Bob Middagh Trail Study
Marin County Parks
August 5, 2016
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Prepared August 5, 2016, by
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Introduction and Background

Marin County Parks retained TrailPeople, Landscape Architects and Planners

Study Scope and Objectives

The Marin County Open Space District (MCOSD) retained TrailPeople, Landscape Architects and Planners to study the Bob Middagh Trail with the objective of identifying physical changes to the existing road/trail, or other measures to accommodate multi-use, including bicycles, while minimizing user conflict. The study to address the following questions:

- What physical changes or measures would help to accommodate bicycles without user conflict?
- What are the opportunities, constraints and improvement alternatives?
- What are their respective pros and cons?

Planning and Policy Background

On December 16, 2014, the MCOSD Board of Directors approved the first comprehensive Road and Trail Management Plan (RTMP) and associated Environmental Impact Report (EIR) to direct future use and management of roads and trails on the MCOSD’s 34 preserves. These goals and policies helped guide the current study and will guide the ultimate decision on any changes or improvement projects.

Over-arching Goals of the RTMP include:

1) Establish and maintain a sustainable system of roads and trails that meet design and management standards;

2) Reduce the environmental impact of roads and trails on sensitive resources, habitats, riparian areas, native and special-status plant and animal species.

3) Improve the visitor experience and visitor safety for all users, including hikers, mountain bikers, and equestrians.

More specific “interests and concerns” supported by RTMP policies (extracted from a list given on page 4-10 of the RTMP) include:

1) Meet current and future demand for access to public lands by providing roads and trails for a variety of users.

2) Ensure a sustainable road and trail system

3) Protect sensitive resources

4) Minimize user conflicts

5) Enhance road and trail connectivity and improve the range of opportunities for visitors to experience the preserves

9) Maintain user safety
Particularly relevant RTMP policies for the current study include:

GOAL TRL-1: Trail Network Preservation and Expansion. Preserve existing trail routes designated for public use on the Marin Countywide Trails Plan maps, and expand the public trail network for all user groups, where appropriate. Facilitate connections that can be used for safe routes to school and work.

GOAL TRL-2.b: Design, Build, and Manage Trails in a Sustainable Manner. Incorporate design measures that protect vegetation, protect habitats, and minimize erosion.

Policy T1d: The MCOSD will permit bicycling and saddle animals on trails designated and signed for their use, including (a) existing trails and new trails that the MCOSD builds and designates for shared use; and (b) existing trails on newly acquired lands, when compatible with natural resource protection and the safety of trail users.

Policy SW.12: Road and Trail Connectivity. The MCOSD will strive to increase road and trail connectivity for all trail users. The MCOSD will strive to provide opportunities for short to medium distance loops and long-distance routes. The MCOSD may consider one-way, uphill-only, time separation, and single-use or priority-use trails to achieve these ends.

Policy SW.16: Prohibition of Uses. The MCOSD may prohibit certain trail uses or apply increased trail use restrictions within certain areas to enhance safety, minimize conflicts between trail users, and protect natural resources. Examples of areas where this policy may apply include, but are not limited to, those proximate to stables and those traditionally heavily traveled by equestrians, and in Sensitive Resource Areas.

Policy SW.17: Displacement of Existing Trail Users. The MCOSD will strive to prevent displacement of equestrians and pedestrians when accommodating trail access and trail connections for mountain bikers. When considering the designation of existing trails as single-use or priority-use, the MCOSD will take care to maintain connectivity between destinations for user groups historically using those trails.

Existing Trail and Setting

The Bob Middagh Trail is an approximately 1/3 mile trail that connects from the Camino Alto Preserve at Camino Alto road to the Alto Bowl Preserve at the Alto Bowl Fire Road (see Figure 1). The Bob Middagh Trail is currently open only to hikers and equestrians, but local bicyclists are requesting a change in use to open it to bikes to provide a connection from urbanized areas in Mill Valley to the southwest, to the Camino Alto Preserve and destinations beyond in the northwest.
Figure 1 – Regional Location Map
Figure 2 – Site Vicinity Map
Current Trail Conditions

The western part of the trail was originally constructed as an access road for installation of a Marin Municipal Water District water line that still exists under the western 2/3 of the trail (see Figures 3 and 4). The trail has relatively gentle gradients, in the range of 5 to 16 percent slope on this portion, but at Camino Alto near Chapman Drive there is a steep (almost 30% average gradient) trail that connects to the main trail, and the main trail has a short steep section where it merges with this connecting trail.

The eastern portion of the Bob Middagh Trail has a relatively straight steep section (up to approximately 20% gradient) extending in a northerly direction before leveling off in a section that winds through the bottom of the valley of Manor Creek. This steep connection resulted from the constraints created by the location of the original water line route on the edge of the steep canyon with a limited amount of public open space available to the north before an area of private homes. Typically a trail connection across a canyon will be made upstream to take advantage of rising elevations, rather than descending. For example if the trail had been routed further down the canyon away from the homes it would have had to descend 35 feet lower in elevation than the current trail, and climb back up 20 feet to reach the Coach Fire Road on a creek bank that is about twice as steep as the slope the trail currently crosses.

The upper/western portions of the trail have a graded bench that is up to 10 feet wide, facilitated by the relatively gentle cross slope of approximately 30 to 35% on which it was constructed. The actual trail tread through these grassland areas is approximately 3 feet wide, except in a few locations where there are two treads resulting from passing.

The lower/eastern, steeper portion of the trail has a graded bench approximately 5 feet wide due to the constraints of the steep wooded slopes of approximately 45 to 50 % cross-slope on which it was constructed. The trail tread on this portion is approximately the same 5 foot width as the bench, in part due to the recent construction of the drain dips.

To manage runoff and prevent erosion, Marin Parks and Open Space staff has constructed a series of “drain dips” along the trail. These consist of a low point in the trail. On the steeper eastern segment they feature a lateral berm on the downhill side to help divert water, and occur at more frequent intervals. On the eastern steeper segment these dips are located at intervals of approximately 40 feet on center. Though these dips are necessary for trail sustainability from an erosion control standpoint, for mountain bikes the more prominent dip/hump combinations present a challenge and/or a jump, which increases the sense of conflict for other users.

Sight distance ahead on the trail is an important consideration to avoid conflict on multi-use trails. The sight distance on the eastern portion of the trail is reduced in a few locations by native shrubs, non-native plum trees, and a stump, as noted on the maps and photos that follow.

The trail crosses over culverts at Manor Creek in the bottom of the valley, and at a smaller tributary drainage to the west. These culverts need maintenance attention to prevent their failure due to clogging and/or deterioration. A larger culvert has failed further up the Manor Creek drainage, partially severing the connection from Coach Fire Road to Sausalito Street.

The photos following Figures 3 and 4 show current conditions; photo locations are shown on the figures.
Figure 3: Bob Middagh Trail Western Segment
Figure 4: Bob Middagh Trail Eastern Segment
A – Steep connecting trail from Camino Alto near Chapman Drive

B – Upper trail segment looking east
C – Generally the upper portion of the trail has moderate slopes and good sight distance

D – Section is a little steep at 16%, but has good sight distance
E – Typical trail segment on upper portion

F – Coyote Brush at this corner limits sight distance
G – Steeper lower section with drain dips

H – Typical drain dip - net drain berm is approx. 4″
I – Lowest portion of the step section

J – “Volunteer” plum trees limit sight distance at this corner
K – Culverts exist under the trail at Manor Creek and this smaller drainage

L – Stump in background limits sight distance at this corner
Conceptual Improvement Options

The configuration of the Bob Middagh Trail reflects the opportunities and constraints created by the road originally graded for the water line installation, and the limits of the available open space property on which to locate the trail connection to the Alto Bowl Fire Road. Due to these constraints, the eastern portion does not meet current design standards for a gradient that minimizes concentration of runoff. Without these constraints it would have been constructed differently, based on the current Road and Trail Management Plan¹ and associated standards. It would have been constructed to follow the contours more closely, rising and falling in concert with the natural small drainages. This results in a trail that is more sustainable, without need for artificial drainage structures, that is more natural and enjoyable for all users, and that limits mountain bike speed and conflict between users. The steep connection to Camino Alto and the steep lower section of the existing trail particularly depart from these standards and are considered for improvement.

Given the existing conditions of the road/trail, there are two options to modify it to try to meet the objectives of the study:

1) **Use the trail “as-is”** with minor modifications to improve sight distance, signage for mountain bike speed and courtesy, and outreach and education efforts focused on bicyclists;

2) **Modify the existing trail** to introduce speed control features for bikes. A series of turns could be created on the steep eastern segment with logs or large rocks. Soon native or naturalized plants and native shrubs and trees would fill in;

3) **Reconstruct/realign part of the trail** for more of a “flowing” alignment that follows the contours and “retire”/restore the eliminated portions of the existing segment to a more natural condition. There are four separate sections where such realignment may be warranted as illustrated in Figures 10 and 12. They could be implemented independently or together.

Minor improvements or maintenance, such as signage for mountain bike speed control and courtesy, trimming trees and shrubs and removing the stump for sight distance, and maintenance or replacement of the two culverts are considered inherent parts of Options 2 and 3.

¹ Road and Trail Management Plan, Marin County Open Space District, December 2014.
Option 1: Trail As-Is with Trimming, Signage and Outreach

Most of the trail is very well configured for shared use; even the steep eastern segment is not extremely steep compared to other shared use trails in Marin County’s and other agencies’ systems, but it is an important regional connection as well as a popular local trail, so there is potential for heavier use and higher conflict than a “backcountry” trail.

User outreach, information and education has been shown to be a major part of the solution for trail conflict. Along with signage at either end of the trail and at the start of the steep sections, Marin County Parks volunteer bike patrol and the Marin County Bicycle Coalition could coordinate on the information and cooperation effort.

The minor trimming of shrubs and trees and removal of one stump as noted on Figures 3 and 4 would be another basic improvement for shared use by improving sight distance.
Option 2: Modification with Speed Control Measures

This treatment is only applicable to the steep, narrow eastern segment. This approach is a trail conflict solution recommended by the International Mountain Bicycling Association (IMBA) and used by California State Parks (see Figure 5).

Natural materials such as rock could be placed on either side of the trail to create a series of turns, coordinated with the drain dips, so that bikes must slow to negotiate them. The available trail width at any point is only slightly reduced, and a full width is available behind the obstacles for passing. Sight distance is undiminished, and if the trimming recommendations are implemented, will be improved over current conditions.

Figure 5: Introduced Turn Examples

Images – International Mountain Bicycling Association

Figure 6 shows the layout of the drain dips and the profile of the existing trail segment. Figure 7 shows examples of how the existing drain dips are constructed. Figure 8 shows schematically how the introduced obstacles could be laid out to create the turns in concert with the drain dips. Figure 9 illustrates the appearance of the resulting trail. The materials, size, spacing and clearance between these introduced obstacles should be carefully resolved so that they appeared as natural as possible and achieved a balance between slowing bikes and providing ample passing opportunities.
Figure 6: Eastern Segment Detail

NOTE:
FOR STATION DETAILS SEE ATTACHED SHEETS
Figure 7: Typical Drain Dips

Figure 8: Introduced Turn Layout Concept
Figure 9: Simulated view with introduced turns
Option 3: Realign Steep Parts of Trail

Figures 10, 11, 12, and 13 show concepts for realigning the steep sections of the existing trail to have a gradient of 10%. There are 5 separate sections that could be done together or separately:

**Realignment A** – (see Figure 10 and images below). This would be a new connection from Camino Alto to the main trail. This realignment would replace a trail that is almost 30% grade. Because of limited space due to a utility pole and guy wires and the water line, three switchbacks, probably with walls and railings, would be needed at the start of the trail to maintain a 10% grade. This part of the trail would stay south of the existing water line. Further east the trail would wrap around the natural bowl in the hillside, descending gradually to connect to the existing trail.

View west showing route of Realignment A (yellow)

**Realignment B** – (see Figure 10 and image below). This would be a connection from the existing trail to new trail A. There is a short steep portion of the existing main trail before it joins the steep connecting trail. If trail A is built it the remaining steep segment could be eliminated by constructing trail B.
View east showing route of Realignment A (yellow) and B (white)

**Realignment C** – (see Figure10) This realignment would eliminate a short section of trail with 16% slope just west of a knoll, and replace it with a more winding 10% gradient section (see Figure 10 and the following photo).
The central portion of the trail (see Figure 11) is well aligned and configured for shared use – no changes are recommended.

**Realignment D** – (see Figure 12). This would be a realignment of the upper end of the current steep eastern segment to reduce it from as steep as 17% to a 10% grade. It includes added turns at the top aligned to avoid crossing the water line.

**Realignment E** – (see Figure 13). This alternative creates two switchback near the bottom – one constructed partly on the alignment of the existing trail. The contours of the surplus portions of the existing trail could be restored using soil cut from the new trail, which would be a full bench (all cut) trail except at the switchbacks. The downslope side of the switchbacks would be all fill, and would require a rock or other type of wall to retain the soil, as illustrated in Figure 14. Split rail fence and/or other measures would be needed to prevent cutting of the switchbacks. The actual layout of the trail would include some grade reversals (locations where the trail gradient rises slightly before descending again) to avoid concentration of runoff, and eliminating the need for the significant drain dip on the existing trail segment. This would be a significant trail/restoration project that would entail closing the trail for at least short periods.
Figure 10: Trail Realignment Options A, B, C – West Segment
Figure 11: Trail Realignment Options - Central Segment
Figure 13: Realignment E – East Segment

Switchback Cross-Section
**Figure 14: Switchback Detail**

_Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds_, Hancock, Jan; Vander Hoek, Kim K. Jones; Bradshaw, Sunni; Coffman, James D.; Engelmann, Jeffrey. 2007. 0723 2816. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center.
Regional Trail Connections

The Bob Middagh Trail connection is regionally important because on the west it connects to the Blithesdale Summit and Camino Alto Open Space Preserves, from which mountain bicyclists can use fire road trails to reach the vast network of trails on and around Mt. Tamalpais. At the eastern end the Bob Middagh Trail connects to the Alto Bowl Fire Road Trail, which in turn connects to the Mill Valley-Sausalito Path (see Figure 15). A suitable multi-use trail connection along this route is particularly sought after by mountain bicyclists, and a proposal for a change in use has been submitted.

Without this connection bicyclists must use at least parts of East Blithesdale Avenue and/or Camino Alto or Corte Madera Avenue to access the same connecting trails. These routes are narrow and winding, with little or no shoulders, and fast, often heavy traffic. With access to the Bob Middagh Trail bicyclists in Mill Valley and southern Marin County, and bicyclists from Corte Madera and Larkspur will be able to access the trail network without having to negotiate busy streets.

The route for bicyclists to reach the Bob Middagh Trail from the Mill Valley-Sausalito Path would be to continue east along Vasco Court, then continue north on Underhill Drive and Coach Road to the Alto Bowl Fire Road. There is also a route north on the Vasco Court Fire Road and through the private Scott Valley Swim and Tennis Club property to Coach Road and the Alto Bowl Fire Road.

For bicyclists coming from the north the route from Tamalpais Avenue would follow Sausalito Street to the Alto Bowl Fire Road and the Bob Middagh Trail.

RTMP goals and policies that support opening the Bob Middagh Trail to bikes include:

GOAL TRL-1: Trail Network Preservation and Expansion. Preserve existing trail routes designated for public use on the Marin Countywide Trails Plan maps, and expand the public trail network for all user groups, where appropriate. Facilitate connections that can be used for safe routes to school and work.

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Figure 15: Regional Trail Connections
Study Summary

Each of the optional improvements is an approach that has been shown to be effective in creating a more sustainable trail that minimizes user conflict on recreational trail systems in Marin County and many other regions.

The minor trimming for sight distance improvement and the realignment of the steep trail segments would have benefits for sustainability and visitor experience even if bicycles are not allowed on the trail; only the “introduced turns” option is focused on addition of bicycles. The “introduced turns” option is not a typical trail feature in that it attempts to mitigate a steep, narrow, straight trail segment that was necessitated by site constraints.

The replacement of the two existing culverts in the eastern part of the trail is important maintenance work that must be undertaken to protect the trail and riparian resources regardless of other improvements or use decisions.

The options are not mutually exclusive alternatives: all three of these options combined would theoretically provide the most sustainable and conflict-free multi-use trail, but there are other considerations and local preferences to be weighed in the decision, along with the overall need and benefit of opening up the trail to bikes. Table 1 shows some of the pros and cons of the options.

Table 1: Comparison of Options for Improving Bob Middagh Trail

<table>
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<tr>
<th>Option</th>
<th>Pros</th>
<th>Cons</th>
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| 1. Open to bikes as-is with minor sight line, signage improvements and mt. bike user outreach | • Low cost  
• Peer pressure shown to reduce speed and conflict | • Still has undesirably steep, straight sections  
• Still physically conducive to speed |
| 2. Modify the existing steep trail segment with introduced turns | • Relatively low cost  
• Relatively low extent of construction  
• Will slow most mt. bikes | • Not natural appearance, at least initially  
• Reduces passing space at these pinch points |
| 3. Reconstruct/realign parts of the trail | • Only way to mitigate steep upper connection  
• Most natural and sustainable long-term  
• Most enjoyable trail with least user conflict  
• Eliminates need for large drain dips | • Significant costs  
• Relatively significant short-term construction  
• Challenge to keep switchbacks from being cut  
• Must avoid construction conflict with water line |
Conclusion

Most of the Bob Middagh Trail is well-configured for low-conflict shared use.

Option 1 - a user information and education campaign could significantly address user behavior and mitigate trail use conflict and is a good idea when opening up an important connection to bikes in any case. Ideally such outreach would be repeated periodically. Light trimming for sight distance and maintaining existing culverts is basic maintenance that would support low conflict and positive visitor experience.

Option 2 – the “introduced turns” alternative, would physically slow bikes and reduce conflict. It is a new approach for Marin Open Space and users may need time to understand and accept it. It should be combined with an outreach and education process if it is implemented.

Option 3 – realignment of steep segments has varying priorities and opportunities. The upper connection at Camino Alto is too steep to meet safety and sustainability goals and should either be closed or realigned (Realignment A). Realignments B and C are desirable but not essential. Realignments D and E are alternatives to Option 2 that involve more construction and disturbance but would create a trail that would more naturally control mountain bike speed and control runoff without the need for large drain dips.