440		Import	Rock Wall Rock	Distance >300'<800'					100	1.5	8.0		cu ft		
448			Trail Junction												
448			Rock						2.0				ea	Trail back to parking lot	
590	640	place	Rock						500				lin ft	potential harvesting site for rock pinch points place barrier rock to keep bikes on outside of trail, place rocks at 10' interval on inside hinge of trail potential harvesting site for rock pinch points	
605		Install	Rock						1.0				ea		
757		Import	Pinch Point	Rock											
757		Import	Rock Barrier	Distance >300'<800'											
974		Construct	Armored Swale Crossing						8.0	1.5	4.0		cu ft	Rock Crossing to have textured surfacing to slow bike use	
974		Import	Rock Wall Rock	Distance >800'<1300'					8.0	1.5	4.0		cu ft		
1022		Construct	Passing Area											5' wide to allow multiple user types to pass	
1245		Construct	Armored Swale Crossing						8.0	1.5	4.0		cu ft	Rock Crossing to have textured surfacing to slow bike use	
1245		Import	Rock Wall Rock	Distance >800'<1300'					8.0	1.5	4.0		cu ft		
1525		Reconstruct	Climbing Turn											put in proper drainage	
1525		Install	Pinch Point	Rock					1.0				ea		
1525		Import	Rock Barrier	Distance >1300'<1800'											
1630		Construct	Armored Swale Crossing						8.0	1.5	5.0		cu ft	Rock Crossing to have textured surfacing to slow bike use	

Tapia Spur Work Log

Begin Feet	End Feet	Action	Feature	Feature Attribute	Tread Width	Mechanized	Accessible	Wood / Plastic	Size/Qty			Units	Comment	Total
									L	H	W			
1630		Import	Rock Wall Rock	Distance >1300'<1800'					8.0	1.5	5.0	cu ft		60.0
1750		Install	Pinch Point	Rock					1.0			ea		1.0
1750		Import	Rock Barrier											
1908		Construct	Armored Swale Crossing						8.0	1.5	6.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	72.0
1908		Import	Rock Wall Rock	Distance >1800'<2500'					8.0	1.5	6.0	cu ft		72.0
1980		Install	Pinch Point	Rock					1.0			ea		1.0
1980		Import	Rock Barrier	Distance >1800'<2500'										
2086		Construct	Passing Area										5' wide to allow multiple user types to pass	
2281	2577	Perform	Trail Construction	Hillslope >20%<40%					296.0			lin ft	Reroute Trail for better alignment	296.0
2281	2577	Perform	Trail Brushing Construction	Heavy					296.0			lin ft		296.0
2281	2577	Perform	Trail Clearing Stob Removal	Heavy					296.0			lin ft		296.0
2281	2577	Perform	Trail Obiteration	Hillslope >20%<40%					296.0		4.0	cu ft		
2351		Construct	Armored Swale Crossing						8.0	1.5	6.0	cu ft	Up slope in new trail alignment. Rock Crossing to have textured surfacing to slow bike use	72.0
2351		Import	Rock Wall Rock	Distance >1800'<2500'					8.0	1.5	6.0	cu ft		72.0
2400		Construct	Armored Swale Crossing						8.0	1.5	6.0	cu ft	Up slope in new trail alignment. Rock Crossing to have textured surfacing to slow bike use	72.0
2400		Import	Rock Wall Rock	Distance >1800'<2500'					8.0	1.5	6.0	cu ft		72.0
2421													Estimated spot new alignment crosses existing trail	
2539		Construct	Armored Swale Crossing						8.0	1.5	6.0	cu ft	Down slope in new trail alignment. Rock Crossing to have textured surfacing to slow bike use	72.0
2539		Import	Rock Wall Rock	Distance >1800'<2500'					8.0	1.5	6.0	cu ft		72.0
2587		Install	Pinch Point	Rock					1.0			ea		1.0
2587		Import	Rock Barrier											
2631		Reconstruct	Switchback	Hillslope >30%<40%										
2631		Reconstruct	Retaining Wall Rock Multi Tier						25.0	4.0	1.5	cu ft	lower leg wall	150.0
2631		Reconstruct	Retaining Wall Rock Multi Tier						25.0	4.0	1.5	cu ft	upper leg wall	45.0
2631		Import	Rock Wall Rock	Distance >1800'<2500'					25.0	4.0	1.5	cu ft		150.0
2631		Import	Rock Wall Rock	Distance >1800'<2500'					15.0	2.0	1.5	cu ft		45.0
2671		Construct	Passing Area										5' wide to allow multiple user types to pass	
2675		Construct	Armored Swale Crossing						6.0	1.5	4.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	36.0

Tamias Spur Work Log

Begin Foot	End Foot	Action	Feature	Feature Attribute	Tread Width	Mechanized	As possible	Wood / Radio	Size/Qty			Units	Comment	Total
									L	H	W			
2875		Import	Rock Wall Rock	Distance >1800'<2500'					6.0	1.5	4.0	cu ft		36.0
2770		Construct	Passing Area										5' wide to allow multiple user types to pass	
2825		Reconstruct	Switchback											
2825		Reconstruct	Retaining Wall Rock Muilt Tier						15.0	2.0	1.5	cu ft	lower leg wall	45.0
2825		Reconstruct	Retaining Wall Rock Muilt Tier						15.0	3.0	1.5	cu ft	upper leg wall	67.5
2825		Import	Rock Wall Rock	Distance >1800'<2500'					15.0	2.0	1.5	cu ft		45.0
2825		Import	Rock Wall Rock	Distance >1800'<2500'					15.0	3.0	1.5	cu ft		67.5
2925			Rock										potential harvesting site for rock pinch points and walls	
2947			Rock										potential harvesting site for rock pinch points and walls	
2947		Construct	Armored Swale Crossing						4.0	1.5	4.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	24.0
2947		Import	Rock Wall Rock	Distance >1800'<2500'					4.0	1.5	4.0	cu ft		24.0
2979		Construct	Armored Swale Crossing						6.0	2.0	6.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	72.0
2979		Import	Rock Wall Rock	Distance >1800'<2500'					6.0	2.0	6.0	cu ft		72.0
3020		Install	Pinch Point						1.0			ea		1.0
3020		Import	Rock Barrier	Distance >1800'<2500'									to allow visual sight distance	30.0
3045	3075	Recut	Cut Bank						30.0					30.0
3146		Construct	Armored Swale Crossing						4.0	1.5	5.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	30.0
3146		Import	Rock Wall Rock	Distance >1800'<2500'					4.0	1.5	5.0	cu ft		30.0
3184		Construct	Armored Swale Crossing						4.0	1.5	5.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	30.0
3184		Import	Rock Wall Rock	Distance >1800'<2500'					4.0	1.5	5.0	cu ft		30.0
3284		Install	Pinch Point						1.0			ea		1.0
3284		Import	Rock Barrier	Distance >1800'<2500'										1.0
3362		Install	Pinch Point						1.0			ea		1.0
3362		Import	Rock Barrier	Distance >1800'<2500'										1.0
3384		Construct	Armored Swale Crossing						4.0	1.5	5.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	30.0
3384		Import	Rock Wall Rock	Distance >1800'<2500'					4.0	1.5	5.0	cu ft		30.0
3322		Install	Bench										at summit, provide overlook	
3584		Reconstruct	Switchback	Hill/slope >30%<40%										

Begin Feet	End Feet	Action	Feature	Feature Attribute	Tread Width	Mechanized	Accessible	Wood / Rustic	Size/Qty			Units	Comment	Total
									L	H	W			
3739		Construct	Armored Swale Crossing						5.0	1.5	6.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	45.0
3739		Import	Rock Wall Rock	Distance >1300'<1800'					5.0	1.5	6.0	cu ft		45.0
4054		Install	Pinch Point	Rock					1.0			ea		1.0
4074		Import	Rock Barrier	Distance >1300'<1800'										
4288		Construct	Armored Swale Crossing						5.0	1.5	6.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	45.0
4305		Import	Rock Wall Rock	Distance >800'<1300'					5.0	1.5	6.0	cu ft		45.0
4504		Construct	Passing Area										5' wide to allow multiple user types to pass	
4806		Install	Pinch Point	Rock					1.0			ea		1.0
4806		Import	Rock Barrier	Distance >800'<1300'										
4801		Construct	Armored Swale Crossing						4.0	1.5	4.0	cu ft	Rock Crossing to have textured surfacing to slow bike use	24.0
4801		Import	Rock Wall Rock	Distance >800'<1300'					4.0	1.5	4.0	cu ft		24.0
4829		Construct	Retaining Wall Rock Multi Tier						8.0	3.0	1.5	cu ft	to stop cutting between trail legs	36.0
4853		Import	Rock Wall Rock	Distance >300'<800'					8.0	3.0	1.5	cu ft		36.0
5014		Construct	Retaining Wall Rock Multi Tier						10.0	3.0	1.5	cu ft	to stop cutting between trail legs	45.0
5041		Import	Rock Wall Rock	Distance >300'<800'					10.0	3.0	1.5	cu ft		45.0
5204		Reconstruct	Switchback	Hillslope >30%<40%										
5433		Construct	Retaining Wall Rock Multi Tier						8.0	2.0	1.5	cu ft	to stop cutting between trail legs	24.0
5433		Import	Rock Wall Rock	Distance >300'<800'					8.0	2.0	1.5	cu ft		24.0
5514	5856		Trail Entrenched						34.6	1.5	8.0	cu ft		4098.5
5542	5856	Import	Fill Material	Distance <300'					314.0	1.5	8.0	cu ft	shale material to be hauled in	3767.6
5856			Segment Ends										Group Camp Mailbu Creek	