# TRAIL ASSESSMENT & ANALYSIS FOR PHASE III OF THE FRANKLIN TRAIL, SANTA BARBARA COUNTY, CALIFORNIA

*Report prepared for:*

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and

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# 1 OVERVIEW

This report provides a detailed description and analysis of the Franklin Trail Restoration Project for the Phase III portion of the Franklin Trail located near the city of Carpinteria in Santa Barbara County, California (Figure 1). The project proposes a restoration of a 2.69-mile section of the Franklin Trail located on U.S. Forest Service (USFS) land that was closed for public use in the early 1970s when private property owners along a lower section of the trail revoked permission to use it.

The Franklin Trail is one of the original trails constructed at the turn of the past century when Santa Barbara National Forest was created in 1908. The route was completed in 1913 and served as the main access point for the citizens of Carpinteria to access the Santa Barbara backcountry for hunting, fishing and other recreational purposes. The trail was completed with the financial and volunteer support of the Carpinteria community and served for more than a half century to provide access to a portion of the backcountry otherwise impossible to reach from the City.

Recently, a partnership between the County of Santa Barbara Parks Department, Friends of the Franklin Trail and the Santa Barbara County Trails Council (SBCTC) has organized a campaign to re-open the trail. The project developed through the partnership is designed to re-open the entire 7.9-mile section of the Franklin Trail from the trailhead near Carpinteria High School on the south to the crest of the Santa Ynez Mountains to the north. The project consists of three phases: Phase I, finalization of easements and trail construction through Johannes Flower property and the Horton Ranch; Phase II, finalization of an agreement with Rancho Monte Alegre to allow public use of existing jeep roads from the end of Phase I to national forest property; and Phase III, restoration of the historic trail from the from that point to the crest.

Over the past several years the partnership has been successful in obtaining the needed easements and funding to open the Phase I and Phase II sections of the trail to the public. This 5.2-mile section of the trail (the parts within County jurisdiction) ends provides use of major part of the Franklin Trail that has not been open since the early 1970s. The Phase III project proposes restoration of the last remaining portion of the Franklin Trail not currently open to the public and will provide access to Santa Ynez Mountain crest and interior parts of the backcountry.

## 1.1 Location

The proposed Phase III restoration project is located along a portion of the original Franklin Trail that follows an unnamed ridge between Sutton Creek on the west and the upper watershed of Carpinteria Creek on the east to the crest of the Santa Ynez Mountains. The project area is shown on the United States Geological Survey (USGS) Carpinteria 7.5 Minute Series quadrangle (Figure 2) in portions of Township 4 North, Range 26 West and Township 5 North, Range 26 West, San Bernardino Base and Meridian. The lower portion of the Phase III trail begins at the end of an Edison Jeepway located at an elevation of 1,703 feet and ends at the crest of the Santa Ynez Mountains where it intersects with the Divide Peak Off-Highway Vehicle (OHV) at 3,720 feet.

## 1.2 Purpose & Needs

The purpose of the project is to add Franklin Trail, Phase III to the National Forest Trail System providing recreational access to an area that presently has none. Informal reviews of current use indicate that on an average weekday more than 100 people use the lower part of the trail and as much as twice as many on weekends, making it one of the most popular trails in the Santa Barbara area. The first two phases of the project to re-open the historic Franklin Trail from the Carpinteria city boundary to national forest lands have been completed and are open to the public. The Phase III project will complete the re-opening of the historic trail, provide the community with access to the Santa Ynez Mountains and backcountry, including the upper Santa Ynez River and the Agua Caliente, Mono and Indian Creek areas and nearby wilderness areas.

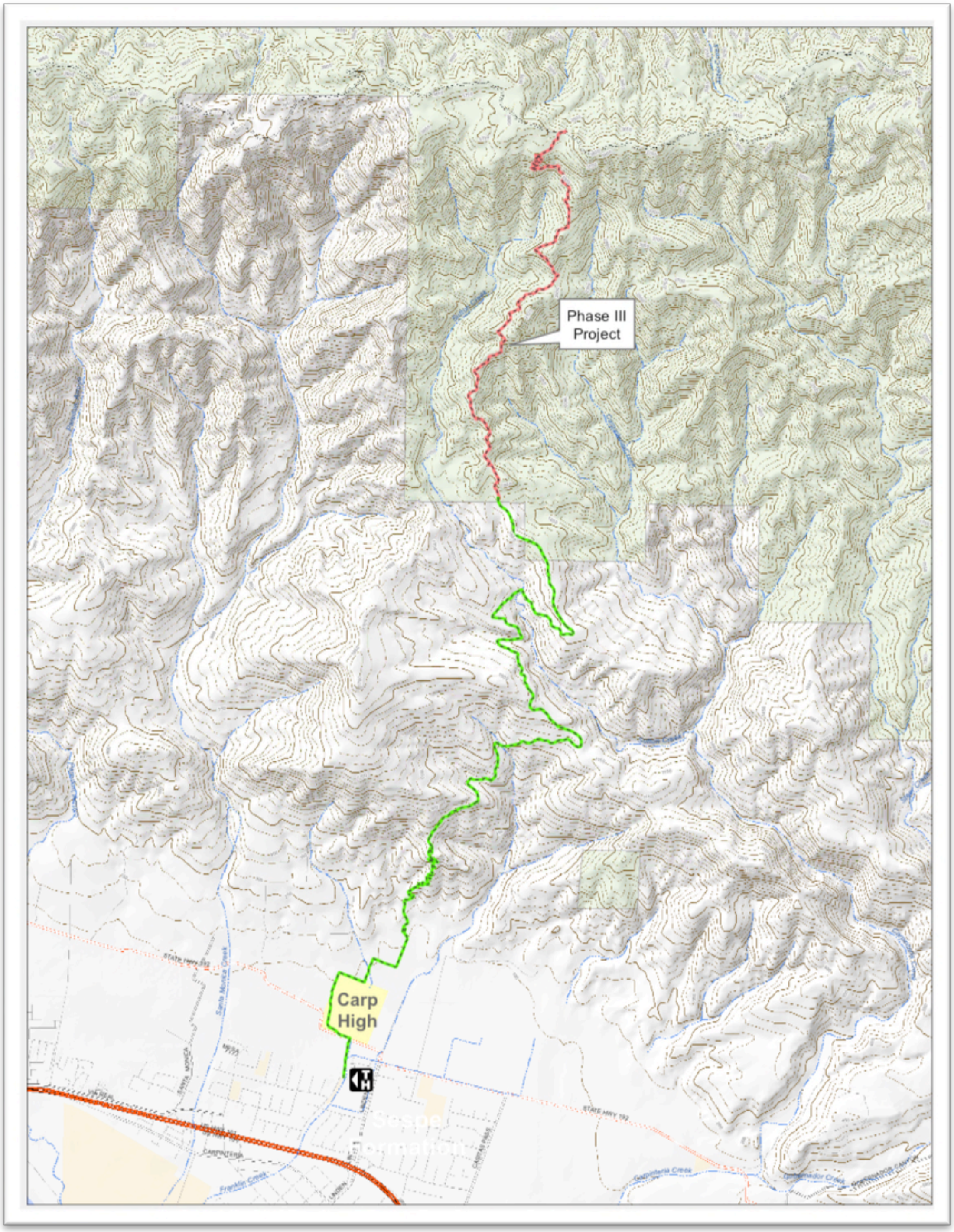


***Figure 1. Phase 3 Project Location.***

*Map shows Phase 1-2 parts of the trail in green that have been completed and are open to the public. The Phase 3 section shown in red is located on national forest land and when completed will open the trail to the crest of the Santa Ynez Mountains.*

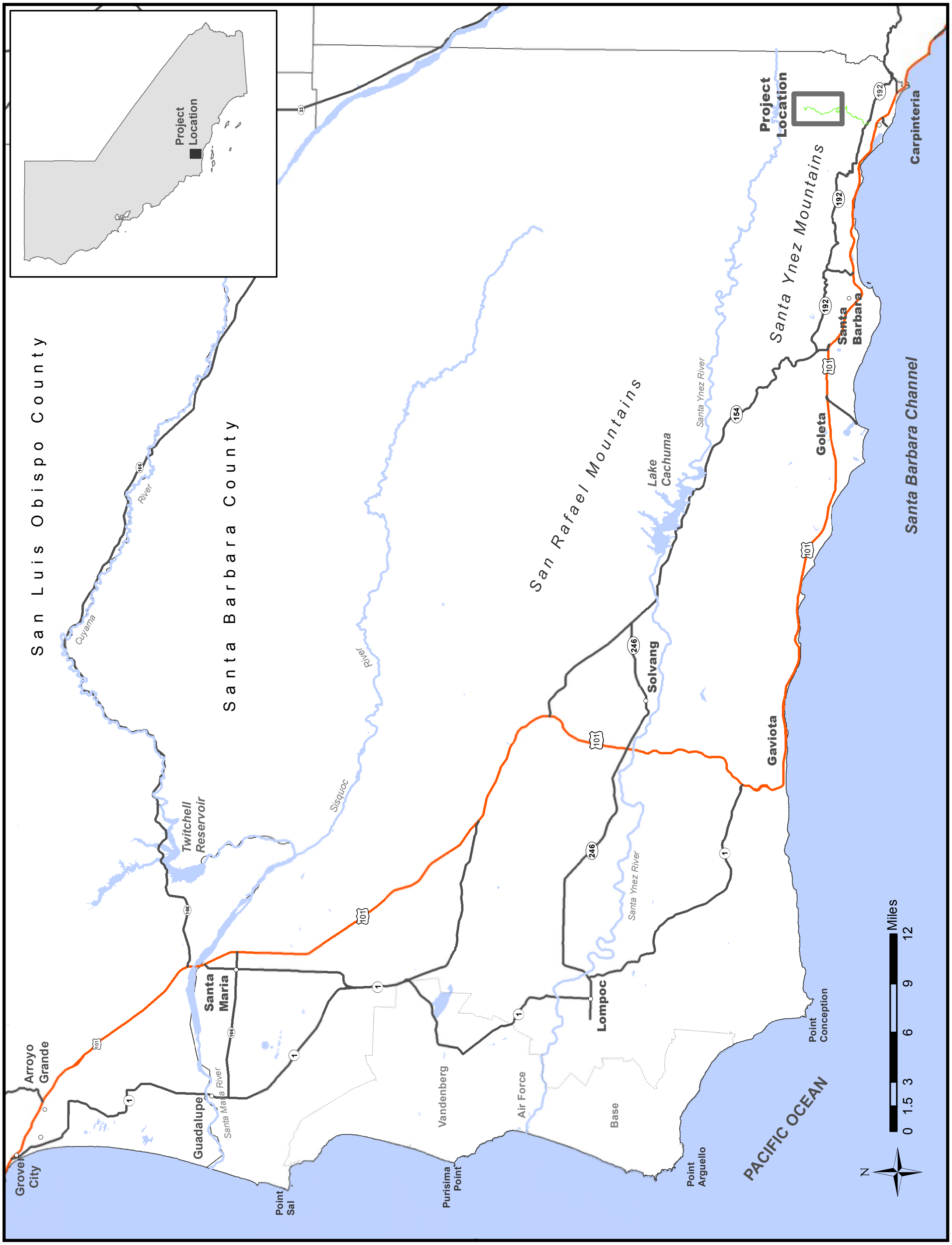


*Figure 2. Project Location Overview*

# 2 BACKGROUND

## 2.1 Trail History

The Franklin Trail is one of our area's oldest trails, having been constructed in 1913 by the Forest Service and support from the Carpinteria community. For many years the trail was one of the most popular ways to access the backcountry, climbing over the crest of the Santa Ynez Mountains and dropping down Alder Creek to an area known as Billiard Flats, not too far from the present site of Jameson Reservoir.

In that year the *Santa Barbara Guidebook*, authored by Leila Weekes Wilson noted: "The Carpinteria-Juncal Trail [the Forest Service designated name for the trail], a new trail, from Franklin Cañon, Carpinteria, over the mountains to the upper Santa Ynez River, is now complete. This is a trail that will appeal strongly to every resident of Santa Barbara County. From the summit one may turn and look toward the Pacific Ocean and the islands, and the Eden of Santa Barbara County, the lovely valley of Carpinteria, at your feet. While looking east [actually north] are rugged ranges that drop down to the beautiful Santa Ynez River, where trout fishing is good, and camping facilities ideal."[1]

**Cate School Adventures**. One of those who plunked down a chunk of change to see the Franklin Trail completed in 1913 was Curtis Cate. According to Roxie Grant Lapidus, whose description of these early days on the Franklin Trail in her essay titled: *The Historic Franklin Trail and Early Adventures in the Back Country*, "Cate quickly discovered the trail's potential for teaching his kids some tough lessons," she wrote "Mr. Cate was an advocate of cold showers and rugged outdoor experiences, and every student was required to have a horse. Small groups of boys rode the local trails every weekend, either toward the Casitas, or up the Franklin Trail and over into the Santa Ynez River area."[2]

Lapidus also describes the nostalgia for one student who as he is about to graduate, describes what the experience has meant to him: "One cannot possibly forget certain moments associated with camping: that first smell of frying steak, the first meal prepared in the twilight after the long ride over the Coast Range, and, next morning, the keen exhilaration of a plunge into the Santa Ynez. What can be finer, on the return trip, after the exhausting climb up the north slope of this last western range, than reaching the summit and looking out over that wide vista of coastal plain, the blue Pacific, and beyond…."

The Franklin Trail provided access for decades for many an outdoor adventurer, hunter, fisherman and backcountry explorer for many decades until things began to change after World War II, especially as avocado ranching became more and more prominent. About the same time Carpinterians were first venturing over the Santa Ynez Mountains to explore the mysteries of the backcountry, Santa Barbara Judge R.B. Ord introduced the Mexican avocado to the area. By the 1950s a number of varieties were becoming commercially successful, among them the Fuerte and the Hass.

**Avocado Ranches Boom**. In Carpinteria, ranches such as those owned by the Franklin families and others began to change hands and this shift in ownership accelerated in the early 1960s when the Carpinteria Valley became a mecca for commercial flower growing. Over time a wide swath of valley land stretching along the base of the mountains from Santa Monica Canyon east to the County were developed either for avocados or nursery related businesses. By the mid 1970s, public access to the mountains ground to a halt.

The issue for the local ranchers was what is known as avocado (*Phytophthora*) root rot, considered to be the most serious and important disease of avocado worldwide a disease that is potentially fatal should a tree become infected. Worrying that horses or foot traffic could introduce the disease into their orchards

[1] Leila Weekes Wilson, "Santa Barbara Guidebook, 1913.
[2] Roxie Grant Lapidus, *The Historic Franklin Trail and Early Adventures in the Back Country.*

the solution was simple; keep the public out. By the 1980s, fate of the Franklin Trail was held in the hands of three property owners: Johannes Flowers, the Horton Ranch and a large 3,000+ acre holding above known as Rancho Monte Alegre, owned by RMA Partners VI (RMA). The question was whether easements through the three properties might ever be established. Of these, the Monte Alegre property was the first that the County and its Riding and Hiking Trails Advisory Committee (CRAHTAC) began to look at since it stretched from the top of the first knoll behind the high school to national forest owned land further inland. Eventually after a number of battles, both in court and in the political arena, an easement was confirmed through the property but only under the condition that it be fenced on both sides for its entire length. Clearly that was no a practical option and for the 1980s and 1990s, there was little progress in re-opening the trail.

**Land Trusts Get Involved**. Then in the early 2000s, a glimmer of hope appeared when negotiations began for the development of conservation easements on two of the properties. In 2004, RMA Partners approached the Trust for Public Land (TPL) in 2004 to discuss a conservation easement that would help protect the natural and agricultural resources and provide the long sought trail easement that could re-open the Franklin Trail.

According to the TPL website "the conservation easement granted to The Land Trust for Santa Barbara County, permanently extinguished development rights on the property except for the agreed upon 25 home sites and permitted agricultural uses." In addition the RML Partners agreed to begin a separate discussion on the donation of two major public trail easements, one along the Franklin Trail corridor and the other an east-west route that could tie into other existing trails.

Then in late 2005 Bill and Glenna Horton, owners of the middle property, entered into an agreement with the Land Trust for Santa Barbara County to preserve 104 acres of the Horton avocado ranch. "We wanted to preserve it as a ranch and open space for the benefit of the community," noted Bill. "I would hope other property owners do the same. I hate to see the hillsides covered by these monstrous homes and/or greenhouses."

"It's a way for some owners to get the value out of their home without selling it," said Land Trust Executive Director Michael Feeney at the time. "If the ranch is ever sold, he noted, conditions of the conservation easement do not change.

It appeared that public access to the Franklin Trail might soon be on the horizon. However, it turned out not to be the case. Along with a number of technical stumbling blocks it turned out that raising the funds needed for the construction of the trail once the easement issues had been settled was not so easy. County Parks turned to a grant source known as the CA Recreational Trails Program but was turned down repeatedly in the mid-2000 period. When the economy sunk in 2008, the grant funds began to dry up and when the economic issues began to impact the RML lands, discussions relating to the easement on that property began to lag as well.

**Friends of the Franklin Trail Emerge**. Enter long time trail supporters Jane Murray and Bud Girard, both members of the Montecito Trails Foundation and long time Carpinteria residents, who stepped up and took the lead. With Bud working with the County and Land Trust on the technical issues and Jane helping to spearhead the fund raising side, a group known as the Friends of the Franklin Trail was born in 2010. By 2012 the group had raised sufficient funding that trail construction was now a real possibility.

**Phase I Opens**. In the meantime, both County Park officials and the Friends of the Franklin Trail intensified discussions with Horton Ranch representatives and initiated discussions with Johannes Persoon on an easement through his nursery. Issues relating to the easements were resolved in early 2013 and sufficient money was raised for the project to move the project ahead. Construction began in late May and after 45 years of trail closure, the Phase I section of the Franklin Trail was opened in July 2013.

**Rancho Monte Alegre Agreement for Phase II**. Though the re-opening the Phase I section of the trail was considered a major accomplishment in the effort to open the entire length of the Franklin Trail, an additional easement with RMA was required to open the trail further. However, development of lots on the eastern portion of the property had stalled over the past few years due to economic issues putting discussion of the easement on the back burner. With the opening of the Phase 1 section of the trail, the overwhelming popularity of the trail and increased interest from the public in opening the Phase II section, discussions on the easement were re-started. The main hindrance to getting that approved was a requirement to fence the trail along the entire portion of the RMA property. Eventually the issues were resolved and in April 2015 the Phase II section was opened as well.

**Phase III — Los Padres National Forest**. Concurrently with discussions relating to the easement through RMA property, the Santa Barbara County Trails Council requested permission from the Forest to open a preliminary route (p-line) through the Phase III section on national forest land. Permission was granted to cut a p-line along the route and work began in early 2014 on creating an opening along the historic route from the end of the Phase II section to the crest of the Santa Ynez Mountains. Work on the p-line continued through late spring 2014, was suspended during fire season, and started back up in November 2014 when the fire danger had passed. The p-line was completed on January 31, 2015.

***Figure 3. Hunting Excursion via the Franklin Trail***

*Back from a hunting excursion to the backcountry, brothers John H. and James W. Ogan with a large buck return to the Ogan's Carpinteria ranch. Photo courtesy of Ogan Family.*

Currently, SBCTC is in the process of working with the Santa Barbara District Ranger of Los Padres National Forest on the surveys and environmental reviews in compliance with the National

Environmental Policy Act to determine whether or not Phase III will become part of the National Forest Trail System.

# 3 PROPOSED ACTION

Los Padres National Forest proposes restoration of a 2.69-mile section of the historic Franklin Trail as part of the National Forest Trail System to Class 3 Pack and Saddle standards that will provide for shared use of the trail by those on foot, equestrians and mountain bikers. The proposed project begins near the terminal end of an Edison Jeepway Road (34.443378° N, 119.506464° W) where the Santa Barbara County easement for the trail ends and the Forest Service section of the Franklin Trail would begin. The project area then continues along the historic route of the Franklin Trail to the crest of the Santa Ynez Mountains where it intersects the Divide Peak OHV route (34.466455° N, 119.501663° W) See Figure 3 next page.

The project would primarily involve Level 1 and Level 2 trail maintenance work (Appendix E) that includes brushing, maintenance of the trail corridor and tread disturbance where erosion control features and short sections of crib wall are needed. Project work includes:

- Brushing, clearance of stubs, roots and other impediments to create a corridor eight feet wide and ten feet high to meet Pack and Saddle Standards that is safe for multi-use.
- Restoration of the tread to a width of four feet, including the removal of slump material and backsloping the hillside.
- Use of rock to reinforce and armor the trail edge and minimize wear.
- Installation of short 5-8 feet sections of crib wall as needed to protect less stable sections of the trail, sections of the trail where the trail is washed out or minor slides have occurred.
- Addition of rolling grade dips, grade reversals, water bars and step overs and other techniques to minimize erosion control sedimentation as described in Section 5.1, *Designing Sustainable Trails*.

In addition to the Level 1 and 2 trail maintenance, approximately 200 feet of Level 3 crib wall construction is proposed, constituting less than .01% of the total trail length in Phase III, to reinforce sections of the trail that have washed out. The crib wall construction will use native rock located along these sections along with rebar and cement to reinforce them as needed. Section 6 of this document provides specific detailed recommended (mitigation) work for the entire length of trail.

The restoration work will be completed by an SBCTC trail crew along with volunteers from the Carpinteria community and Los Padres Forest Association.

Equipment used during the project includes use of hand tools (shovels, Mcleods, Pulaskis, hand saws, winch), power tools (chain saws, field generator, hammer drills) and a Kubota K-018 tractor where practical. All work will occur during the fall, winter and spring months to minimize the potential for fire danger and will be done using Fire Mitigation practices approved by Los Padres National Forest.

## 3.1 Project Area Description

The Phase III section of the Franklin Trail located on national forest lands was originally constructed in the early 1900s and completed in 1913. The trail was designed primarily for pack and saddle use. As a result it was constructed to reach the Santa Ynez Mountain summit in as short a route as possible. Though steep, most of the tread is still intact, requiring only brush removal to make it passable.

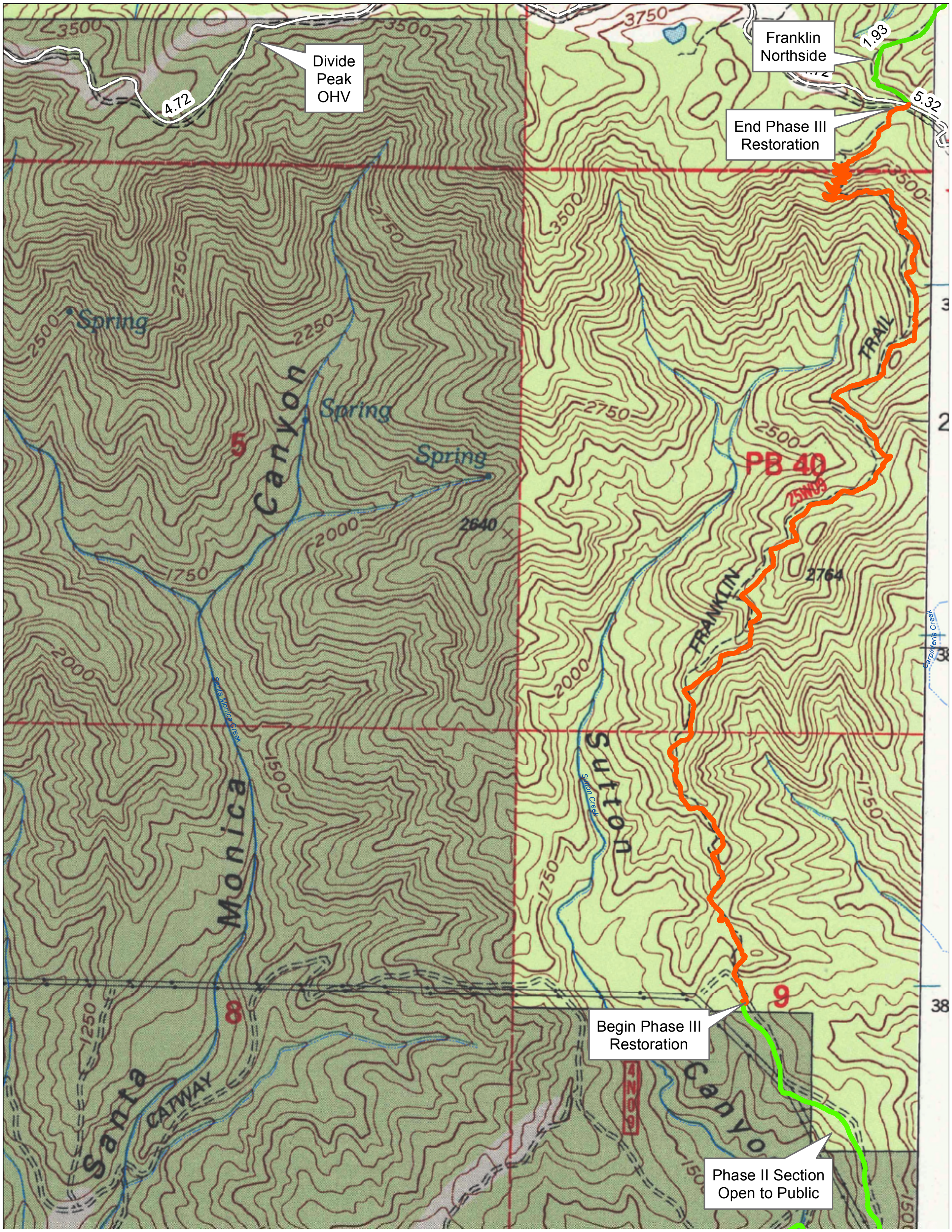


*Figure 4.  USGS Carpinteria 7.5 Minute Quadrangle*

The trail follows a long ridgeline between Sutton and Carpinteria creeks running predominantly along the western and northwestern edge of the ridge for the first two miles. The trail ranges from 50 to 150 feet in elevation below the ridgetop. Unlike most other front country trails, until the final last 700-foot climb to the crest, where there are numerous switchbacks, there is only one other switchback along the first 2.4 miles of the Phase III trail. Partly this may be due to desire of those constructing the trail to reach the rest in as short a distance as possible, but primarily it is due to the sharpness of the ridge and the steepness of the side slope — often in excess of 60%, makes addition of switchbacks almost impossible to construct or maintain.

Given the lack of maintenance over the past four decades, the trail remains in remarkably good condition. Partly this may be due to the heavy growth along the trail that has helped stabilize the trail tread and partly because of the lack of use. Recent surveys conducted while the p-line was being opened up note the following:

1. Almost 40% of the trail consists of firm tread that is a minimum of 4 feet wide or with minimal clearing of slump material along the inside part of the trail, would restore the trail to its original 4-foot width. It appears there has been little damage to the tread. Minimal work will be needed to improve these sections to Class 3 Pack and Saddle standards, including brushing, clearance of stubs and other obstructions, backsloping and the addition of erosion and sedimentation control features.

***Figure 5. Tread typical along a majority of Phase III.***

2. Along approximately 50% of the trail hillside slumping has narrowed the tread width to between 18-to-24 inches wide. In combination with the restoration described above, the slump material will have to be removed and additional backsloping done to widen the trail to a width of four feet. Additional features such as use of short sections of crib wall and armoring the outside edge of the trail may be needed to stabilize the tread and prevent erosion.

***Figure 6. Narrow Tread Requires Widening***

*Other parts of the trail similar to the section above are narrower, either due to more extensive slumping. In areas like this removing more of the backslope material to widen the trail to a four-foot width will be required. Rock material from the backslope and finely cut dead brush can be used as armoring on the outside edge of the trail to minimize damage to the tread and reduce sedimentation.*

3. Less than 10% of the trail needs more intensive restoration and less than .01% of that requires construction of more intensive crib walls. Small slide areas and several sections 30-50 foot in length will need crib wall added to stabilize the trail tread and there are other sections where rock obstacles will need to be removed to improve safety for shared multi-use.

**TRAIL RESTORATION NEEDS**

The figures to the right are examples of the 10% of the Forest Service portion of the trail project that will require more extensive work to widen the trail, repair washouts and construct crib walls.

### *Figure 7. Trail Washout*

Upper right. A short 16' section of the tread has washed away. As a part of the p-line work to open the historic trail for environmental review, a narrow 10" wide tread was cut to allow safe passage. Areas like this are continual sources for erosion, unchecked sedimentation and eventually the creation of steep gullies. Use of nearby rock material is proposed for construction of crib walls to reinforce the outside edge of the trail and armor it against future damage.

### *Figure 8. Narrow Rocky Section*

Middle Right. The trail passes through a rocky section. More extensive work to remove some of the rock will be required to widen the trail but areas like this are also excellent sources of rock for crib wall construction, step overs and trail armoring.

### *Figure 9. Major Restoration*

Lower Right. This image shows one of two spots along the Phase III sections of the Franklin Trail that will require more extensive restoration. The other is around the corner and out of sight. Slumping of the extremely steep backslope has washed out this 80-foot section of trail and made it very dangerous for all trail users. These parts of the trail are the two main spots where more extensive Level 3 restoration will be required to make them safe for shared use.

## 3.2 Trail Grade

Total elevation gain along the Phase III section of the trail is 2,017 feet. Over the entire section the resulting grade is 14.7%, which is well above typical USFS standards for trail grade. However, the grade is not distributed evenly along the trail. Some sections are in excess of 30% grade and others much less, including several sections where the trail drops for short distances. The result is a trail that alternates between shorter sections of very steep grade ranging from 25-35%; plateaus where you can catch your breath and rest your legs; followed by slight downhills and longer uphill sections from 8-14%. Rarely are there places along the trail that meet typical Forest Service standards for grade (8-10%).

It appears from the surveys, conducted over multiple trips along the trail that mitigating potential impacts caused by excessive grade will be the single most critical consideration to be addressed. See the chart Appendix A for information relating trail grade in Phase III.

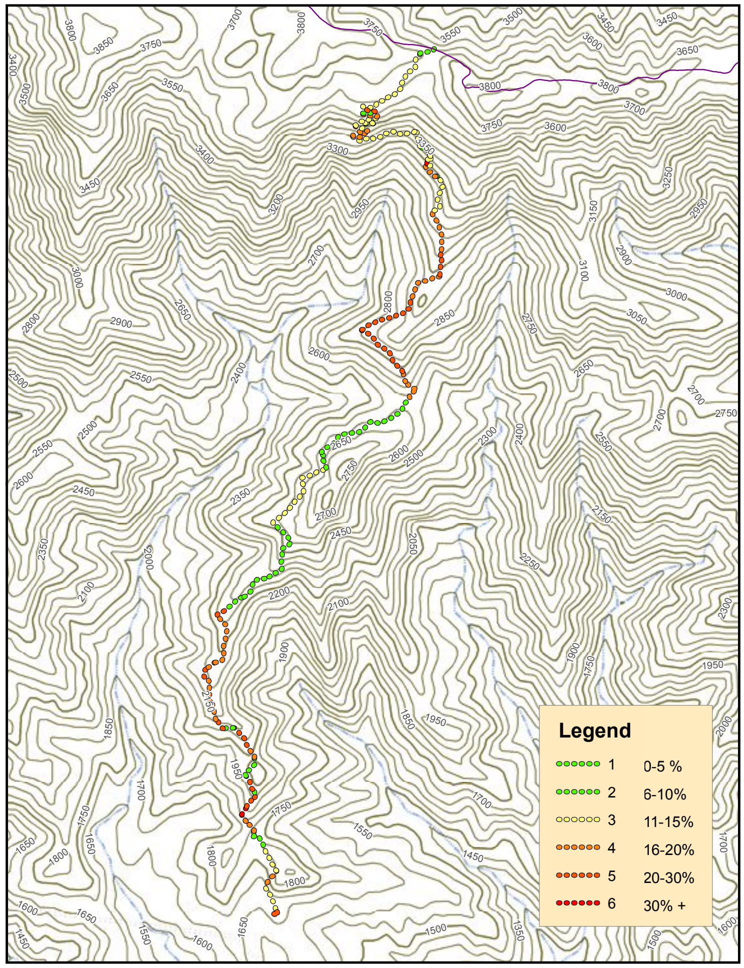


***Figure 10. Color Coded Trail Grade Map***

## 3.3 Trail Design Mitigation

The majority of the Phase III section of the Franklin Trail consists of trail that contours along the western side of a long ridge that leads from the Edison Jeepway to the point where the trail meets a last major headwall where it then switches back and forth to the crest. Such contours are known as "sidehill contours."

The most important consideration in designing hillside contour trails is minimizing the impacts caused by water flowing across and down the trails. This is especially true of ones like the upper part of the Franklin Trail that are very steep. This can be accomplished by use of a number of erosion control techniques, beginning with designing for grade. The general rule of thumb for mountain trails like the Phase III section is that trail grade averaging 10% or less will be the most sustainable on most soil for most types of use.[3] Because not all trails fall within that range, trail managers also use two additional concepts in determining appropriate trail grade: the "Half Rule;" and Maximum Sustainable Grade.

**Half Rule**. This states that slope of the trail should not be more than one-half of the cross slope. This has the most application in less steep areas. For example, if the slope of the hill the trail runs along is 16%,

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[3] Building sustainable trails: key design elements, http://www.americantrails.org/resources/trailbuilding/MAsustain.html, 2008.

according to the rule the grade should be no more than 8%. The concept behind this rule is that if a trail is too steep, relative to the slope of the hill, water will tend to collect and run down the trail instead of sheet flow across the trail and down the hill.

Hugh Duffy from the NPS Rocky Mountain Region takes the concept a step further, noting that due to topographic variation characteristic of most mountain trails, the rule should be closer to a 1-to-4 ratio. His findings "suggests a 2.5% maximum profile grade in 10% cross slope areas, 5% in 20%, 10% in 40%, and 12% maximum profile grade in 48% cross slope areas or greater." It is clear that many segments of the proposed project, regardless of the steepness of the sideslope, are far in excess of the maximum of 12% that Duffy recommends.[4]

Duffy also notes in his article that making this determination involves a lot of factors beyond simply calculating the grade. Other factors he mentions include "soil types, aspect, exposure, season of use, type of use, volume of use …. trail design and maintenance standards, ecological implications of vegetation, and functional and aesthetic control points." The key point being made is that other factors besides grade, such as geology, vegetation, trail design and maintenance can play a role in making steep trails sustainable.

In its *Trail Construction and Maintenance Notebook, 2007 Edition*[5] the U.S. Forest Service also notes:

> "Trails of greater difficulty can be built at grades approaching 15 percent if solid rock is available. Trails steeper than 20 percent become difficult to maintain in the original location without resorting to steps or hardened surfaces."

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[4] Hugh Duffy, National Park Service, QUESTIONS and ANSWERS from webinar on Mountain Trail Sustainability, 2014.

[5] USDA, Trail Construction and Maintenance Notebook, http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf07232806/pdf07232806dpi72.pdf, 2007.

**Maximum Sustainable Grade**. While most trail managers agree that trail grades in the 8-10% range are most appropriate and may be sustainable up to 12-15%, there is agreement that shorter sections of trail with much steeper grade can be sustainable if the appropriate trail mitigation measures are used.

***Figure 12. Use of Drain Dips and Reversals.***

This 150-foot length of trail climbs at a grade of 19%. Note the slightly undulating character of the trail and slight dips along it. Even though climbing at a relatively steep grade, by using more pronounced outsloping (8-9% rather than the usual 5%) and adding several rolling drain dips, water can be sheeted off the trail.

In addition, by lining the slope below the tread with the brush (brush and fill), chainsawing it into fine pieces, and lightly covering it with soil when clearing out the slump material, an excellent barrier can be created for managing any sediments that might flow off the trail.

Step overs composed of nearby sandstone rocks can also be used to create barriers that can also force water off the trail where the trail is too steep for dips.

# 4 GEOLOGY

Among the many variables that help determine maximum sustainable grade for this project are the formations underlying the trail. More than 60% of the Phase III section of the trail is underlain by two massive and highly resistant formations: Coldwater Sandstone along the lower portions of the trail and Matilija Sandstone along the upper part of the trail. Collectively they form the bulk of the mountains immediately behind Carpinteria.

The Santa Ynez Mountains form the most westerly part of the Transverse Ranges, one of the few ranges in the United States that runs in an east-west direction. Rising at an angle of almost 50 degrees, the Santa Ynez portion of the range forms a vertical wall separating the costal areas from the interior parts of Santa Barbara County.

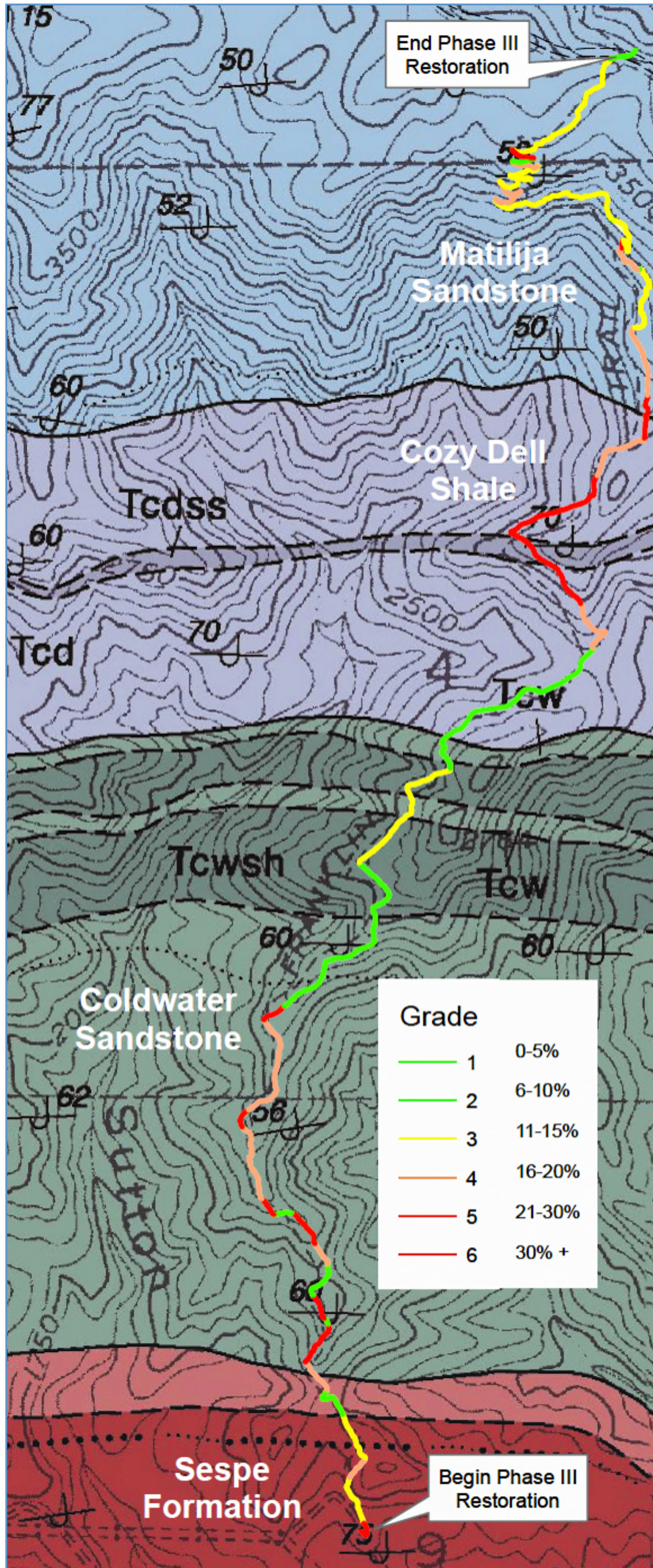


***Figure 13. Trail Grade & Geology***

*Base Map — Geologic Map of the Carpinteria Quadrangle by Thomas W. Dibblee, 1986.*

Average height of Santa Ynez Mountains is about 3,000 feet, with heights averaging closer to 2,000 feet towards the western end and 5,000 feet near the eastern part of the mountains along the Santa Barbara-Ventura County border.

Much of our area's geologic history, beginning almost 135 million years ago, is tied to the process of continental drift, collisions of the Pacific and North American plates and the beginning of a mountain building process that resulted in the development of the Santa Ynez Mountains and a series of associated ranges further to the interior.

In the vicinity of the Carpinteria area, the mountain crest ranges from 3,500 to

3,800 feet. There are four main rock formations that comprise this section of the range: the Sespe Formation; Coldwater Sandstone; Cozy Dell Shale; and Matilija Sandstone. Figures 13 (map above) and 14 (image below) shows the route as it passes through all four geological formations.

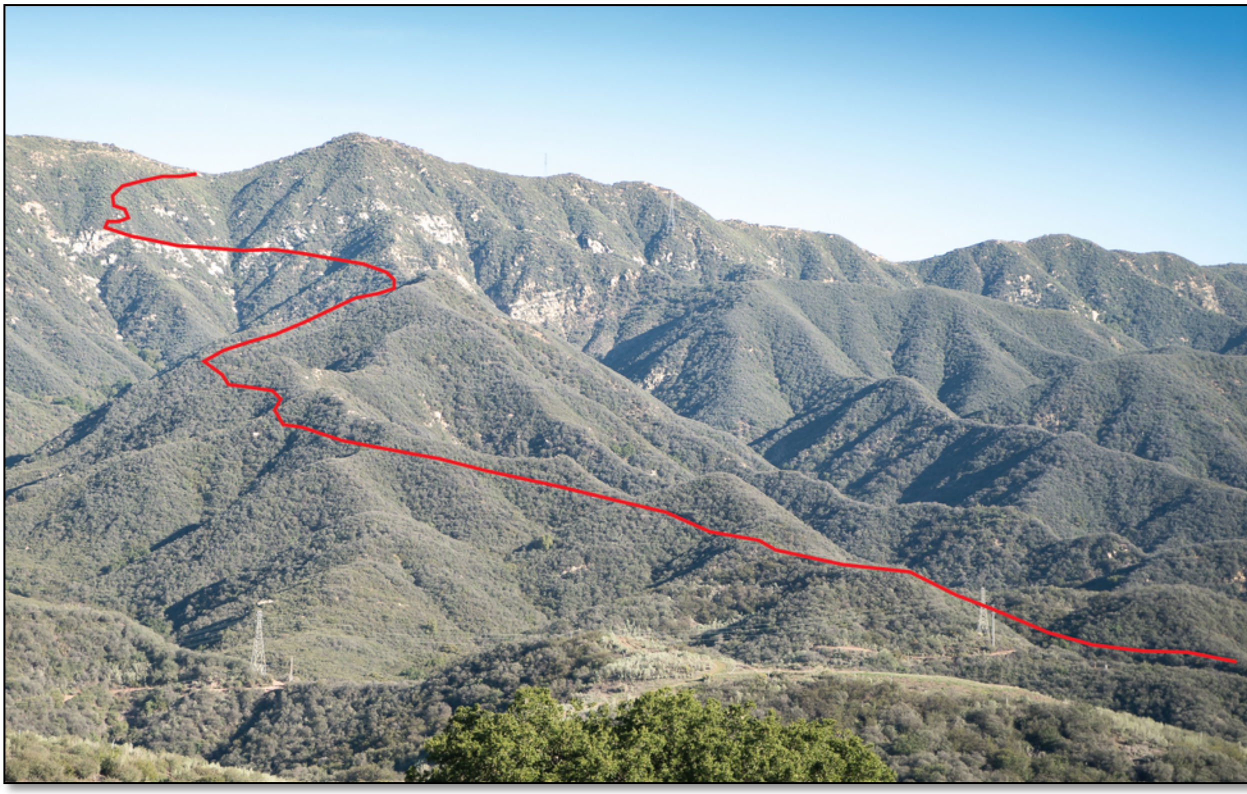

***Figure 14. Route Overview***

*Image shows the approximate route of Phase III section of the Franklin Trail. The trail begins in the lower foothills near the power lines in the Sespe Formation, enters into the Coldwater Sandstone by the prominent hill above and left of the power lines, then follows the Cozy Dell Formation nearer the top where the trail turns to the right and finally climbs up through the Matilija Sandstone where it turns back to the left near the top.*

**Sespe Formation**. The Sespe Formation is composed of interbedded shales, sandstones, and conglomerates that total 3,000 feet in thickness. The rock is primarily reddish-brown or maroon due to the high content of iron oxide found in it. The Sespe Formation is the only non-marine layer of rock found in the Santa Barbara area. It accumulated on a nearly level plain as the sea became choked with sediment. Eventually the iron oxidized to become the rusty color it is today. The Sespe Formation is found along the lower part of the foothills and comprises many of the rolling hills found in the Carpinteria area. Where there is a large percentage of clay in the strata, it weathers to a loamy soil, supporting grassy slopes, many of which have avocado orchards on them.

**Coldwater Sandstone**. Coldwater Sandstone is the thickest of the marine sandstones found in the Santa Barbara area. Its resistant layers form the pyramid-shaped Mission Crags in the mountains directly above the Botanic Gardens. Averaging 2,700 feet in thickness, it is composed mostly gray-white sands that weather on the outside surfaces to a buff color. The sandstone forms the picturesque ledges, cliffs, and boulder fields found in the lower parts of the Santa Ynez Mountains. Where it lies along the base of the Santa Ynez Mountains, Coldwater Sandstone forms beautiful narrow canyons that feature large pools and waterfalls. Seven Falls, located in the mountains behind Santa Barbara, is the most well known of these narrow canyons.

**Cozy Dell Shale**. Formed in the upper Eocene, this formation is composed almost entirely of shale. Cozy Dell Shale is almost 1,700 feet thick and disintegrates readily into small fragments. This causes it to form markedly recessive topography, most graphically the deep saddles you can see in between the Matilija and Coldwater sandstones. It is dark gray and weathers to a brownish-gray or olive gray color. Cozy Dell Shale was deposited as a fine mud 35 to 40 million years ago when the Eocene sea reached its maximum depth. While the Coldwater and Matilija sandstones form spectacular peaks and cliffs, the Cozy Dell saddles have their own gentle grace.

**Matilija Sandstone**. Matilija Sandstone is the thick, resistant layer of sandstone that forms the 3,985-foot high La Cumbre Peak. It is 2,000 feet thick at this point. This sandstone is grayish-white, weathers to a creamy buff color, and is extremely hard. This makes it highly resistant to erosion, and allows it to form the most rugged, craggy, and scenic strata found in the Santa Ynez Mountains. Where it forms the crests of the Santa Ynez Mountains the Matilija Sandstone forms impressive headwalls such as the final section of the Franklin Trail where the elevation gain is 1,000 feet from a low point in the Cozy Dell Shale to the crest, a distance of less than a mile.

**Mitigating With Geology**. Example on the right provides an example of what the underlying structure of a large part of the Phase III trail is like where the sandstone is exposed. Sections like this were cut into the sandstone. The grade here is 15-20% and as the trail climbs up through the sandstone it does so in staircase fashion, with short rises followed by more level sections.

Also note the entrenchment. By removing the berm on the outer edge, cutting dips into the bedrock and cutting into the backslope to widen the trail, due to the resistance of the sandstone to erosion, this section will be sustainable with maintenance even though very steep.

***Figure 15. Coldwater Sandstone Basics***

# 5 SUSTAINABILITY

Sustainability of natural surface trail can be defined simply as the ability of a trail to support planned and future uses with minimal impact to the surrounding environment over time given topography, geology, climate and other factors.[6] In large part the concept of sustainability has come to be based upon the premise that getting water off the trail as soon as possible is the key to minimizing erosion and its associated impacts. However, other factors can, and often do, play an important role. One of these is geology.

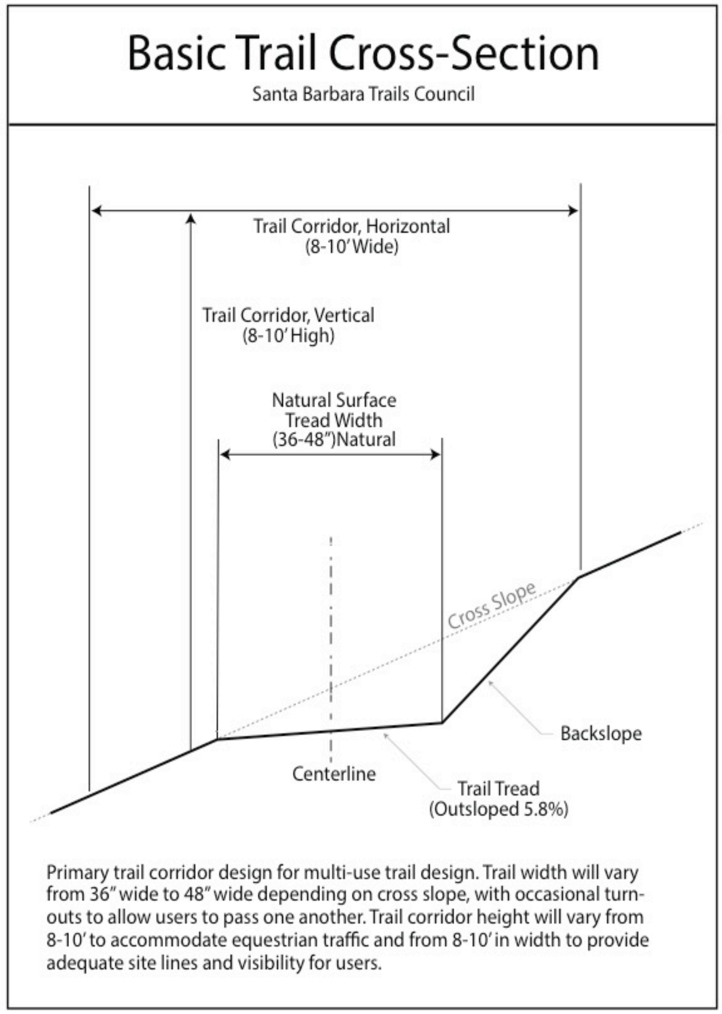


***Figure 16. Basic Trail Cross Section***

The geologic formations through which the trail passes — especially the Matilija and Coldwater sandstones — provide both characteristics that help resist erosion and the materials with which it is possible to remediate the excessive trail grade. Both layers erode slowly to form a thin layer of soil underlain by bedrock.

The Phase III restoration project proposes to use a variety of techniques that focus on mitigating the impacts that excessive grade has the potential to cause:

- Use of Sustainable Trail Design techniques to minimize the impacts of water and reduce erosion and keep sediments from migrating downhill.
- Use of trail construction techniques to minimize the impact that intensive shared use may cause, especially from equestrian and downhill mountain bike activity.
- Application of techniques available due to the abundance of rock and cut brush that are unique to this project.

## 5.1 Designing Sustainable Trails

Designing for trails that reduce the impacts of water, mitigate for excessive grade and reduce the impact of trail use can be accomplished in a number of ways. The ultimate goal is to get water off the trail,

[6] Ray Ford, summary of key concepts developed over the past two decades in managing restoration and maintenance projects on local Santa Barbara, CA trails.

minimize erosion and reduce the impacts of trail use. See Appendix B for more information on Best Management Practices for reducing sedimentation.

The project proposes use of the following techniques to do this. See Appendix C for more details:

1. Use of Full Bench Construction. Full bench construction involves cutting the tread so that is rests on uncompacted soil for its full width. This involves cutting into the backslope to increase the width rather than adding loose soil to the outside edge, providing a solid, stabile trail tread for its full width.

   Use of the full-bench technique is an essential starting point for minimizing erosion and sedimentation and maintaining a trail over time.

   It appears from trail surveys that the original tread was constructed using the full-bench technique and that the outside edge of the trail is well compacted. This greatly reduces the impacts associated with adding uncompacted soil to the outside edge of the tread.

2. Brush and Fill. Use of the brush cleared during the opening of the p-line and additional brushing during the project will provide an excellent source of material to further stabilize the slope immediately below the trail. The technique involves lining the lower edge of the trail with brush, chainsawing it into fine pieces and then filling it with the slough material cleared from the lower backslope. This serves to act as a sedimentation barrier that prevents erosion, traps any soil being carried off the trail and makes valuable use both of the brush and backslope material.

   In addition, the brush provides a network of interlocking material that holds together well and as it decomposes it helps form rich soil that will support plant growth. It can also be used as a base for armoring the slope above it with rock.

3. Outsloping. Outsloping (sloping the tread away from the hillside) is one of the key concepts used to eliminate the impacts caused by running water. Note the gentle outslope in the full-bench design shown above. The project proposes to outslope the trail in amounts ranging from 5-7% wherever possible, with slightly higher percents (8-9%) where the trail grade is steeper. Slightly increasing outslope, along with armoring edge armoring (see below), can be very effective in mitigating for grade.

4. Armoring the Trail. In areas where the outside edge of the trail is less stable, use of nearby rock material embedded to further stabilize trail edge. Used in conjunction with outsloping, this not only protects the outer edge from user damage, but also will serve to reduce erosion. One of the goals of outsloping is to cause water to sheet off the trail rather than to run down and then wash off it. Use of edge armoring will help maintain the outer edge as water sheets off. By adding additional armoring in spots where water might tend to run off in larger amounts, those areas can also be protected as well.

   Use of outsloping, brush and fill techniques and armoring works extremely well to meet several key basics:

   - Sheets water off the trail, which is critical in offsetting the potential damage that can be done when water runs down steep sections of trail such as those found along the Phase III section of the Franklin Trail.
   - Makes good use of the brush and slough removed when widening the inner part of the tread.
   - Reduces sedimentation by catching soil that might wash off the trail.
   - Adds a protective barrier on the trail edge to resist gullying, maintain the edge and reduce the impacts from trail use.

5. Rock "Stacking". The phrase comes from the concept used by those who originally built the Franklin Trail, though they might not have used this term. In constructing the trail, it appears they realized that they could stabilize the outer edge of the trail simply by using the rock pried up when they were removing rock and soil to create the tread. The image on the right appears to have crib wall both above and below the trail, but actually the rock below the trail was stacked in place from rock removed while creating the tread. This work was done a century ago and still serves well.

***Figure 17. Rock Stacking - Upper Switchbacks***

   With almost 70% of the trail underlain by Matilija and Coldwater Sandstone, there is a ready supply of rock available for similar uses along much of the trail. Quite a bit of the rock has also fractured into slabs similar to the ones in the photo and are perfect for stacking. Where there is a large supply of rock, loosely stacking it below the lower edge of the trail will lightly armor the slope, add protection, can be done reasonably quickly.

6. Use of Grade Reversals. Figure 18 shown next page, courtesy of the Central Coast Concerned Mountain Bikers (cccmb.org), depicts a gentle grade reversal in the upper part of the illustration. Typically, a grade reversal is achieved by curving the trail so that it climbs for a short distance, levels out and then drops. The goal is to reverse the trail grade for short distances so that it rises and then falls again over regular intervals. This has the effort of forcing the water off the trail where it rises and prevents water from collecting and running down the trail, thus reducing the potential for erosion.

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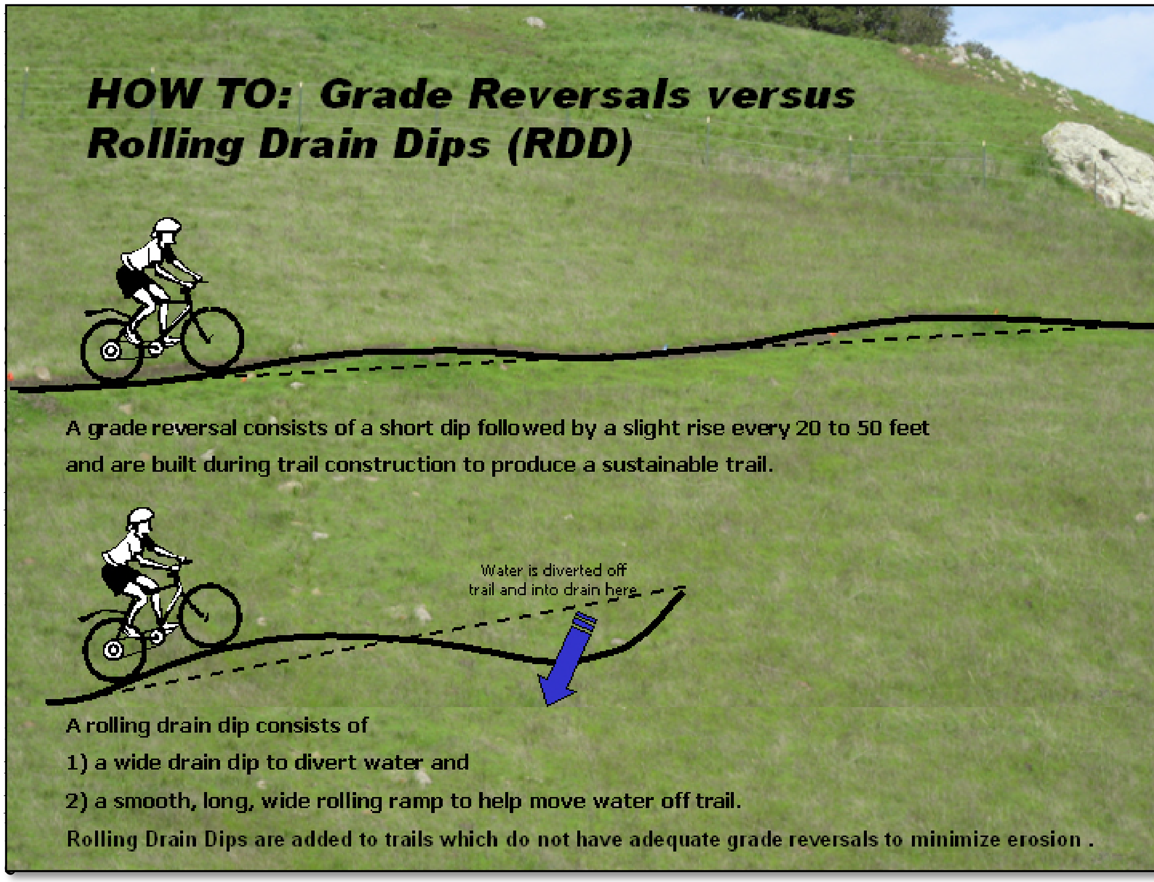



***Figure 18. Grade Reversals, Dips and Knicks. 3CMB***

Designing grade reversals into an existing trail presents challenges, especially on trails contouring along a steep hillside where it isn't that easy to add rises and falls without extensive backsloping and creating the potential to destabilizing the hillside.

However, even on steep trails like the Franklin, it is possible to add grade reversals at key points above and in the middle of many of the steeper sections where there are short level areas. The goal is to divert water off the trail above any steep section and in the middle of it wherever there is enough relatively level tread to build them.

7. Addition of Rolling Drain Dips (Super-Charged Trail Knicks). The lower part of Figure 18 illustrates a similar concept, but is achieved by removing soil to create dips in the trail where water can be diverted off it. True dips are much longer, typically constructed with a gentle drop into the dip, a level section and the followed by a gentle rise out of the dip, creating the effect of a grade reversal in locations where reversals aren't practical.

   In contrast, the rolling drain dips are relatively short, serve to get water off the trail like water bars were designed to do, but do it more effectively and requiring much less maintenance over time. Rolling drain dips that work well to get water off the trail, minimize the need for maintenance and reduce sedimentation — especially on steeper grades — have a number of characteristics:

   - Use of changes in trail direction. Dips work extremely well at any location where there is a turn in the trail. Water by its nature wants to flow in a straight line. Adding dips where the trail is changing direction aligns the water flow with the direction you want it to go off the trail and reduces opportunities for the dip to become clogged with sediments.

- Increased outslope above the dip. Adding additional outslope above the dip for 6-10 feet from 5-7% to 10-12% starts the water moving towards the edge of the trail, helps create a sheet flow and reduces the potential for gullying.
- Use of rock armoring at the lower edge and bottom of the dip will reduce damage to the dip, protect the lower part of the dip during high water flows and can help slow the water down so sediments are left on the hillside rather than washing downhill into the creeks.

The project proposes extensive use of rolling drain (see Appendix C) dips to mitigate the impact of the steep grades and use of armoring to stabilize the hillside below the dips, allowing sediments to be deposited on the upper hillsides rather than being washed down into the creeks below them.

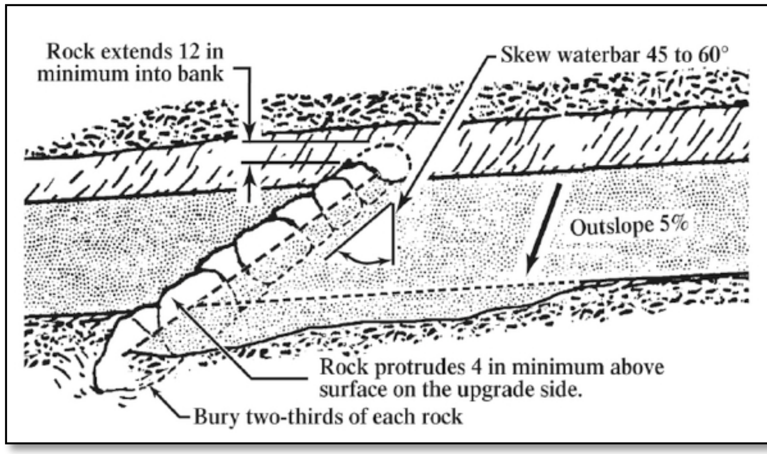



*Figure 19. Rock Step Over*

8. Use of Step Overs. In locations where the trail grade is excessively steep, as is the case on the Phase III section of the Franklin Trail, use of rock step overs embedded at a diagonal angle creates a barrier that helps divert water off the trail and slowing users down.

   While step overs such as shown in the illustration on the right were originally designed as a more natural version of a waterbar, the technique is no longer used on most Forest Service trails as the primary way to get water off the trail because they are more prone to fail and need to be cleaned out every year. However, where the grade exceeds 20% step overs can work really well to divert water off the trail and also slow down trail users.

   The project proposes to use step overs every 40 feet where the grade is between 12-20% and every 20 feet where in excess of 20%. This will serve as a series of barriers that forces water off the trail at regular intervals. The step overs will be angled between 45-60$^0$, with the tread armored above the step overs and the slope below armored to minimize erosion. The step overs will be designed to allow mountain bike travel over the upper edge of the step over along the backslope.

9. Sedimentation Armoring. As noted in several of the descriptions above, use of rock and other material to armor the areas where water is being forced off the trail (dip drains, step overs, grade reversals) can help protect them from damage and slow down the flow of water as it goes off the trail.

# 6 SPECIFIC TRAIL ANALYSIS

As noted near the beginning of this report, mitigating potential impacts caused by excessive grade will be the single most critical consideration that will need to be addressed. Ironically, in surveys done during the construction of the p-line, there has been no significant deterioration of the trail over the past 45 years, despite the lack of maintenance.

This may be due to the lack of use and the ability of the existing vegetation along the trail corridor to resist the effects of erosion. However, during the 18-month period when the trail was being brushed to allow access for environmental review, subsequent surveys have not observed any additional erosion of the trail or damage to it in any of the areas that have been cleared. This may indicate that the underlying geology may also play an important role in determining the susceptibility of the trail to withstand erosion, even along the steeper grades. Unknown, is what the impacts will be, once the trail corridor is opened to its full width and the trail is opened multiple use.

On April 1 2015, using a clinometer and GPS, the entire 2.69-mile length of the trail was surveyed to gather data relating to trail grade. GPS points were taken at each point where there was a noticeable change in grade. The result identified 55 points of measurable change in grade. These points were then overlaid on a shape file of the Phase III section of the Franklin trail provided by Leidos, INC in spring 2015 using sub-meter GPS equipment. The shape file was then broken down into segments corresponding to each point and the overall length of each segment was calculated along with the elevation at the beginning and end of each segment and the total change in elevation for each. Using distance and elevation change, the grade in percent was calculated and then mapped using ArcGis software (See Figure 9 on Page 14).

In addition to color-coding the data, it was also overlaid on the *Geologic Map of the Carpinteria Quadrangle by Thomas W. Dibblee, 1986* to compare the data relating to grade with the underlying geologic formations. By comparing grade and geologic formations, the 56 segments surveyed were reviewed to see how they might be combined into larger segments that would be easier to analyze. As a result eight sections were identified for more detailed analysis, each containing from 3-to-7 of the smaller segments (See Figure 19 next page).

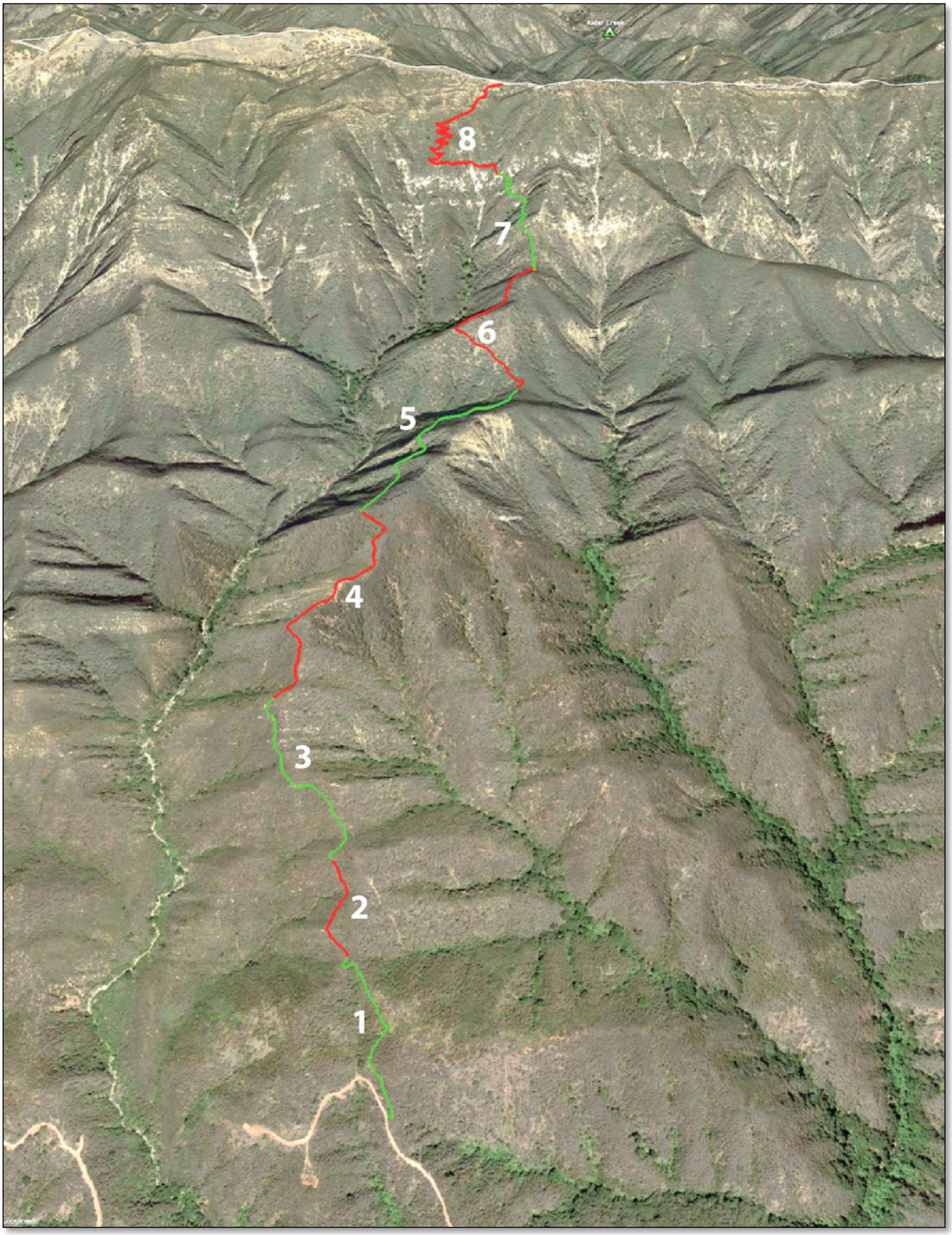



*Figure 20. Phase III Trail Segments*

## 6.1 Trail Segment 1

Length: .2 miles

Elevation Gain: 147 feet

Average Grade: 13.9%

Geology: Sespe Formation

Evaluation: Segment 1 slightly exceeds typical Forest Service standards for grade. The trail cuts through the underlying Sespe Formation, which supports a variety of both chaparral types. Currently, the tread is in reasonably good condition, averages 3-4 feet in width and shows little impacts from erosion.

Mitigation: One short section of tread at the beginning of the section requires use of a hammer drill to widen the trail and crib wall to stabilize the lower edge of the trail. Above that point, removing slump material to widen the tread in places, addition of either knicks or short sections of grade reversal and use of step overs to slow downhill traffic will minimize erosion and reduce sedimentation.

***Figure 21. Aerial View Trail Segment 1***

Additional Sedimentation Control: At locations where knicks are added or there is a potential for sedimentation the slopes below the points where the water is being directed off the trail will be armored with nearby rock to stabilize the hillside, slow the movement of water down and cause it to fan out.

***Figure 22. Section 1 Tread***

*Photo to the right shows the wide tread characteristic of Section 1. Grade averages 10-13%.*

**Section Description.** The first segment of the Phase III project begins at a point where the trail leaves the Edison Road and climbs up onto the ridge and begins to contour it for the next several miles.

For the first half of Segment 1 the trail contours along the east side of a small drainage, gradually gaining elevation until it reaches the top of the ridge. It then meanders along a fairly level part of the ridge to the point where the trail begins to climb steeply uphill.

The Sespe Formation underlies the majority of this section. Composed of interbedded shales, sandstones, the rock is easily recognized due to its primarily reddish-brown or maroon color. The high percentage of clay in the formation weathers to more rounded grassy hills and provides rich soils that support a wide range of vegetation types.

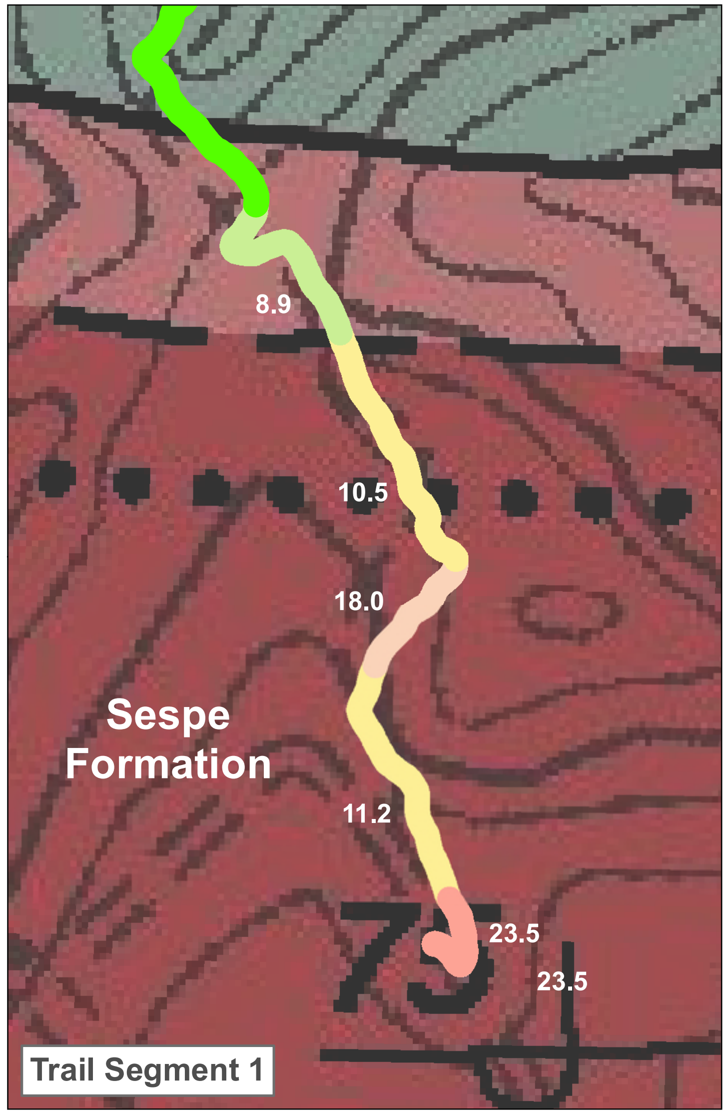



***Figure 23. Segment 1 Geology***
*Image on the right shows grade broken down by segment. Highest grade is at the very beginning of the trail, primarily due to the steepness of the road cut, which will be reduced when the trail is constructed. Though one part of this segment reaches 18% in grade, it lasts only 150 feet and shows no signs of damage. Use of outsloping, edge armoring and knicks will be used to mitigate the grade.*

**Summary**. The majority of this section of trail is in reasonably good condition, showing little impact from the lack of maintenance over the past four decades. The average tread is 4 feet wide and will mainly require brushing to meet Class 3 Pack and Saddle standards, clearance of slump material to restore the trail to its full width. Use of basic erosion control techniques such as outsloping the tread, addition of grade reversals and rolling drain dips to shed water off the trail and step overs to slow user speed can be combined to mitigate any impacts due to excessive grade.

## 6.2 Trail Segment 2

Length: .13 mile

Elevation Gain: 244 feet

Average Grade: 25.2%

Geology: Upper end of Sespe Formation; majority of Section 2 is in the lower part of the Coldwater Sandstone formation.

Evaluation: Though it doesn't appear to be too steep in the photo of the right, this segment has the most extreme grade on the entire trail, with one short section reaching a grade of 34%. Other parts of this segment range from 19-27% grade. The sideslope is also steep, ranging from 30-50%, making it difficult to add one or more switchbacks to lower the grade.

Mitigation: Most of Segment 2 is underlain by Coldwater Sandstone, which forms a rocky surface that is resistant to erosion. However, in several places because of the steep sideslopes, the trail has washed out and requires short crib walls to stabilize the hillside.

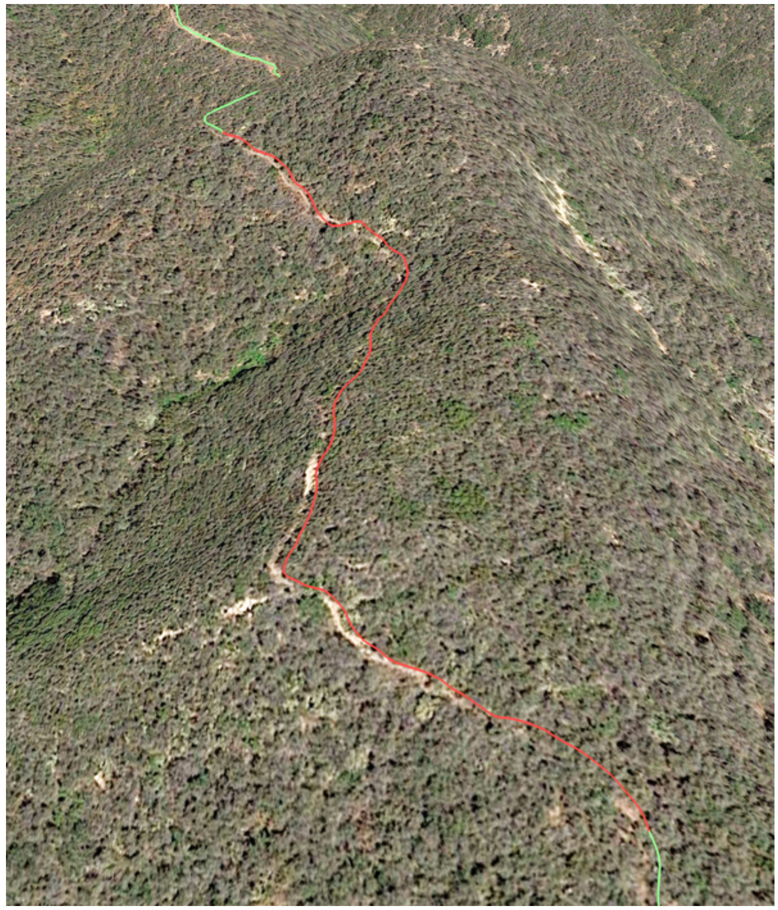


***Figure 24. Aerial View Trail Segment 2***

There is also an abundance of sandstone, consisting of fractured rock slabs, small boulders and larger rock 2-3 feet in diameter. This rock will be helpful in the crib wall construction, armoring the slopes below the trail and for adding step overs.

Additional Sedimentation Control: Key to minimizing erosion is using all of the design tools described above. Use of bush and fill below the trail will be very helpful in creating a sedimentation barrier that can also serve as a base for armoring the slope with rock. Offsloping, use of rolling drain dips in selected places and step overs will serve to sheet water off the trail and where steepest, force it off the trail at intervals ranging from 25-40 feet.

**Section Description.** Segment 2 begins at a point where the ridge turns from being relatively level to becoming extremely steep when it hits a major headwall. The trail turns northwest and begins to ascend at a 17-9% grade and continues to get steeper:

- 34% for 95 feet
- 27% for 122 feet
- 5.1% for 11 feet
- 21.5% for 51 feet

Though this segment is only .13 miles long, it will require a major effort to restore the trail to its original width, stabilize the washouts and construct the erosion control features needed to mitigate for this excessive grade.

On the positive side, with the exception of several washouts, a large part of the tread is still intact, often 3-4 feet wide and in others where slump material has narrowed the trail it will be easy to remove it and restore the original tread width. There is also plenty of rock material along the trail.

**Summary**. The average grade for this segment is 25.2%. While 75% of the trail tread is in good condition it is far too steep to be sustainable without heavily armoring the trail and using "brush and fill" to minimize sedimentation, trail armoring, step overs and rolling drain dips where possible. The key to managing this part of the trail is use of the nearby rock material to stabilize the hillside below the trail and the tread itself.

**Recommendation**. Regular review of trail conditions should be done to identify areas of concern and make repairs as needed until the hillside is stabilized.

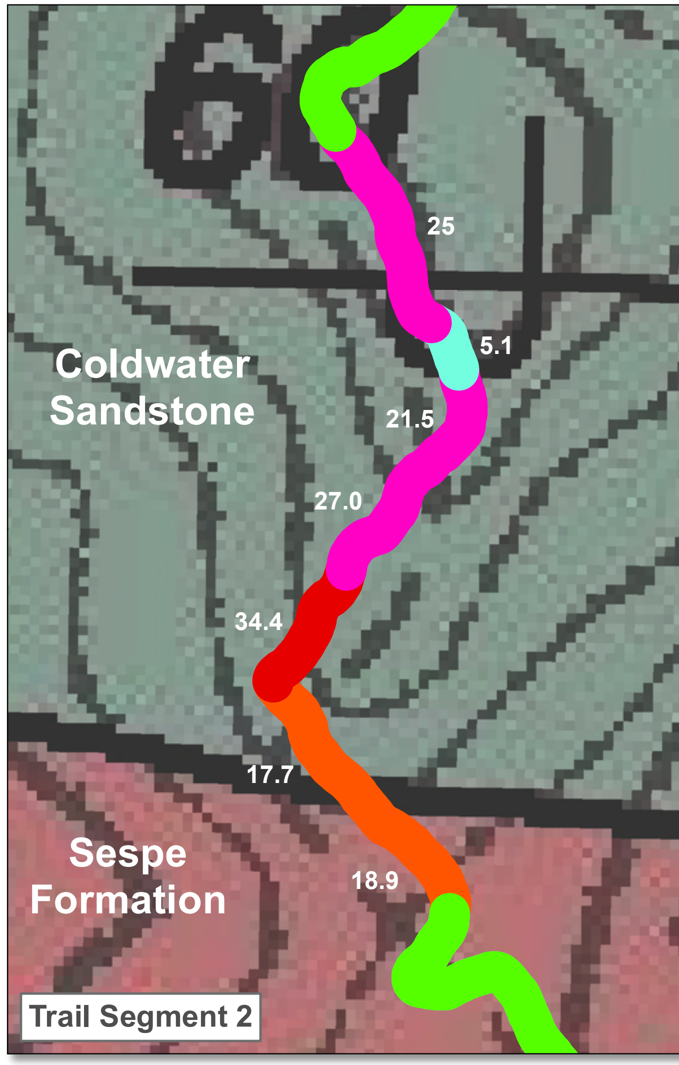



***Figure 25. Segment 2 Geology***

*Image on the right shows how steep the grade is along this segment. Use of outsloping, edge armoring and knicks will be used to mitigate the grade.*

## 6.3 Trail Segment 3

Length: .26 mile

Elevation Gain: 252 feet

Average Grade: 18%

Geology: Middle part of the Coldwater Sandstone formation.

Evaluation: After the steep climb up the west side of the first major headwall the trail begins to level out as it tops out on the ridge above it. This segment is just over a quarter mile long and is characterized by a series of short climbs and level sections as the trail meanders through the bedrock to a saddle where the views stretch far and wide in all directions.

Along with the decrease in grade the sideslope is also less steep near the top of the headwall. As a result less material has slumped onto the trail and more of the sandstone is exposed, with much of the tread being composed of highly resistant sandstone.

Though sections of the trail have grade in excess of 20%, because it rests on the sandstone bedrock there is little danger of it eroding. Rather than mitigating primarily for erosion, the main concern is the narrowness of the trail. Given the difficulty of cutting tread through the sandstone, those who originally constructed the trail appeared to be more concerned about opening the way through this section than making it as wide as it is in other places.

Mitigation: While outsloping and addition of rolling drain dips are proposed to control erosion, the primary goal will be widening the tread to a four-foot width.

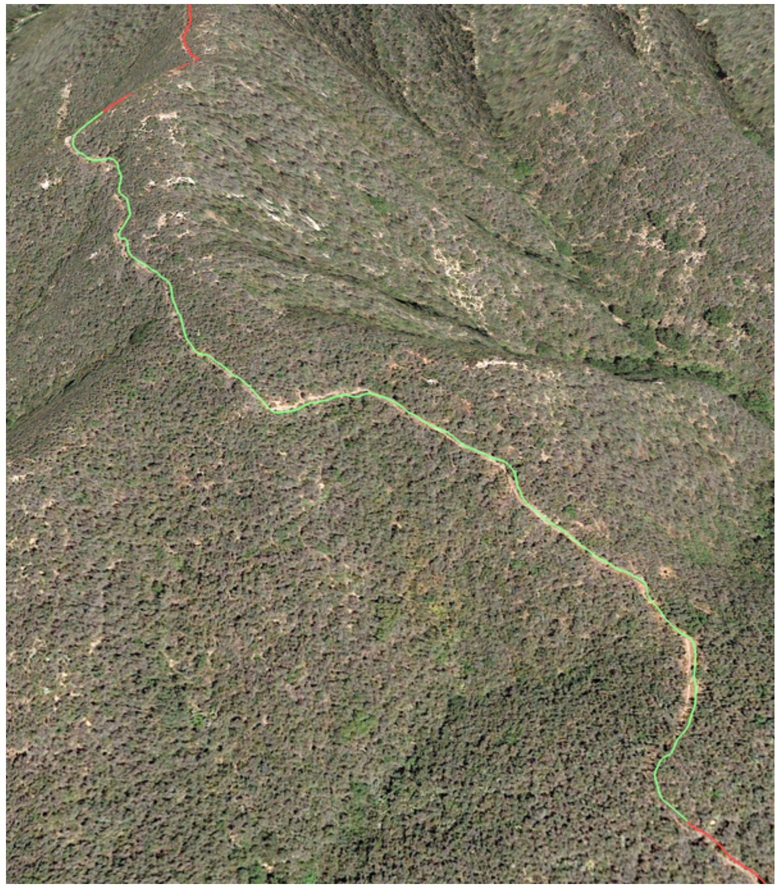


***Figure 26. Aerial View Trail Segment 3***

***Figure 27. Exposed Bedrock Along Segment 3 Trail***

Additional Sedimentation Control: Use of brush and fill along the lower slope to trap sedimentation and addition of grade reversals in locations where the trail is less than 10%.

**Summary**. Though several short sections of this segment have grades in excess of 20%, there are many opportunities to add rolling drain dips and grade reversals to offset the grade. The segment also is mainly comprised of tread consisting of exposed bedrock that is highly resistant to erosion. However, water will drain off of it faster.

Use of offsloping, dips and the brush and fill technique to trap sediments can be combined to mitigate any impacts due to excessive grade.

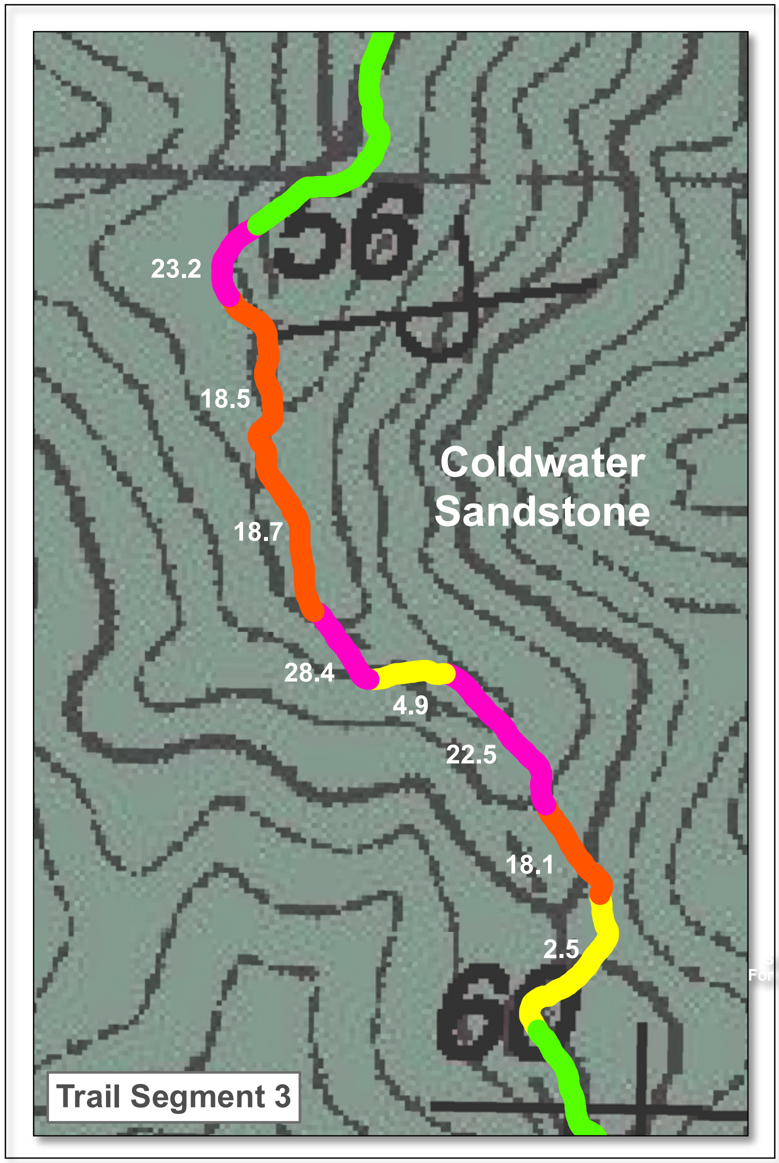



***Figure 28 Segment 1 Geology***
*Image on the right shows how steep the grade is along this segment. Use of outsloping, edge armoring and knicks will be used to mitigate the grade.*

## 6.4 Trail Segment 4

Length: .39 mile

Elevation Gain: 284 feet

Average Grade: 13.8%

Geology: Primarily consists of Coldwater Sandstone with some Coldwater shale near the top of the segment.

Figure 29. Aerial View Trail Segment 4

Evaluation: For the first 90% of this segment the trail rises at a much lower grade. The grade along this section averages 16% to the point where the trail turns due north and then it lessens to just over 6% grade for the next 400 yards. There is ample sandstone material to use in armoring the trail and typical erosion control measures will mitigate for any potential issues.

However, near the end of the segment where the trail turns sharply to the left as it crosses a steep gully the trail has washed out along an extremely dangerous section of the trail and will require armoring the slope below the washout and installation of several sections of crib wall to stabilize the slope.

Mitigation: The project proposes the typical erosion control techniques described above for the first 90% of the trail restoration. For the washed out section of the trail the project proposes:

- Cutting into the hillside to widen the tread to five feet so there is ample room for users to pass.
- Use of rock collected from widening the trail to construct the crib wall.
- Crib wall construction based on illustration shown on right with crib wall angled into the hillside at a 20-30% angle.[7]

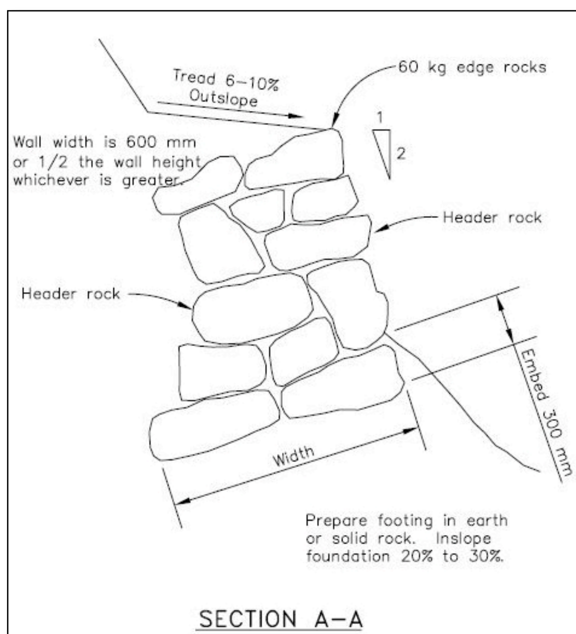



Figure 30. Crib Wall Design

[7] USFS recommended crib wall design.

***Figure 31. Segment 4 Trail Section Leading To Washout***

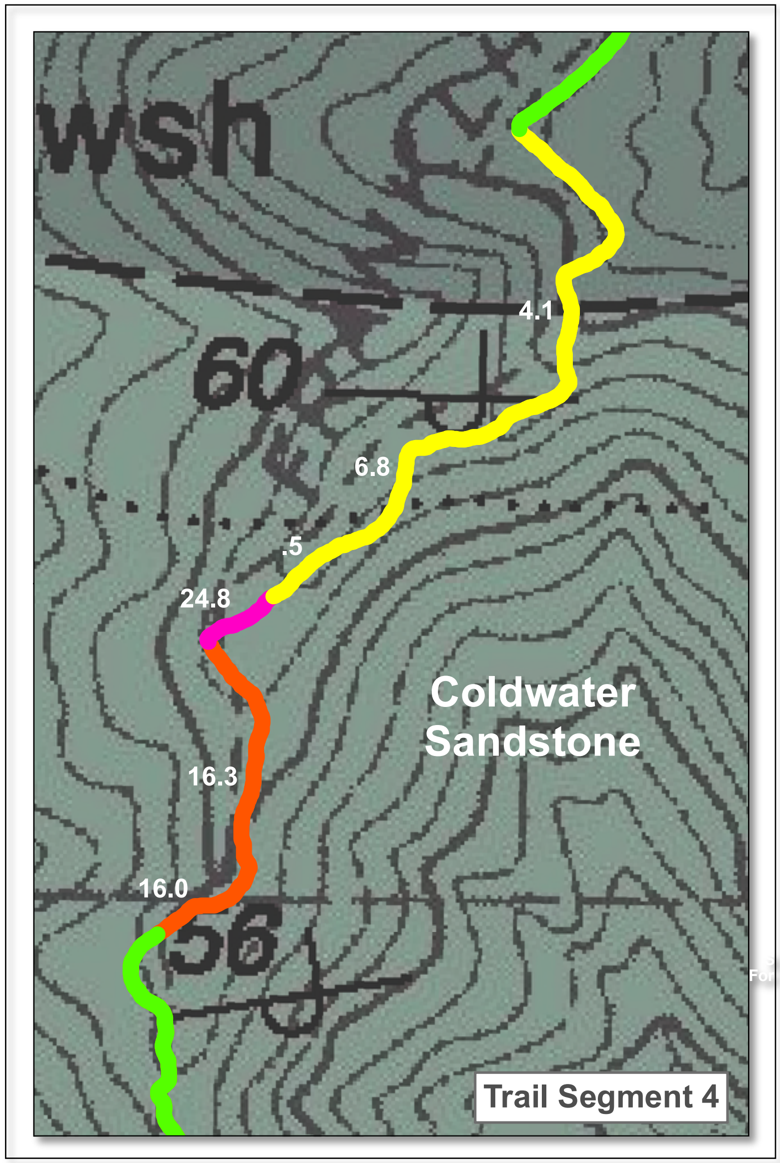
*Hillside slope along this part of the trail exceeds 60%. While much of this section is almost level and there is plenty of opportunities to widen the trail and armor the lower slope below the tread, in the distance where the trail turns sharply to the left most of a 100 foot section of the trail is washed out.*

***Figure 32. Washout***

*Photo to the right shows how unstable this section of trail is. Note the fractured rock in the hillside above the trail that could be used to armor the slopes below and in construction of the crib wall. The project proses to widen this section to five feet and add crib wall using approved USFS standards for their construction.*

**Summary**. With the exception of the last part of the segment where crib wall construction will be required, Segment 4 can be mitigated through use of basic erosion control features.

***Figure 33. Segment 4 Geology***



## 6.5 Trail Segment 5

Length: .40 mile

Elevation Gain: -10 feet

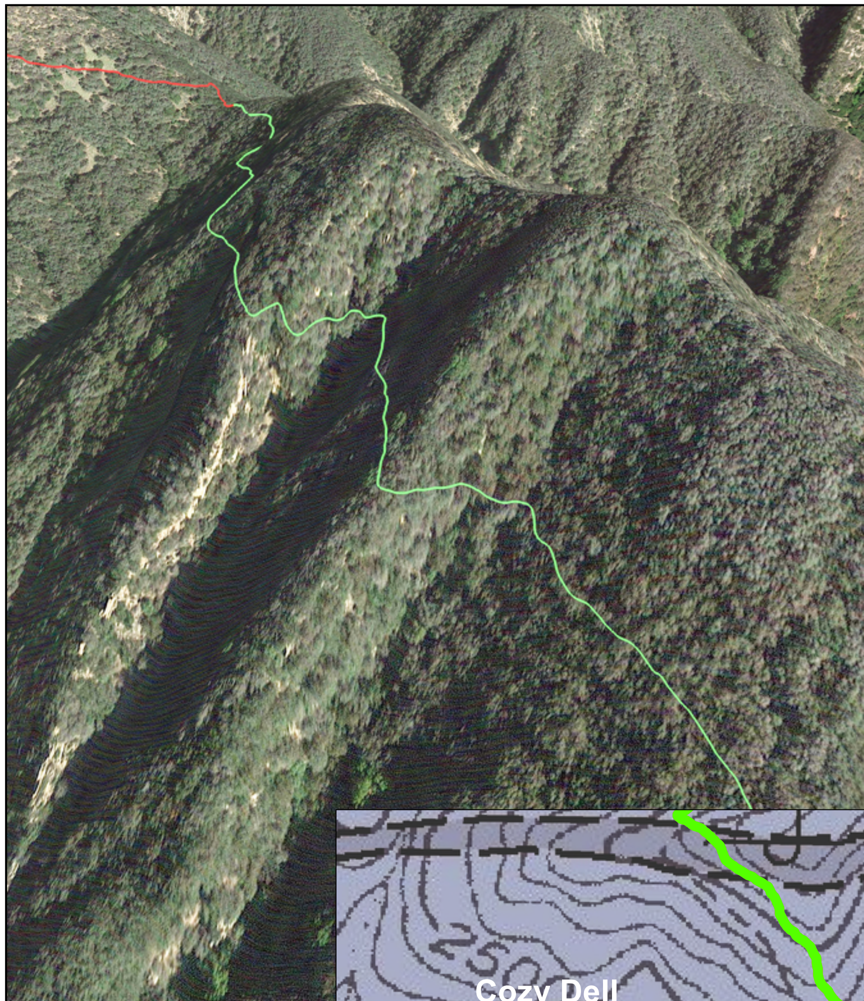
Average Grade: -.4%

The trail rises gently for 300 yards then descends gradually to a saddle formed where the Cozy Dell Formation crosses through the ridge.

Geology: The Coldwater Sandstone has created a long steep ridge that transitions to a saddle where the Cozy Dell Formation begins.

Evaluation: Segment 5 is actually one of the few sections of Phase III trail that meets USFS standards for grade except for a few short sections.

Mitigation: As you can see from the image on the right, this trail segment contours along a steep ridgeline. Despite the steepness of the sideslope, the rock along the trail is highly fractured and there is ample rock material to armor the trail and mitigate for erosion. There are also numerous opportunities for construction of grade reversals and rolling drain dips to further minimize erosion.



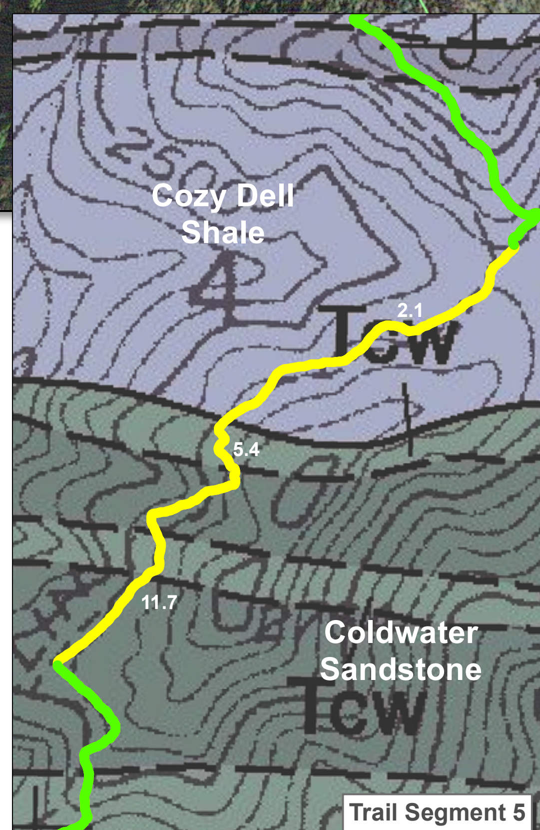



***Figure 34. Segment 5 Aerial View***

***Figure 35. Segment 5 Geology***

**Summary**. Though a good portion of this segment contours along a very steep side hill, the fractured sandstone rock to be found along it will provide excellent opportunities to armor the trail and minimize erosion.

## 6.6 Trail Segment 6

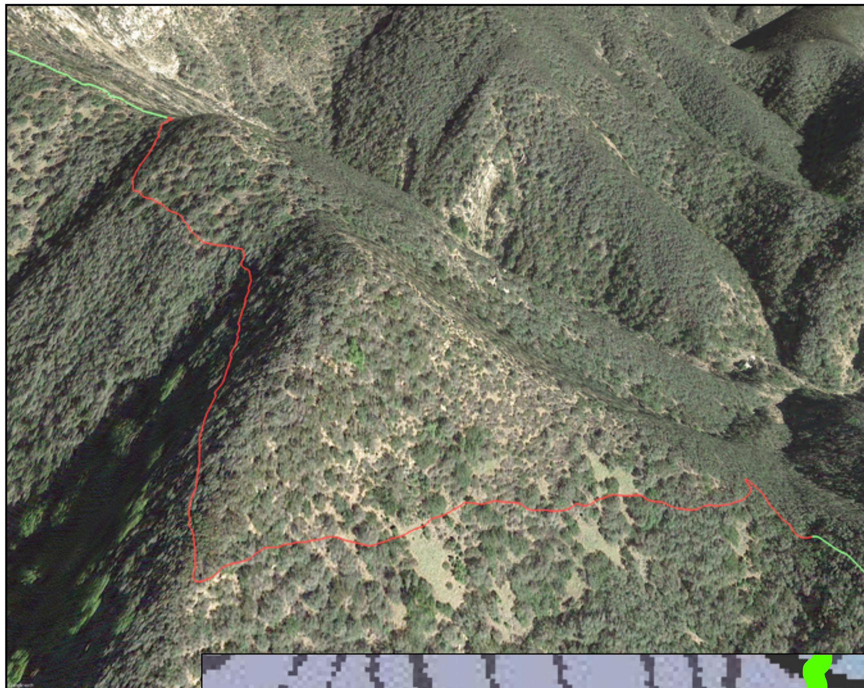
Length: .38 mile

Elevation Gain: 390 feet

Average Grade: 19.4%

Geology: Cozy Dell Shale

Evaluation and mitigation: Trail Segment 6 contours around the western corner of a prominent unnamed point mostly through the Cozy Dell Shale Formation though the point itself that rests on top of the Cozy Dell sediments is composed of Matilija Sandstone. The junction between the two formations is fairly visible, with the Cozy Dell weathering to form the more open grass-covered slopes.



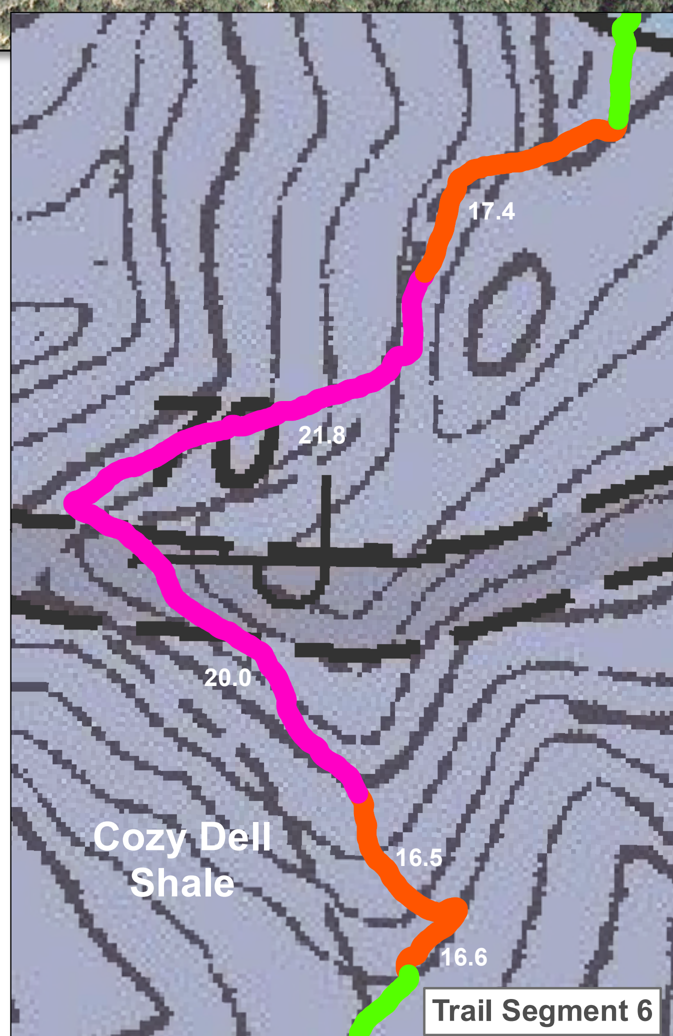



***Figure 36. Segment 6 Aerial View***

***Figure 37. Segment 6 Geology***

Though this section of the trail isn't as steep as some of those below, it does average between 16-20%, which is far higher than desired based on Forest Service standards. Along the lower part of the section, where the trail goes through the Cozy Dell Shale, this can be mitigated through the use of rolling drain dips, grade reversals, outsloping and step overs. Above, where the trail begins to enter the more resistant Matilija Sandstone, in addition to these techniques, the fractured rock along the trail provides a good source for armoring the trail and adding step overs.

**Summary**. Though this section exceeds USFS standards for grade, using both available sources of rock and the techniques described in Section 5.1, this segment of trail is designed with the intent of providing a sustainable condition.

## 6.7 Trail Segment 7

Length: .32 mile

Elevation Gain: 276 feet

Average Grade: 16.0%

Geology: Matilija Sandstone

Evaluation: Segment 7 begins at the saddle at the point where the Cozy Dell Shale ends and the Matilija Sandstone begins. From the saddle the trail heads north up the ridgeline for 300 feet to a point where the headwall begins. From this point the trail begins to contour to the north through a series of thick sandstone layers that were dynamited during the original trail construction.

Though the grade averages 13%, most of the tread is composed of exposed sandstone that is resistant to erosion. The trail continues along through a series of vertical bands of sandstone similar to the first one, all opened up by dynamiting the rock. Fifty yards after a short switchback the trail climbs steeply (31.2%) up onto a massive rock formation similar in size to Gibraltar Rock. The trail then crosses over the upper part of the rock along an eight-foot-wide ledge, also blasted out to create a way through.

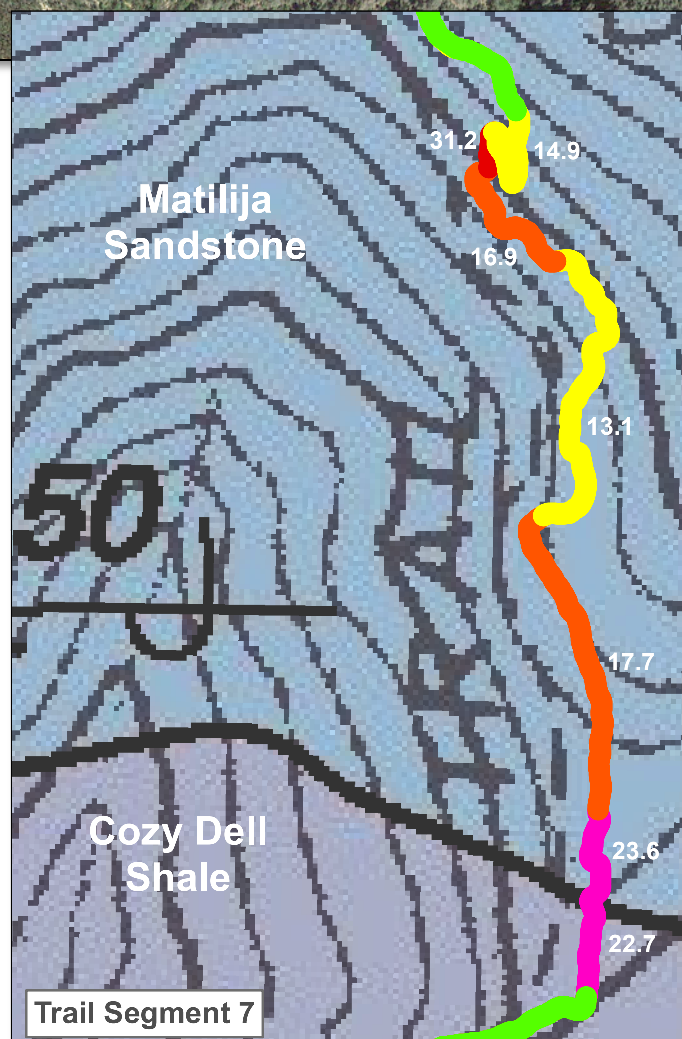



***Figure 38. Segment 7 Aerial View***

***Figure 39. Segment 7 Geology***

Mitigation: During the first 300 feet beyond the saddle the trail goes more or less straight up the ridge. The route will need to be adjusted slightly so that it has more of a curvilinear flow, allowing it to go back and forth across the fall line every 75 feet. This will minimize erosion by allowing water to flow off the trail on the one side of the centerline then off on the other side when it re-crosses. This constitutes a minor realignment along a narrow ridge of less than 15 feet from the original trail.

The balance of the .32-mile section contours along the side of the ridge through exposed bedrock. Though this section varies from 16-18% grade, because almost all of the tread is on bedrock, there is little potential for erosion. The primary goal is to add rolling drain dips at 75-to-100 foot intervals and to armor the outside edge and lower slopes below the dips to prevent gullying and sedimentation.

***Figure 40. Segment 7 Route Through Bedrock***

*Most of the Segment 7 section was cut through the extremely dense layers of Matilija Sandstone by blasting it with dynamite. Much of the restoration will involve chipping out out the rock in places to widen the trail for multi-use, adding dips and armoring the outside edge of the trail.*

**Summary**. Cutting the trail through the Matilija Sandstone as it contoured through it must have been an interesting proposition. This is the only section where it appears that dynamite was required to blast out a route and must have taken quite a bit of time. While difficult for these early pioneers, once cut through, most of this section rests on exposed bedrock and has changed little over the past century. Minimal work —mainly additional brushing and chipping out the sandstone in places to increase the width for shared multi-use — will be needed to restore the trail. Use of rolling drain dips and armoring will mitigate for grade and prevent sedimentation.

The main area where additional work will be needed is the first 100 yards of the segment. Because the trail leads straight uphill along the fall line, mitigating for erosion and preventing sedimentation will require curving the trail off the fall line on both sides so that water only flows off on one side for a short distance and then the other side. By alternating back and forth across the fall line, adding rolling drain dips and armoring the tread, it is possible to mitigate for erosion and sedimentation.

## 6.8 Trail Segment 8

Length: .61 mile

Elevation Gain: 434 feet

Average Grade: 13.5%

Geology: Matilija Sandstone

<u>Evaluation</u>: This last section of the trail up to the crest of the Santa Ynez Mountains leads through a series of switchbacks from the lower part of the Matilija Formation to the Divide Peak OHV road.

From the end of Segment 7 the trail contours for 1,000 feet at an overall average of 12% and then begins to switch back and forth .42 miles, gaining 324 feet in the process. Average grade over the entire set of switchbacks is 14%.

While slightly in excess of USFS standards for grade, this section of the trail is in excellent condition. Part of the reason is that it was designed well when originally constructed. As the fractured rock was removed to create the tread, it was stacked along the outside edge, forming a crib wall of sorts that has become consolidated along the lower edge of the trail and now forms a very effective armored edge for the trail. In addition the switchbacks were cut to USFS standards, have wide, gentle turns and have also remained in excellent condition.

The main restoration proposed for this section of the trail is removal of the outside berm in areas where the trail has become slightly entrenched, addition of at least one grade reversal in the middle of each leg of the switchbacks and or rolling drain dips in several shorter legs.

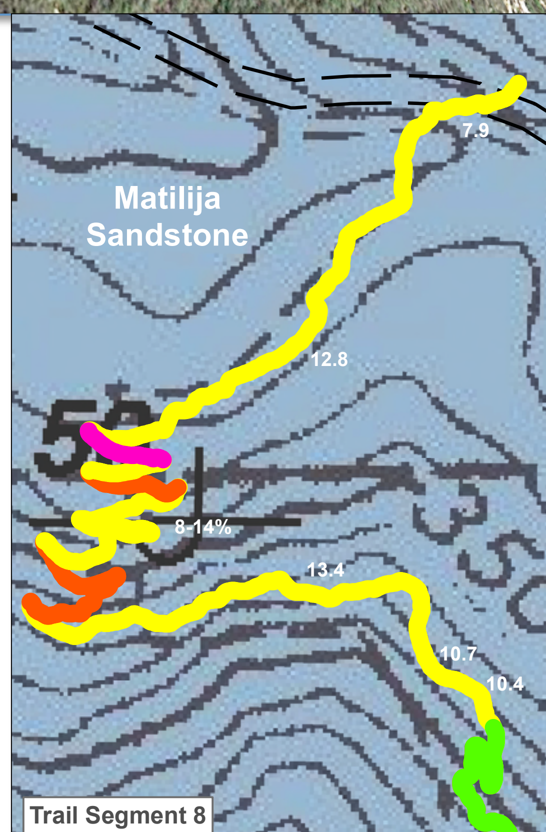



***Figure 41. Segment 8 Aerial View***

***Figure 42. Segment 8 Geology***

**Summary**. Though the steep slopes near the top of the Santa Ynez Mountains form what appears from distance to be an almost vertical headwall, the pioneers who built the trail did an excellent job of laying out the route in a way that was sustainable a century ago. As a result it is in better condition that 90% of the other front country trails, even without being maintained for many years. This section can be restored to meet Forest Service standards with minimal effort including additional brushing, removal of berms and use of rolling drain dips and grade reversals.

***Figure 43. Segment 8 - Switchback***

*Switchbacks on the upper part of this section are in excellent condition. No maintenance has been done on this part of the trail for the past 45 years, other than to clear it recently for environmental reviews for this project.*

# 7 Project Recommendations

Restoration of the Franklin Trail poses unique challenges given the topography and larger-than-usual portions of the trail that exceed Forest Service standards. While the underlying bedrock and associated soils have shown to resist erosion over the hundred year existence of the trail, careful use of the sustainable-use techniques described in Section 5 and illustrated in Appendix C should be sufficient to mitigate for excessive grade and minimize erosion such that it meets Forest Service standards. These techniques include:

1) Use of Full Bench Construction throughout the 2.69-mile length of the trail.
2) Brush and fill to stabilize the slope immediately below the trail.
3) Outsloping the trail from 5-7, with slightly higher percents (8-9%) where the trail grade is steeper.
4) In areas where the outside edge of the trail is less stable, armor the trail edge with embedded rock material to further stabilize the slope below the tread.
5) Use nearby rock material, which is abundant along a large portion of the trail, to construct simple rock walls to provide additional armoring.
6) Wherever possible, add grade reversals and rolling grade dips designs to drain water off the trail.
7) In locations with more extreme grade, also include “step overs” that force water off the trail at regular intervals, with armoring where the water flows off to prevent erosion.

In addition to use of these techniques the project proposes use of the following guidelines to mitigate issues relating to restoration of the Franklin Trail, to minimize impacts created during the reconstruction period and to ensure the trail is maintained to Forest Service standards afterward.

## 7.1 Trail Construction and Maintenance

1) To the extent possible, trail construction and maintenance will occur from August 1 to March 14, outside of the migratory bird-breeding season.
2) Since the bird-breeding season dates vary from year to year, these dates can be adjusted based on surveys conducted by a qualified biologist within one week prior to trail construction.
3) Workers will receive training concerning Threatened, Endangered, and Candidate federally listed and for Forest Service Sensitive species prior to performing project activities.
4) Workers will avoid direct-interaction with wildlife while performing project activities.
5) All vehicles operated within the Proposed Action area will be properly maintained to ensure that no inadvertent discharges occur within the nearby watersheds.
6) Vegetation removal will not exceed the prescribed clearing limits defined in the established Forest Service standards (i.e., more is not better, as vegetation removal outside the trail prism is essentially pointless habitat alteration).
7) The limits of the Proposed Action area will be conspicuously defined and all activities will be strictly limited to this area.
8) All Proposed Action activities, including ground clearing and trail construction activities will be conducted during daylight hours.

## 7.2 Wildlife Habitat Protection

1) The project will implement BMPs from the Soil and Water Conservation Handbook and agency water quality policy.

2) The proposed trail corridor will be sited and designed to avoid known locations of sensitive plants and wildlife.
3) No specimen native trees will be removed during ground clearing and trail construction related activities.
4) Strict erosion control measures will be included in the implementation of the Proposed Action, as described in the Project Description.
5) Following the implementation of the Proposed Action, signs will be posted at trailheads to limit visitors' direct and indirect disturbance of wildlife.

## 7.3 Noxious Weeds

1) Trail workers will be instructed in weed prevention management practices such as entering the project area with clean boots and tools prior to conducting project activities. Care will be taken to clean tools and boots when moving from a trail segment with invasive weeds to and area without weeds. Staging areas and landings will be maintained in a weed-free condition.
2) The project manager will monitor and — to the extent feasible — record the distribution and abundance of encountered weeds to determine if additional weed control measures are needed. If occurrences of noxious weeds are detected after project implementation, initiate control measures immediately and attempt to eradicate any incipient infestations.
3) Proposed ground clearing and trail construction activities will include the removal of highly invasive species within and immediately adjacent to the Proposed Action area.
4) Following the implementation of Proposed Action, periodic maintenance, including weeding and eradication of invasive species, will occur in order to promote the re-establishment of native species.

## 7.4 Erosion and Water Quality

The following sections outline BMPs that should be implemented during clearing, grubbing, and any other modifications with the Proposed Action area.

1) Trail surfaces will be constructed and maintained to dissipate intercepted water in a uniform manner along the road by outsloping with rolling dips, insloping with drains or crowning with drains. Where feasible and consistent with protecting public safety, the project will utilize outsloping and rolling the grade (rolling dips) as the primary drainage technique.
2) Surface drainage structures will be adjusted to minimize hydrologic connectivity by:
    a) Discharging road runoff to areas of high infiltration and high surface roughness.
    b) Armoring drainage outlet to dissipate energy dissipater and to prevent gully initiation. Cleaning ditches and drainage structure inlets only as often as needed to keep them functioning. Preventing unnecessary or excessive vegetation disturbance and removal on features such as swales, ditches, shoulders, and cut and fill slopes.
    c) The project will minimize diversion potential by installing diversion prevention dips that can accommodate overtopping runoff.
    d) Diversion prevention dips will be placed downslope of crossing, rather than directly over the crossing fill, and in a location that minimizes fill loss in the event of overtopping.
    e) Diversion prevention dips will be armored when the expected volume of fill loss is significant.

f) The risk and consequence of future failure at the site will be addressed when repairing trail failures. Vegetation, rock, and other native materials will be used to help stabilize failure zones.

g) Trail surface drainage will be maintained by removing berms, unless specifically designated otherwise.

h) Markers will be installed to identify and protect drainage structures that can be damaged during maintenance activities (e.g., culverts, subdrains, etc.) to minimize any damage to them.

i) Surfacing materials suitable to the trail site and use will be used and maintained to withstand traffic and minimize runoff and erosion. Particular attention will be paid to areas where high wheel slip (curves, acceleration, and braking) during motorized use generates loose soil material.

## 7.5 Cultural Resources and Mitigations

1) Construction activities will not result in clearance of vegetation or ground disturbance directly adjacent to the resource, with construction occurring a minimum of six feet away from the resource (i.e., no construction will occur on the resource side of the barbed-wire fence).

2) In the event that archaeological resources are discovered, construction will be suspended until the Los Padres Heritage Program Manager, or delegated Heritage Program personnel have been contacted to evaluate the nature and significance of the find. After the find has been appropriately mitigated, work in the area may resume.

## 7.6 Fire Hazard

1) The risk of fire will be substantially reduced by implementation of construction between November and April, when the vegetation is most lush and the risk of fire is typically at its lowest.

2) The project will follow approved Forest Service standards for use of chain saws or other power equipment that create high fire risks.

3) The trail maintenance crew will carry fire retardant during the use of mechanical equipment and Santa Barbara County Fire Department and Los Padres Hotshots would be notified prior to trail construction activities.

4) To reduce the risk of fire during trail operation, fire hazard signage will be placed at the trailhead indicating the risks of trail usage.

# Appendix A

Phase III Grade Data for Individual Trail Sections.

Data for each section of trail measured in Phase III includes the distance in feet, elevation gain over that distance and the grade in percent for each of the segments. Beginning and end points for each of the trail sections were based on changes in grade sufficient enough to be measured. Due to the number of sections measured (56) the sections were then combined into larger segments for analysis.

| Section # | Length (FT) | Elevation Gain | Grade (%) |
|---|---|---|---|
| 1 | 114.6 | 27 | 23.5 |
| 2 | 285.5 | 32 | 11.2 |
| 3 | 149.7 | 27 | 18 |
| 4 | 285.4 | 30 | 10.5 |
| 5 | 324.4 | 21 | 8.9 |
| 6 | 126.7 | 24 | 18.9 |
| 7 | 79.3 | 14 | 17.7 |
| 8 | 94.4 | 32 | 34 |
| 9 | 121.7 | 33 | 27 |
| 10 | 50.67 | 11 | 21.5 |
| 11 | 39.49 | 2 | 5.1 |
| 12 | 151.6 | 38 | 25 |
| 13 | 230.8 | 6 | 2.5 |
| 14 | 142.6 | 26 | 18.1 |
| 15 | 226.5 | 51 | 22.5 |
| 16 | 101.67 | 5 | 4.9 |
| 17 | 116.5 | 33 | 28.4 |
| 18 | 181 | 34 | 18.7 |
| 19 | 280.5 | 52 | 18.5 |
| 20 | 116 | 27 | 23.2 |
| 21 | 81.5 | 13 | 16 |
| 22 | 562.1 | 92 | 16.3 |
| 23 | 144.9 | 36 | 24.8 |
| 24 | 178.1 | 1 | .5 |
| 25 | 348.6 | 24 | 6.8 |
| 26 | 723.4 | 30 | 4.1 |
| 27 | 849 | 100 | 11.7 |
| 28 | 184.6 | 10 | 5.4 |
| 29 | 1091.6 | 24 | 2.1 |
| 30 | 265.3 | 44 | 16.6 |
| 31 | 102.8 | 17 | 16.5 |
| 32 | 583.5 | 119 | 20 |
| 33 | 648.8 | 142 | 21.8 |
| 34 | 390.2 | 68 | 17.4 |
| 35 | 206.8 | 47 | 22.7 |
| 36 | 54.8 | 13 | 23.6 |
| 37 | 416.1 | 74 | 17.7 |
| 38 | 426.7 | 56 | 13.1 |
| 39 | 12 | 0 | 0 |
| 40 | 195.1 | 33 | 16.8 |
| 41 | 47.9 | 15 | 31.2 |
| 42 | 174.2 | 26 | 14.9 |

| | | | |
|---|---|---|---|
| 43 | 25.65 | 0 | 0 |
| 44 | 123.6 | 13 | 10.4 |
| 45 | 168 | 18 | 10.7 |
| 46 | 678.4 | 91 | 13.4 |
| 47 | 189.2 | 31 | 16.4 |
| 48 | 164.5 | 28 | 16.9 |
| 49 | 223.7 | 30 | 13.3 |
| 50 | 122.4 | 15 | 12.2 |
| 51 | 186.7 | 26 | 13.9 |
| 52 | 161 | 26 | 16.1 |
| 53 | 126.7 | 11 | 8.6 |
| 54 | 137.5 | 30 | 21.7 |
| 55 | 885.6 | 114 | 12.8 |
| 56 | 164.3 | 13 | 7.9 |
| | | | |

# Appendix B

Best Management Practices for reducing sedimentation.

Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use a watershed perspective and available watershed assessments when planning aquatic ecosystem improvement or restoration projects.
    - Consider how existing water quality and habitat conditions at the project site have been affected by past habitat alterations, hydrologic modification, and riparian area changes in the watershed.
    - Consider how past, current, and future land use patterns may affect the proposed project site.
    - Recognize that inhabitants and users at the site (beaver, deer, birds, and people) may change the current ecosystem state to suit their needs.
- Use desired future conditions to set project goals and objectives.
    - Establish desired future conditions that are consistent with the land management plan's goals and direction.
    - Use a reference condition to determine the natural potential water quality and habitat conditions of a water body.
    - Consider the potential for future changes in environmental conditions, such as changes in precipitation and runoff type, magnitude and frequency, community composition and species distribution, and growing seasons that may result from climate change.
    - Consider water quality and other habitat needs for sensitive aquatic or aquatic-dependent species in the project area.
- Favor project alternatives that correct the source of the degradation more than alternatives that mitigate, or treat symptoms of, the problem.
    - Consider the risk and consequences of treatment failure, such as the risk that design conditions could be exceeded by natural variability before the treatment measures are established, when analyzing alternatives.
    - Consider as a first priority treatment measures that are self-sustaining or that reduce requirements for future intervention.
- Use natural stabilization processes consistent with stream type and capability where practicable rather than structures when restoring damaged stream banks or shorelines.
- Prioritize sites to implement projects in a sequence within the watershed in such a way that they will be the most effective to achieve improvement or restoration goals.

Site-specific BMP prescriptions:

- Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity.

- Avoid or minimize unacceptable damage to existing vegetation, especially plants that are stabilizing the bank of the water body.
- Conduct operations during dry periods.
- Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures.
- Promptly install and appropriately maintain erosion control measures.
- Promptly rehabilitate or stabilize disturbed areas as needed following construction or maintenance activities.
- Minimize bank and riparian area excavation during construction to the extent practicable.
- Properly compact fills to avoid or minimize erosion.
- Contour site to disperse runoff, minimize erosion, stabilize slopes, and provide a favorable environment for plant growth
- Inspect the work site at suitable regular intervals during and after construction or maintenance activities to check on quality of the work and materials and identify need for mid-project corrections.
- Consider short- and long-term maintenance needs and unit capabilities when designing the project.
- Develop a strategy for providing emergency maintenance when needed.
- Include implementation and effectiveness monitoring to evaluate success of the project in meeting design objectives and avoiding or minimizing unacceptable impacts to water quality.

# Appendix C

Grade Data, Mitigation Types and Intervals

The following chart provides information regarding appropriate types of mitigation and intervals for those types based on grade and sideslope.

| **Grade** | **Grade Reversal** | **Rolling Drain** | **Step Over** | **Rock Stacking** | Brush & Fill | **Notes** |
|---|---|---|---|---|---|---|
| 0-5 | ✓ | | | | ✓ | Outslope 5-7%, add dips and grade reversals every 25-40 yards; fine-cut brush and place along lower outside edge of the tread and scatter dirt from cutting the full bench tread or backsloping in the brush to serve as a sediment barrier. |
| 6-10 | ✓ | ✓ | | | ✓ | Same as above. |
| 11-15 | ✓ | ✓ | | ✓ | ✓ | Same as above but increase outslope to 7%; armor the rolling drain dips to minimize gullying at the point where the water flows off the trail; add rock along the outside edge of the trail where there are any signs of instability to protect the slope; brush and fill as noted above. |
| 16-20 | | ✓ | ✓ | ✓ | ✓ | Note: grade reversals no longer feasible due to increased grade.<br>Same as above but increase outslope to 8-9%; armor the rolling drain dips to minimize gullying at the point where the water flows off the trail and increase frequency of drains to no more than 25 yards where feasible; add rock along the outside edge of the trail where there are any signs of instability to protect the slope; brush and fill as noted above; add step overs along with rolling drain dips and in other locations where feasible. |
| 21-25 | | ✓ | ✓ | ✓ | ✓ | Same as above but shorten the dips (similar to knicks) and armor them with rock to minimize gullying at the point where the water flows off the |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | trail; increase frequency of drains to no more than 20 yards; add several layers of rock along the outside edge of the trail where there are any signs of instability to protect the slope; brush and fill as noted above; add step overs along with rolling drain dips and in other locations where feasible. |
| 26-30 | | ✓ | ✓ | ✓ | ✓ | Same as above. Add shorter drain dips and armor them where full drain dips are not feasible; focus on use of step overs along with armoring every 15 yards to prevent gullying. Add several layers of rock along the outside edge of the trail where there are any signs of instability to protect the slope; brush and fill as noted above. |
| 30+ | | ✓ | ✓ | ✓ | ✓ | Same as above but focus on use of step overs along with armoring every 15 yards to prevent gullying. Add several layers of rock along the outside edge of the trail where there are any signs of instability to protect the slope; brush and fill as noted above. |

# Appendix D

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# Appendix E

Trail Management Protocol for Heritage Compliance

**Introduction**

Trails maintenance is considered a screened exemption under the Programmatic Agreement among the Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation (PA).

Screened exemptions are undertakings for which the Heritage Program Manager (HRM) has the responsibility to determine whether the undertaking is considered exempt from all heritage review. The PA states "If the HRM determines that an undertaking has an effect, will continue an on-going effect, or may affect historic properties, the undertaking shall not be considered exempt…". The Los Padres has a high archaeological site density (over 2750 recorded sites and less than 8% of the forest surveyed) and many of the roads and trails are located along prehistoric trails or roadways, and consequently along and through archaeological sites. This constitutes an effect under the law, and therefore roads and trails on this forest are not considered exempt from heritage review.

However, there are certain kinds of maintenance activities that can be conducted with a facilitated heritage review. In fact, once the forest has the archaeological surveys of all roads and trails completed and therefore appropriate information about potentially affected heritage resources, all maintenance activities that do not directly affect a site can have a facilitated review. Reporting requirements for participation in the PA and for the Department of Interior require that the heritage department track and report on maintenance activities because of their potential to have an effect.

**Trail Maintenance Activities**

All requests for heritage review are initiated by an attachment A in which the specific activities for maintenance are described and for which the project location is delineated on a 7.5' topographic quadrangle, and specific work locations if applicable.

1. Level 1 Light Trail Maintenance – defined as no disturbance to the original ground surface
   - Consists of activities such as slide and slough removal, clearing and grubbing, brushing and logging out, and clearing of water bars. These work items occur within the established trail way as defined in the trail guide (Clearing Limits found in Section 911.08 in EM-7720-102).
   - Can be performed along all sections of trails as long as the undertaking does not result in any new ground disturbance outside the established trail way.
   - Slough, berm and slide material removed from the trail way can be used as fill for gully and rill repair in the trail bed.
   - Archaeologists will submit a map to recreation identifying areas to be avoided on the trail if any are needed.
2. Level 2 Tread Maintenance – defined as the reestablishment of the trail way as described in (Earthwork, Section 910 and 911.08 in EM-77-102)
   - Can only be carried out in areas that have been surveyed and where no documented cultural resources are present.
   - Work to consist of ground disturbing activities, such as the construction and repair of new water bars and trail bed repair (referred to as Excavation and Embankment Section 912 in EM-7720-102). This work might include repair to switchbacks, shallow creek fords, rock retaining walls, filling gullies and rills in the trail bed with minimal barrow 44 from the trail way. Embankment work may consist of extending the trail way into the in slope where necessary to achieve a full bench trail bed.

- Trail crews shall limit moderate ground disturbing activity to the area defined as the trail way and within the agreed upon in Clearing Limits. Trail reroutes would not be permitted under this category.
- The boundaries of all cultural resources along the trail where the trail crew is working should be flagged, buffered, and avoided. Work crews would be provided with GPS data and/or topographic maps with flag and avoid site locations.

3. <u>Level 3 Trail Reconstruction</u> – defined as reconstructing the trail way (as described in Section 915, EM- 7720-102).
   - Consists of cutting a new trail bed or operating outside the trail way or agreed upon Clearing Limits. This work might include repairing deep gullies and ruts in the trail bed that require barrow and fill from outside the trail way in large quantities, the construction of sections of new trail necessary to reroute the trail where damage has eliminated the original trail way. Additional work might include repairing stream and river fords where the high water mark has removed the original trail way, and the construction of new water control measures (waterbars and rolling dips).
   - The section of trail that is being subjected to reconstruction needs to be recently surveyed by an archaeologist, cleared, and in some cases monitored by an archaeologist.

**Trail Work in Culturally Sensitive Areas**

Trail work that requires ground disturbance within a cultural context will not be covered under the PA and will be required to go through SHPO consultation. This does not necessarily mean that significantly more information will need to be collected, or that a site will need to undergo an evaluation, but that the law requires that we disclose effects and consult with SHPO on the nature of the effects. We will work to avoid or minimize adverse effects, but sometime they cannot be avoided. SHPO has 30 days from the date they receive a report to make comment to the agency. Lack of a reply is interpreted as concurrence.

Failure to consult with SHPO when there is an effect on a site is considered a foreclosure (foreclosing on SHPO's ability to comment, or make changes that will prevent adverse effects), and is comparable to a "taking" in the biological world. Foreclosures generally mean more work (and black marks, or lack of trust) with SHPO than what it takes to address the issue prior to the work.

Having an effect on a site where the site was not observable prior to the work (as in a buried site) is called an inadvertent effect. This needs to be reported to SHPO through the Heritage staff immediately upon discovery. Consultation then begins between the agency and SHPO to agree on a mutually acceptable course of action regarding the site. This consultation is limited to 10 days. The agency is then required to submit a report describing the undertaking and the circumstances surrounding the effects.

**Tribal Consultation**

Tribal consultation is required. The intent is to protect not only the sites themselves, but other cultural values such as resource collection areas or other areas of importance about which our Native American constituency will inform us, generally through the Tribal Liaison. It is therefore imperative that requests for heritage work be made sufficiently in advance that a determination can be made regarding the presence of archaeological sites as well as other cultural values to be protected.

Consultation has been conducted with the Tribe on the issue of trail maintenance. They want to be informed at least twice a year on which trails are planned for maintenance and on which trails the work as been accomplished, in addition to protection measures and findings.