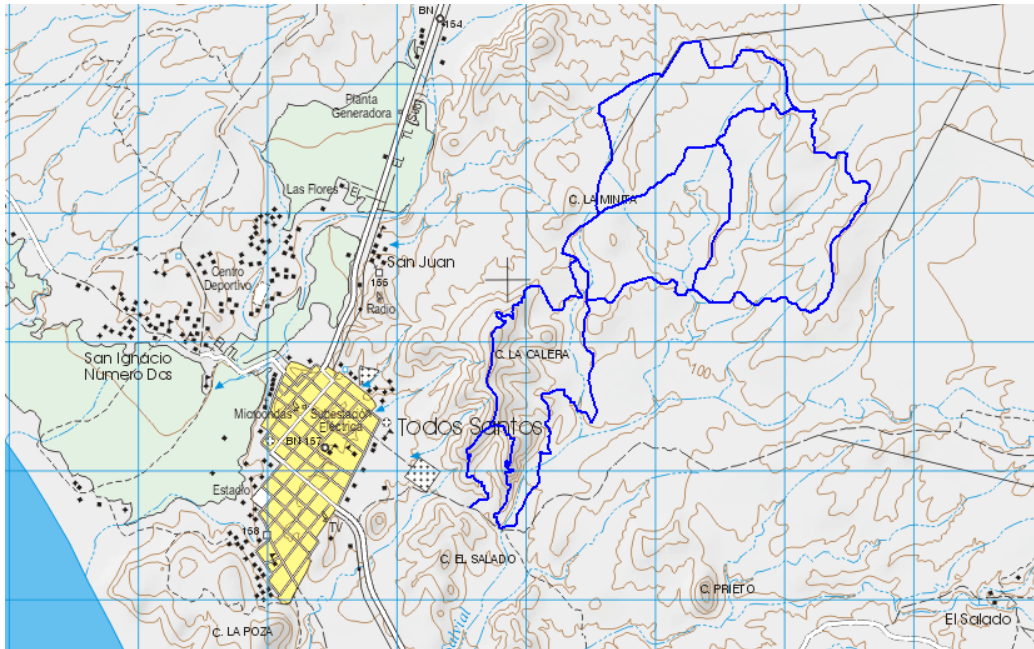


La Calera Trail Assessment

Revised: 6 January 2014

Located on the alluvial fans and cerros east of Todos Santos (Baja California Sur, Mexico; 23.44°N 110.21°W), the 12 mile mountain bike trail system, a mix of singletrack trails and doubletrack ranch roads, is constructed on weathered sedimentary and metamorphic rock formations. Soils range from decomposed granitic sands to sandy clay loam.



This trail system is a Class 2-3 Mountain Bike Trail (U.S.D.A. Forest Service), and because of its tight turn radii and frequent steep pitches, is a Strong Intermediate Trail (International Mountain Bicycling Association). Design and construction do not adhere to modern sustainability requirements for contour alignment, grade control, integrated water control, and durable tread. Given the obvious effects at the current level of use, this trail system and the associated environment would be impacted if the volume or intensity of use increased, and likely could not withstand a major hydraulic event.

Disclaimer: This is a preliminary assessment and is not a comprehensive trail prescription or trail plan. No land ownership records were examined or reviewed.

Observations

Contour Alignment

A contour alignment allows better management of drainage on the trail by reducing the steepness of grade, promoting sheetflow, and preventing fall-line trails

Only a few sections exhibit contour alignment. Most of the routing is either fall-line or *flat* ground.

Grade Control

Overall trail grade should not exceed 10%, while the alignment should be less than 50% of the *sideslope* grade (aka *half rule*) preventing fall-line trails.

On desert soils of granitic sands, it is often recommended to keep grades between 3 – 7%, since the low shear strength and poor cohesion subjects the trail tread to the effects of *erosion* and *displacement* forces from users.

Trail alignment is frequently greater than 50% of the sideslope (fall-line), overall grade exceeds 12%, with frequent sections exceeding 25%.

Integrated Water Control

Integrated water control is dependant on *grade reversals* and/or *knicks* at frequent intervals, and before and after turns; while the *outsloping* of tread (5-7%) promotes sheet flow. Aligning the trail so that it dips in & out of drainages to shed water and prevent stream capture is also critical.

Outsloping of tread is infrequent and associated *berming* and *troughing* is beginning to occur. Few grade reversals or knicks present, no grade reversals before or after turns.

Durable Tread

Full bench construction provides the most compact and durable tread surface possible for terra trails, and eliminates potential for tread creep.

Limited full bench construction... most of the trail is *rake & ride* on existing surface.

Other

Rather than disbursing (*broadcasting*) excavated material down-slope, material is allowed to berm on the outside of tread.

Turn radii frequently less than the 8-12' required for good *flow*.

Climbing/sweep turns are not engineered; "at slope-grade turns" common and are showing displacement effects of users.

Switchbacks are not engineered; "Simple" switchbacks (i.e. without a turning platform) are showing displacement effects of users.

Drainage crossings are not engineered, and not contoured on entrance/exit.

A Sustainable Trail is a dance between the effects of the User, the Environment and the Climate/Weather...

Addendum: Ascents from Ranch Road

Cactus Battle ~.84 miles w/ ~390' elevation gain; 13.5% avr grade (5 sections >20%, 11 sections >15%)

Labyrinth ~.67 miles w/ ~290' elevation gain; 11.1% avr grade (3 sections >20%, 8 sections >15%)

Glossary

Alignment: The configuration of the trail in horizontal and vertical planes.

Berm: A raised shoulder or dike along the downhill (outside) edge of the tread. Berms prevent the flow of water across the trail tread, thus causing erosion along the length of the trail tread.

Broadcasting: The process of widely distributing excavated soil, cut branches, and duff as far downhill or uphill and away from the new tread as possible. Widely distributing so as to blend in with the natural soil contours and vegetation and be as inconspicuous as possible.

Capacity: The maximum number of trail users that can pass through a section of trail during a given time period under existing trail conditions. Also refers to the amount of use a given resource can sustain before an irreversible deterioration in the quality of the resource begins to occur.

Climbing Turn: A turn to reverse direction that doesn't have a constructed turning platform or landing. The upper and lower legs of a climbing turn are generally joined by a short section of trail (the apex of the turn) that lies directly in the fall line. As a result, climbing turns located on hillsides with a grade of more than 7 percent can be erosion prone. In a climbing turn, water drains off the outside edge on the entire length of the turn. A thru-cut climbing turn is constructed on a sidehill of 20% or more when measured between the exterior boundaries of the turn, and cuts through the sidehill grade as it changes the direction of the trail 120 to 180 degrees.

Contour Trail: A trail that traverses a hillside and is constructed to drain water without causing erosion of the trail; characterized by gentle grade, grade reversals, and outsloped tread.

Displacement: The forces moving material sideways.

Erosion: The natural process of wearing down and removing rock and soil by wind, water and traffic.

Fall Line: Steepest line across a given contour or the direction water flows down a slope (path of least resistance) under most circumstances. Constructing a trail on the fall line encourages water to run down the trail and leads to erosion.

Flat Trail: A type of trail built across level terrain. The terrain is without a pronounced cross slope and has inefficient or unpredictable drainage. Techniques for flat trail include elevated tread or a system of channels to improve trail drainage.

Flow: The rhythm or "feel" of a trail. Two basic types include "open and flowing" and "tight and technical".

Full Bench Cut: The total width of the trail tread is excavated out of the slope, and the trail tread contains no compacted fill material.

Grade: The vertical distance of ascent or descent of the trail expressed as a percentage of the horizontal distance, commonly measured as a ratio of rise to length or as a percent. For example, a trail that rises 8 vertical feet in 100 horizontal feet has an 8% grade. This is not the same as measuring in degrees.

Grade Reversal: A reverse in the trail grade – usually a short dip followed by a rise – that forces water off the trail. Grade reversals are subtle and typically designed into the alignment of the trail. When designed into the alignment they can prevent the need for more artificial water diversion structures such as rolling dips.

Half Rule: Laying out a trail so that the prevailing grade is less than half the grade of the side slope. If the trail grade is steeper than half the grade of the sideslope, it is considered a fall-line trail and gravity will pull water down the trail instead of across it. This leads to erosion of the trail tread.

Knick: Shaved-down section of trail, about 10 feet in diameter, with an exaggerated outslope. Like a rolling grade dip, a knick is used to shed water off a trail and is a useful remedy for wet spots on relatively flat trails.

Outsloping: A method of tread grading that leaves the outside edge of a hillside trail lower than the inside to shed water. The outslope should be barely noticeable—usually no more than about one inch of outslope for every 18 inches of tread width.

Overall Trail Grade: The average steepness of a trail over its entire length.

Runout: A section of trail, usually at or near the base or bottom of a decent, that provides adequate length and grade reduction in order for the user to safely slow, stop or negotiate turns, intersections or structures.

Radius: An arc or curve that connects two straight trail segments in order to provide smooth horizontal and vertical alignment.

Rake and Ride: Used by mountain bikers to describe trails that were not constructed. Volunteers rake the leaves out of the way and folks start riding.

Sheetflow: The more or less even disbursement of water flowing on low gradient slopes.

Sideslope: The slope or gradient of the undisturbed hillside; the amount or grade of the pre-existing slope across a trail corridor.

Slope: The natural or man made pitch of the land, as shown on contour maps. Generally refers to the hillside (land), not the trail, as trail “slope” is called the grade.

Switchback: A sustainable turn on a hillside which doubles back or “switches back” on itself. The trail is routed onto a level landing or deck where it makes a transition to the opposite direction. The lower leg of a switchback is outsloped but the upper leg is insloped to drain water run-off out the end of the turn.

Tread Creep: When the loose soil of the trail tread moves (sags or slides) downhill because of erosion or use. Specific causes include bushes or trees protruding into the trail from above, exposure of roots from an uphill tree, an improper bench cut, or poor trail flow.

* Glossary derived from *Recommended Standardized Trail Terminology for Use in Colorado* (Colorado Outdoor Training Initiative) and *Trails, Greenway, and Outdoor Recreation Terms* (Schmid).

References

Colorado Outdoor Training Initiative. 2005. *Recommended Standardized Trail Terminology for Use in Colorado*.

International Mountain Bicycling Association. 2004. *Trail solutions, IMBA’s Guide to Building Sweet Singletrack*.

Schmid, Jim. 2010. *Trails, Greenway, and Outdoor Recreation Terms*.

<https://americantrails.org/resources/info/glossary.html>

U.S.D.A. Forest Service. 2011. *U.S. Interagency Trail Design Parameters*.