Prescott Park Conceptual Trail Plan

Medford, Oregon

October 2013

PREPARED FOR: City of Medford, Parks and Recreation Department

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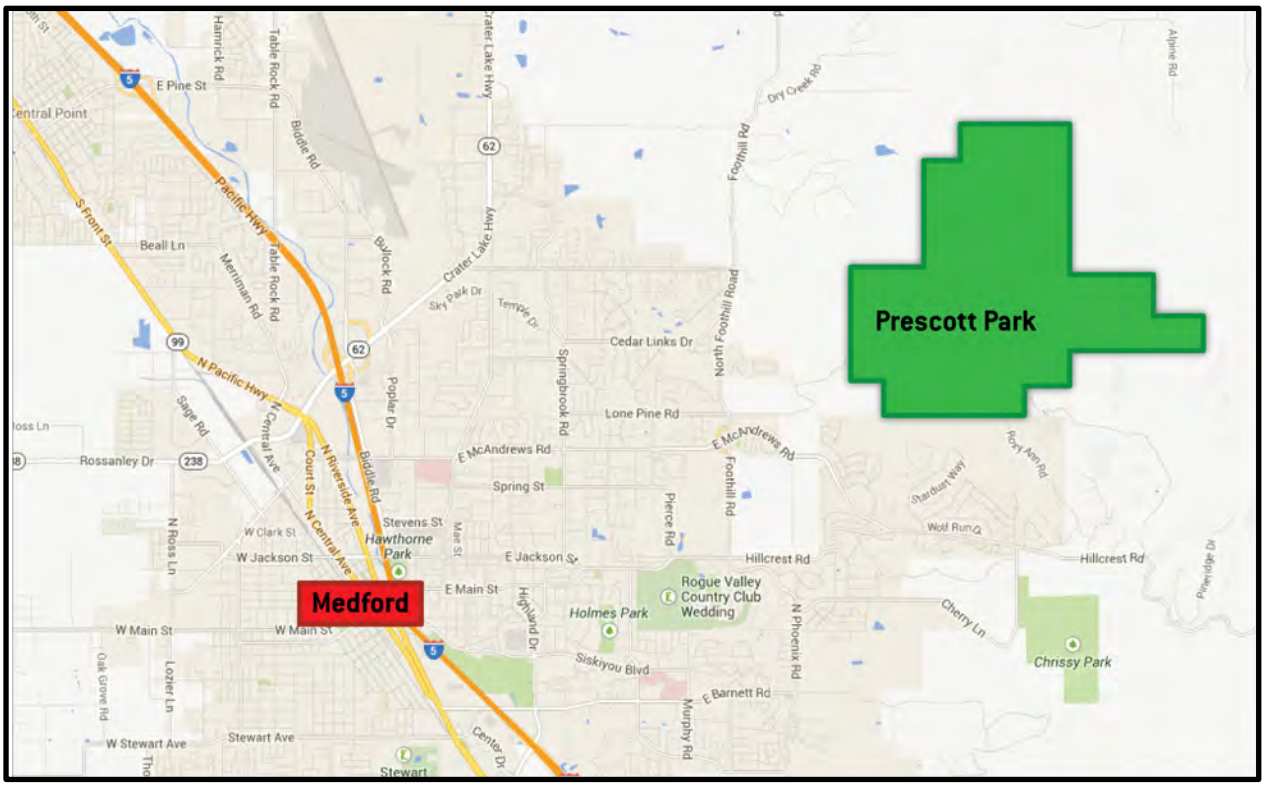
I. Overview

IMBA's Trail Solutions program was tasked with assessing the current Prescott Park trail network and creating a conceptual trail plan as a review of the Master Plan adopted in 2008. The project area is located East of Medford, Oregon on the sloping terrain surrounding Roxy Ann Peak. After assessing the park's trails, field scouting the terrain, and identifying the opportunities and constraints on the site this report was drafted. Conceptual routes to optimize the trail system were drafted and are represented in the accompanying map data.



Constraints

Minimal Signage

The trails of the Prescott Park trail system are poorly marked and lack information about allowed uses and difficulty levels. Trail users expect to find a way-marked route system where trails are identified in a way that enables them to follow a designated route on interconnecting trails. Marking routes in this manner is a convenient and effective way of giving visitors a self-guided experience without the need for frequent map checks. Way-marked routes usually link trails of similar difficulty.

Inadequate Trailhead Access

The only official trailhead facility is at the first gate on Roxy Ann Road. Although this facility is centrally located, it is more remote and requires additional time to access from town. It also starts trail users higher up the slopes and reduces the access to lower terrain.

Unsustainable Trails

Most of the existing trails at the park are unsustainable and would not withstand increased use. Expansion of the park will bring more users and this means unsustainable trails must be upgraded to prevent erosion and damage. Steep grades and poor drainage are the main sustainability issues.

Truck Traffic on Roxy Ann Road

The quarry located in the parks southeast corner is accessed daily by large trucks hauling materials. Although these drivers appear to be safe and courteous their presence on the road, which is used as a beginner trail, can be intimidating.

Private Land Inholdings

There are a number of parcels that are inholdings or impinge upon the park boundary in a manner that could affect optimization of the conceptual trail plan.

Park Security

Significant evidence of unauthorized use by off-road trucks, motorcycles and ATV's was noted. The majority of the incursions are from the power line access road on the west side of the park. These vehicles have done a large amount of damage to roads and vegetation. Other significant risks associated with unauthorized access include wildfire starts, refuse dumping, vandalism and damage to natural resources.

Ticks & Poison Oak

Large populations of the western black-legged tick and thick growths of poison oak create a barrier for entry to many users. Ticks can be considered a risk to the community's health due to their potential as a vector for Lyme disease. The painful rash that results from skin exposure to poison oak oils can be a powerful deterrent to many users. Controlling these problems would create a space that users can enjoy with less worry.

Land Use Permits

Prescott Park is located outside the City of Medford Urban Growth Boundary and are subject to County land use regulations. Jackson County Land Development Ordinance Section 3.2.9 provides for the minor alteration of existing parks. Major trailhead improvements and other public facilities improvements may not be able to be considered minor under those provisions. It is unknown whether all 34 miles of additional trails would be considered major or minor, but it is expected that the Phase 1 trails could likely be approved as a minor improvement under JCLDO Section 3.2.9. The Bordeaux Avenue Trailhead would be located within the City's urban growth boundary and

therefore could be developed with a full complement of urban facilities and improvements under City of Medford conditional use permit criteria.

Opportunities

Spectacular Scenery and Ecology

At the center of the park is Roxy Ann Peak, 3576 feet, which possesses astonishing and beautiful views of its surroundings. With clear weather visitors can even see the peak of Mt. Shasta in northern California. The vegetation changes dramatically as visitors ascend to the peak.

Passionate User Base

The members of the Rogue Valley Mountain Bike Association (RVMBA) have expressed a strong desire to see higher quality purpose-built mountain bicycle trails developed in the park. The excitement generated by the potential for these kinds of trails has motivated RVMBA to be a resource to aid in planning future construction and changes to current trails.

Supportive Land Management

The City of Medford Parks and Recreation Department have been cooperating with RVMBA and are committed to providing high quality mountain bicycling trails at Prescott Park. Trail improvements and expansion are a major component of the Master Plan adopted in 2008.

Excellent Terrain

With a high point of 3576 feet and a low point 1960 feet the park has over 1600 feet of vertical terrain to access. This terrain is spread over 1740 acres of oak savannah and pine forests. A variety of soil types are present as well as a number of rocky outcrops and jumbles.

Proximity and Connections to Urban Trail Users

East Medford is one of the largest residential areas in Jackson County. Thousands of households already live in this portion of the County and the City's land use plans support the growth of several thousand more in the Southeast Medford area over the next ten to twenty years. These residential areas already contain or are planned to contain urban trail systems that can eventually connect directly to the recreational trail system at Prescott Park. For example, a proposed new trailhead on Bordeaux would be located just two blocks from the separated pathway along McAndrews Road. This would provide access to the trail system for a large population in the area below Foothills Road. Development of the Prescott Park trail system presents a unique opportunity to develop over 30 miles of recreational trails with trailheads that can be easily accessed directly from City resident's homes. This would reduce pressure on roads infrastructure and create healthier communities.

Moderate Elevation Provides Opportunity for 4-Season Recreation

The top of Roxy Anne Peak is just below the elevation that tends to hold snow for extended periods during the winter months. The low point of Prescott Park is just above the inversion layer that sets

up during periods of high pressure in the late fall and winter months. It is often the case that temperatures at the valley floor during inversion periods are at or below freezing while temperatures at Prescott Park are likely to be in the mid 40's to 50's, which are very comfortable temperatures for park use. The elevation of the site creates an excellent opportunity for outdoor recreation during colder months when higher altitude trails are still covered in snow.

Year-Round Site Creates Event Opportunities

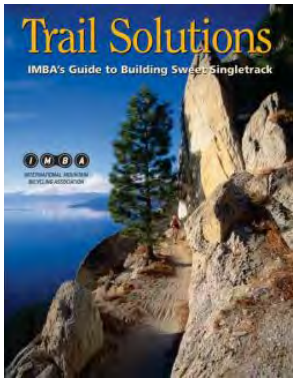
There are many groups interested in mountain biking events in the shoulder seasons in late fall and early spring, but most locations in Oregon are not suitable because of inclement weather. It is expected that these seasons will be some of the best times for visiting Prescott Park and there may be opportunities to attract future events once a high quality facility has been constructed. The Oregon Bicycle Racing Association sanctions competitions around the state almost every weekend from April through October. However, few events exist in December - March and this site will be quite desirable during this period.

II. Desired Conditions

Community Goals

The City of Medford desires to refine and implement the 2008 Master Plan by and through this conceptual trail plan and associated analysis. The people of Medford and the RVMBA desire that the trails of Prescott Peak become an even greater asset for a healthy, active community. These trails should provide safe, convenient access to recreation and nature. They should also attract tourists to provide an economic benefit.

Design Goals



The trails of the Prescott Park network should be built and maintained using the best practices for sustainable trail construction. Information to guide this goal will be provided in this document. Additional information is available in IMBA's book, "Trail Solutions". The trail should accommodate a wide variety of non-motorized users by creating clear sight lines and safe intersections. Optimizing drainage and using moderate grades should minimize maintenance. The result will be rolling contour trails with a flowing and playful character.

Trail Specifications

All existing and future trails in the Prescott Park Network should be brought to the following standards where practical and in accordance with the chart in Appendix B. Further details and techniques can be found in Appendix D.

Style –

- *Traditional* - Rolling contour trail with a layout that meanders up and down slope to create grade reversals at 20 to 40 foot intervals. The tread should be outsloped at approximately 5% except in areas that require in-sloping such as berms and in-sloped reversals.
- *Flow Trail* - Rolling contour trail that is optimized for descending. The layout dramatically meanders up and down slope to create large grade reversals at 20 to 40 foot intervals. The tread should be outsloped at approximately 5% except in areas that require in-sloping such as berms and in-sloped reversals.

Width – Constructed at approximate 24-36", this will naturally narrow up as vegetation grows and the tread is compacted by use. Sustained width should be maintained at 20-24".

Corridor Clearing and Vegetation – All brush should be cleared a minimum of 18" from the tread edges before construction begins to create a 6-foot wide corridor. Special attention should be applied to the clearing of brush and branches at eye level to improve sight lines and reduce potential injuries. The corridor should be cleared to a minimum of 8 feet in height. All brush should be cut squarely and flush with the ground to prevent injuries to users. Any standing trees or their roots should not be cut without explicit approval. Trail construction should use techniques that minimize damage to large tree root systems.

Grade – Because of the variable soils in the area the average sustained grade is planned at 7%. Any sections of trail that are constructed at greater than 15% for more than 20 feet must be armored with stone or other hard materials to prevent erosion. Refer to the *Sustainable Trail Guidelines* section in Appendix D. for appropriate armoring techniques.

III. Assessment & Recommendations

Improve Existing Trails

Additional details can be found in Appendix B.

Ponderosa Trail – As it exists this trail climbs from Roxy Ann Road on the west side and ends on top of Roxy Ann Peak. It is well used but has a number of sustainability issues. This trail has a number of very steep and tight turns. The radius of these turns should be increased and grade reversals should be integrated.

- Recommended Trail Rating – Black
- Bike/Hike
- Multi-Direction

Madrone Trail – This trail climbs from the main trailhead to an intersection with Roxy Ann Road. It is very steep and has many problems with erosion. Minor rerouting of the trail to reduce the grade is the best solution.

- Recommended Trail Rating - Black
- Hike
- Multi-Direction

Oak Trail – This trail has a number of sustainability issues, which are primarily the result of poor drainage. Improvements to the drainage are recommended.

- Recommended Trail Rating - Green
- Bike/Hike
- Multi-Direction

Manzanita Trail – Consisting of a large number of segments beginning on the south side of Roxy Ann Peak. The lower portions of this route possess a number of sustainability problems that can be repaired or rerouted as indicated in the accompanying map documents. The upper segment (#4) has a number of very steep and tight turns. The radius of these turns should be increased and grade reversals should be integrated. Segment #4 appears to have once been a road and should be narrowed to define the tread.

- Recommended Trail Rating - Blue
- Bike/Hike
- Multi-Direction

Improve Existing Facilities

Signage – The current signage is very minimal and is primarily limited to a sign at the main entrance with park rules and regulations. Signs at trail entrances are sporadic and have a limited amount of information. A new signage system should be created and installed using the following standards:

- *Trailhead Kiosks* - Larger signs positioned at the beginning of the trail or trail system. Well-designed kiosks include a complete map and description of all the nearby trails. The main trailhead kiosk is the ideal place to describe trail length and relative difficulty. Visitors armed with this information can make smart decisions about which trails to travel. Trailheads are also excellent places to promote trail etiquette, explain local rules, list emergency contact information, and recruit volunteers for future trailbuilding efforts.

- *Directional Signs* – These provide navigational information—everything from a simple blaze or trail name to the length of a route—and should be repeatedly posted along the trail. These signs can be small, so long as they are obvious and clearly mark the way. Be careful not to overuse them, especially if the route is easy to follow. More frequent placement may be needed for trails that are hard to follow, such as on rock or paths that are frequently snow-covered.

- *Warning Signs* – These are used to caution trail users of upcoming hazards and should be placed close to the trail so they're easy to see. Be sure to position them well in advance of the hazard so that visitors have enough time to read the sign and react. It is particularly important to sign before very challenging technical trail features, like big drop-offs, narrow bridges, or other elements of increased risk.

- *Difficulty Level Signs* - These should be posted at the main trailhead and at every access point. Signs should be large enough to clearly display the trail's difficulty level as well as its length. Signage should be particularly clear at the intersections of trails with differing difficulty levels.

- *Regulatory Signs* – These delineate rules, such as the direction of travel, or designate user groups. When creating regulatory signs, keep the tone constructive and upbeat. Visitors are more apt to obey rules that are presented in a positive way.

Signs will help prevent conflict between user groups. Additional details can be found in Appendix C.

Trailheads – The current trailhead is located at the first gate on Roxy Ann Road. The parking is unmarked and not organized in a formal manner. There is room for 20-25 vehicles at most with no turn-around facilities for equestrian users with trailers. No restroom facilities are available.

Recommendations –

- New trailhead should be constructed at the end of Bordeaux Avenue (Refer to Appendix A.) with parking and restroom facilities for 25-30 cars. This will serve users of a conceptual trail and adjoining network terminating at Bordeaux Avenue. It is recommended that the City of Medford should seek to purchase surrounding land and any other inholdings to expand the park and maximize the public's enjoyment.
- Improvements should be made to the existing trailhead or relocate it to an area with more space. Improvements should include additional parking, marked parking spaces, restrooms, pet cleanup bags, and a kiosk sign with detailed park information and maps.

Roads & Perimeter – The road system in the park is utilized for maintenance, utility tower access, commercial trucks hauling material from the quarry and recreational users. Significant evidence of unauthorized motorized use by off-road trucks, motorcycles and ATV's was noted. The majority of the incursions are from the power line access road on the west side of the park. These vehicles have done a large amount of damage to roads and vegetation

Recommendations –

- Safe bypass routes for all allowed uses should be constructed at all gates.
- Signs warning recreational users to be alert for vehicle traffic should be installed.
- Install signs that warn recreational users to stay out of quarry area. Build an easy/green trail to bypass the quarry area.
- Roads on west side should be gated to prevent unauthorized motorized access.
- The perimeter of the park, especially on the west side should be fenced to prevent damage, dumping, and fires from unauthorized motorized access.

Build New Trails

The construction of new routes with different styles, skill levels and user access will provide opportunities for users to progress and challenge their capabilities. As more trails are added to the system a majority of them should be designed for intermediate and advanced users. Users with higher skill levels generally desire more mileage in order to have a satisfying experience.
The area presents a multitude of options to construct a well-rounded trail system. These zones will provide different experiences for users in different skill levels. Refer to Appendix A for a map of all conceptual routes.

Hire a Professional Trail Builder

Enlisting a professional trail builder to design and manage the construction of the trails will help to ensure funds are well spent. Appendix E. lists professional trail builders in the region. This will provide the community with an onsite expert who can guide them through the more complex aspects of trail system development. Oftentimes mechanized construction is the most efficient and effective technique. This is especially the case when performing major tread work on fire roads or firebreaks and where more complex flow-based trails are being built. To prevent unnecessary disturbance to the environment outside the trail corridor machinery operators should always be trained and experienced mountain bicycle trail builders. To secure bids from a trail contractor prepare a detailed bid package with specifications for the trail. This should include:

- Estimated length
- Desired average width
- Desired user experience
- Skill level/description of features to be included
- Specifications of any non-native materials to be used (aggregate, wood, etc)
- Erosion control or impact restoration requirements
- Seasonal closures
- Environmental, botanical or wildlife related issues
- Construction method preferred (mechanized, hand)
- Level of finish

Conversely, if the funding source allows and the situation in amenable, a design-build contract may be employed. A knowledgeable trail builder can advise you on the relative benefits of either course of action.

Construction Costs

To develop the estimated 34 miles of trails as indicated in this plan would cost approximately $360K - $720K. The approximate construction cost is based on Trail Solutions experience on similar projects. The costs noted in this report are for construction only, and do not include planning, design, permitting, easements/purchases, trailhead development, or project management. Costs vary greatly based on a variety of factors, including: remote nature of the work, demand for trail contractors in a given year, terrain, vegetation, and length of the build season

The funding for these kinds of projects is a challenge for communities but not insurmountable. One of the most popular funding sources is the Federal Recreational Trails Program (RTP). These funds are apportioned to each state, which then uses a mix of federal and state guidelines to determine its dispersal. In California, federal RTP money is used to supplement other funding sources, which can come from other federal, state, or private funds. For the state, the maximum amount of RTP funds allowed for each project is 88% of the total project cost. The applicant is responsible for obtaining a match amount that is at least 12% of the total project cost. Based on experience with other projects a typical and realistic fundraising goal for projects of this type is $50K - $100K.

It is estimated that trailheads will cost an additional $100K to $250K for both trailheads depending on the type and precise location of the trailheads and level of amenities desired.

Construction Phasing

Some segments of the trail system are critical to maximizing the usability of the system as it is being expanded. These construction-phasing recommendations are divided into Phases 1, 2, 3, and 4. Ideally all segments of Phase 1 will be completed before constructing Phase 2, 3, or 4.

Execution of Phase 1 will involve the construction of approximately 10 miles of new trail. Please refer to Appendix A. for a map illustrating Phase 1. Estimated cost for this phase of the trail system is +/- $200K. Phase 1 can be executed without the acquisition of the property surrounding the proposed Bordeaux Avenue Trailhead but it is not the preferred condition. It is estimated that access for the Bordeaux Trailhead would cost +/- $50K. Providing access for users from this point will be more convenient and will help to distribute use across the park. Phase 1 will create the backbone of the trail system and result in a continuous trail loop that is over 10 miles and will open up many parts of the park that are currently underutilized. It may make sense to consider potential parking phasing options.

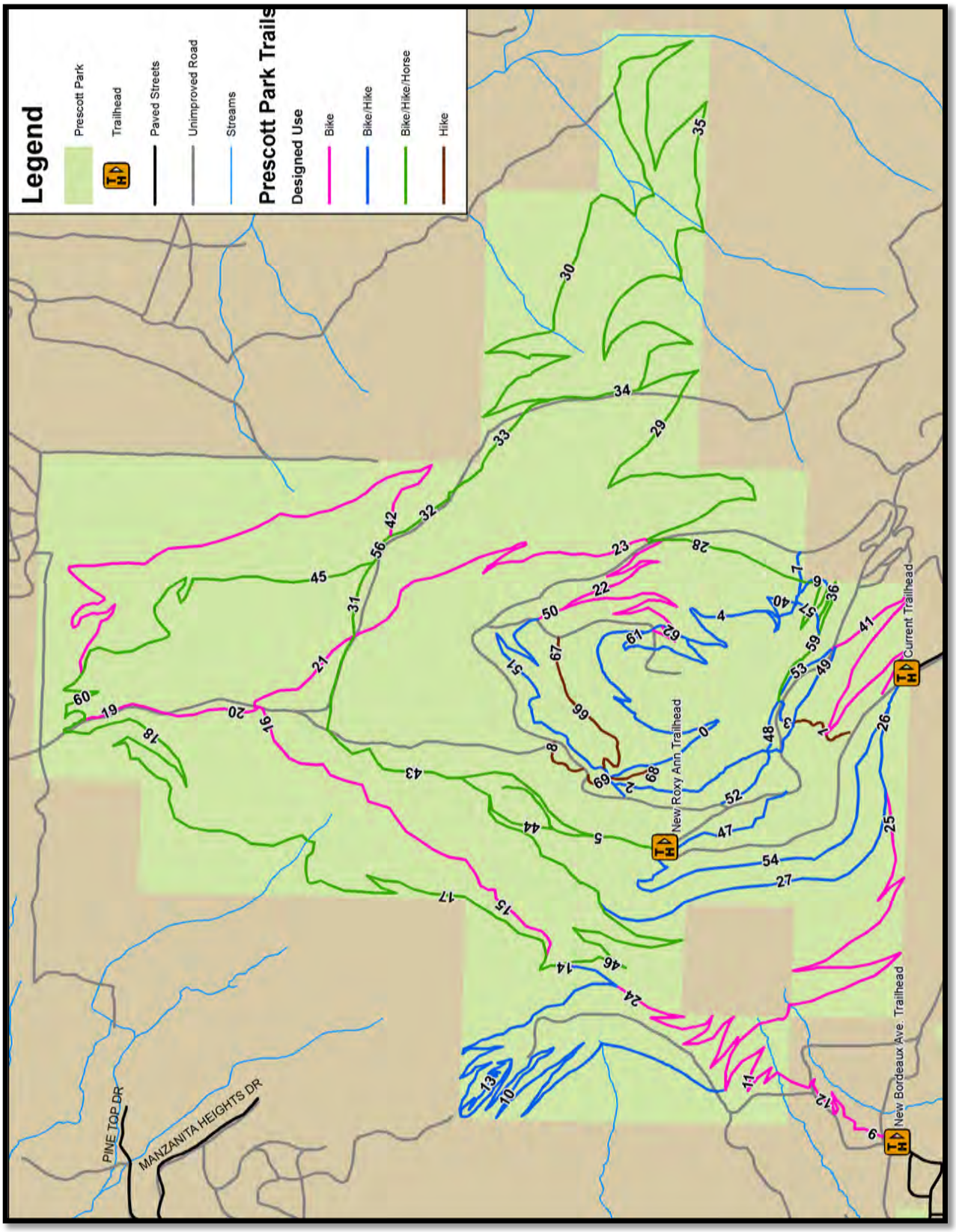
Implementation Steps

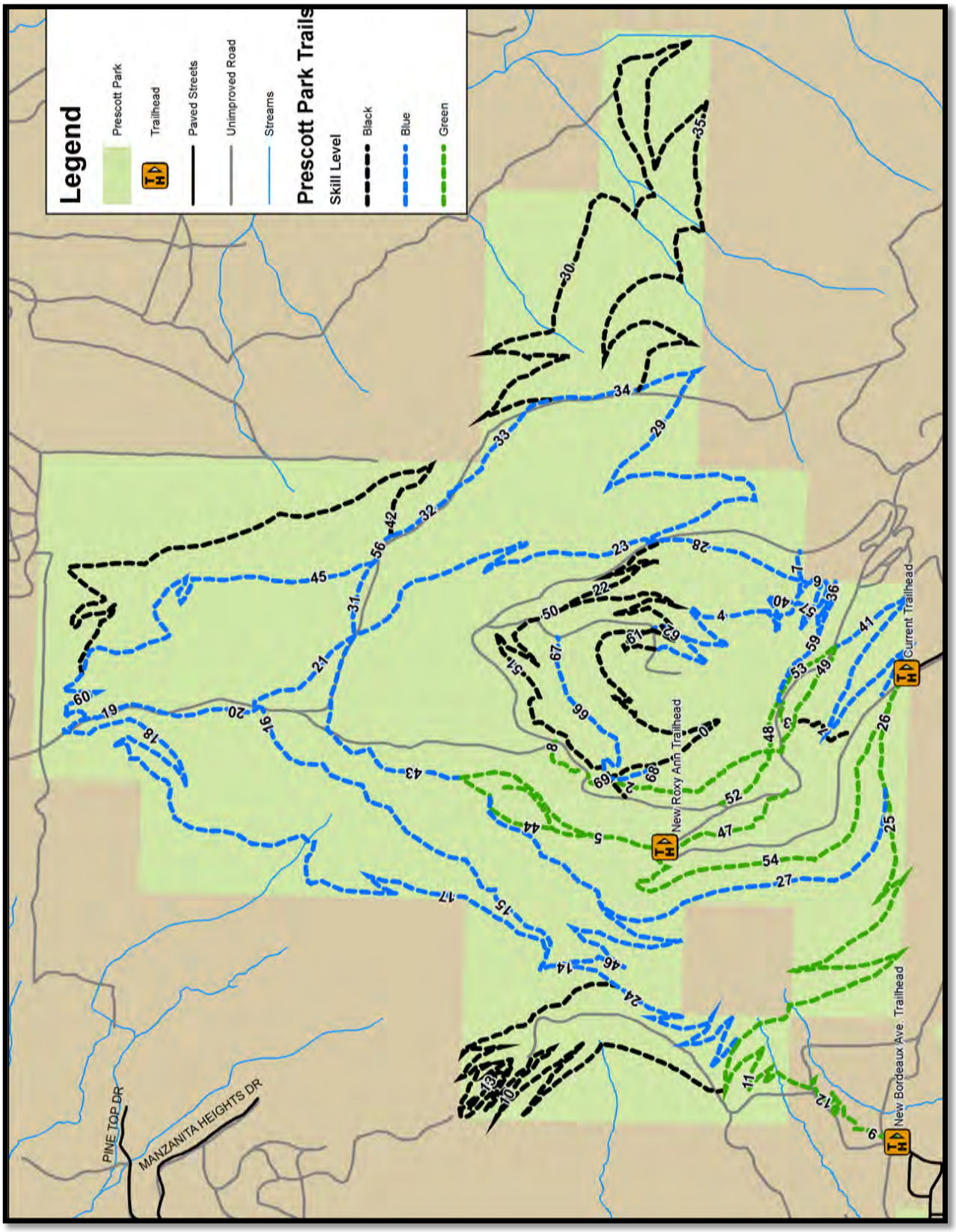
There are several additional steps that can be taken to begin the plan implementation. The next logical step is to work with a trail builder to move from planning level cost estimates to preliminary engineering estimates. This will allow the more precise definition of proposed project Phase 1 and allow more precise budgeting. Another potential step is to undertake some preliminary maintenance planning. This will allow the City to consider and evaluate the long-term financial implications to assure the trails are properly maintained post-construction. Typically maintenance planning can be rolled into a Parks and Recreation Department's normal budget development and maintenance scheduling.

Appendix A. – Maps

Maps

1. Designed Use
2. Skill Level Recommendations
3. Phase 1 Development


Legend
Prescott Park
Trailhead
Paved Streets
Unimproved Road
Streams
Prescott Park Trails
Designed Use
Bike
Bike/Hike
Bike/Hike/Horse
Hike
New Roxy Ann Trailhead
Current Trailhead
New Bordeaux Ave. Trailhead
PINE TOP DR
MANZANITA HEIGHTS DR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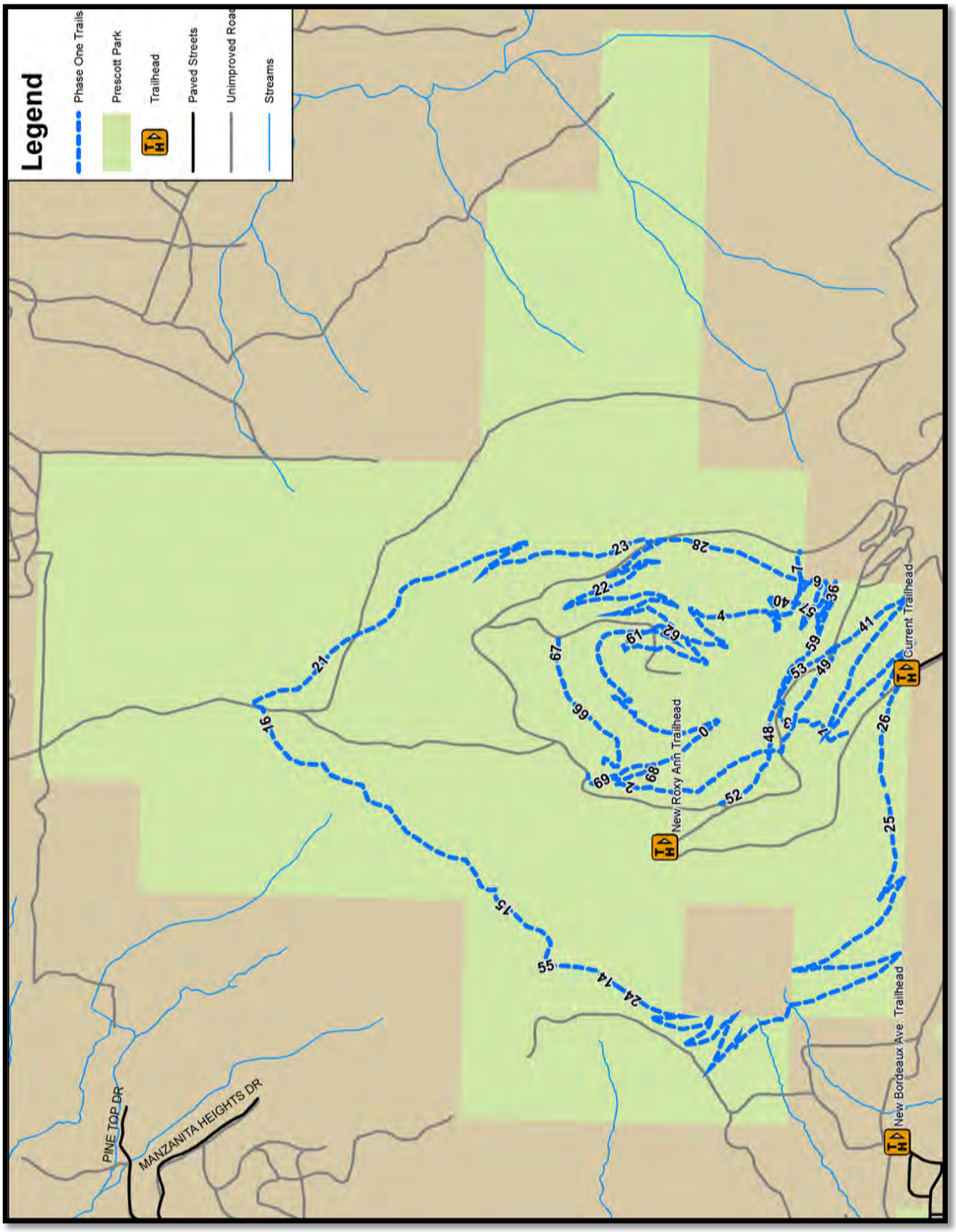

Legend
Phase One Trails
Prescott Park
Trailhead
Paved Streets
Unimproved Road
Streams
New Roxy Ann Trailhead
Current Trailhead
New Bordeaux Ave. Trailhead
PINE TOP DR
MANZANITA HEIGHTS DR

Appendix B. - Trail Index

Prescott Park Trails Index							
ID	Name	Skill Level	Type	Designed Use	Status	Length	Phase
0	Ponderosa Trail	Black	Traditional	Bike/Hike	Existing	0.9	1
1	Madrone Trail 02	Black	Traditional	Hike	Existing	0.2	1
2	Oak Trail	Green	Traditional	Bike/Hike	Existing	0.5	1
3	Madrone Trail 01	Green	Traditional	Bike/Hike	Existing	0.1	1
4	Manzanita Trail 04	Blue	Traditional	Bike/Hike	Existing	0.6	1
5	Un-named Trail 01	Green	Doubletrack	Bike/Hike/Horse	Existing	0.4	2
6	Manzanita Trail 05	Blue	Traditional	Bike/Hike	Abandon	0.1	1
7	Manzanita Trail 07	Blue	Doubletrack	Bike/Hike	Abandon	0.1	1
8	Ropes Course	Green	Traditional	Hike	Existing	0.1	0
9		Green	Flow Trail	Bike	Conceptual 2013	0.3	2
10		Black	Traditional	Bike/Hike	Conceptual 2013	2.7	4
11		Green	Flow Trail	Bike	Conceptual 2013	0.6	2
12		Green	Flow Trail	Bike	Conceptual 2013	0.1	2
13		Black	Traditional	Bike/Hike	Conceptual 2013	0.4	4
14		Blue	Traditional	Bike/Hike	Conceptual 2013	0.2	1
15		Blue	Flow Trail	Bike	Conceptual 2013	0.6	1
16		Blue	Flow Trail	Bike	Conceptual 2013	0.4	1
17		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.8	3
18		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	1.4	3
19		Blue	Flow Trail	Bike	Conceptual 2013	0.2	3
20		Blue	Flow Trail	Bike	Conceptual 2013	0.2	3
21		Blue	Flow Trail	Bike	Conceptual 2013	0.7	1
22		Black	Flow Trail	Bike	Conceptual 2013	1.1	1
23		Blue	Flow Trail	Bike	Conceptual 2013	0.5	1
24		Blue	Flow Trail	Bike	Conceptual 2013	0.9	1
25		Green	Flow Trail	Bike	Conceptual 2013	1.4	1
26		Green	Traditional	Bike/Hike	Conceptual 2013	0.3	1
27		Blue	Traditional	Bike/Hike	Conceptual 2013	0.8	3
28		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.4	1
29		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	1.1	2
30		Black	Traditional	Bike/Hike/Horse	Conceptual 2013	1.6	4
31		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.2	2
32		Blue	Doubletrack	Bike/Hike/Horse	Existing	0.2	2
33		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.3	2
34		Blue	Doubletrack	Bike/Hike/Horse	Existing	0.2	2

35		Black	Traditional	Bike/Hike/Horse	Conceptual 2013	1.9	4
36		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.2	1
37	Manzanita Trail	Blue	Traditional	Bike/Hike/Horse	Abandon	0.0	1
38	Manzanita Trail	Blue	Traditional	Bike/Hike/Horse	Existing	0.1	1
39		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.3	1
40		Blue	Traditional	Bike/Hike	Conceptual 2013	0.2	1
41		Blue	Flow Trail	Bike	Conceptual 2013	1.0	1
42		Black	Flow Trail	Bike	Conceptual 2013	1.6	4
43		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.6	2
44		Green	Traditional	Bike/Hike/Horse	Conceptual 2013	0.6	2
45		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	1.0	3
46		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	1.2	3
47		Green	Traditional	Bike/Hike	Conceptual 2013	0.4	2
48		Green	Traditional	Bike/Hike	Conceptual 2013	0.1	1
49		Green	Traditional	Bike/Hike	Conceptual 2013	0.2	1
50		Black	Traditional	Bike	Conceptual 2013	0.1	2
51		Black	Traditional	Bike/Hike	Conceptual 2013	0.8	2
52		Green	Traditional	Bike/Hike	Conceptual 2013	0.2	1
53		Green	Traditional	Bike/Hike	Conceptual 2013	0.2	1
54		Green	Traditional	Bike/Hike	Conceptual 2013	1.0	2
55		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.1	1
56		Blue	Doubletrack	Bike/Hike/Horse	Conceptual 2013	0.1	2
57	Manzanita Trail 02	Blue	Traditional	Bike/Hike	Abandon	0.2	1
58	Manzanita Trail 06	Blue	Traditional	Bike/Hike	Existing	0.1	1
59	Manzanita Trail 01	Blue	Traditional	Bike/Hike/Horse	Existing	0.2	1
60		Blue	Traditional	Bike/Hike/Horse	Conceptual 2013	0.3	3
61		Black	Traditional	Bike/Hike	Existing	0.1	1
62	Manzanita Trail 03	Blue	Traditional	Bike/Hike	Existing	0.0	1
63	Manzanita Trail 03	Blue	Traditional	Bike/Hike	Abandon	0.0	1
64	Manzanita Trail 03	Blue	Traditional	Bike/Hike	Abandon	0.0	1
65		Black	Flow Trail	Bike	Conceptual 2013	0.1	1
66	Challenge	Blue	Traditional	Hike	Existing	0.3	1

Appendix C. - Trail Difficulty Rating System

IMBA Trail Difficulty Rating System

	EASIEST WHITE CIRCLE	EASY GREEN CIRCLE	MORE DIFFICULT BLUE SQUARE	VERY DIFFICULT BLACK DIAMOND	EXTREMELY DIFFICULT DBL. BLACK DIAMOND
TRAIL WIDTH	72" (1,800 mm) or more	36" (900 mm) or more	24" (600 mm) or more	12" (300 mm) or more	6" (150 mm) or more
TREAD SURFACE	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
AVERAGE TRAIL GRADE	Less than 5%	5% or less	10% or less	15% or less	20% or more
MAXIMUM TRAIL GRADE	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
NATURAL OBSTACLES AND TECHNICAL TRAIL FEATURES (TTF)	None	Unavoidable obstacles 2" (50 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 36" (900 mm) or wider	Unavoidable obstacles 8" (200 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 24" (600 mm) or wider TTF's 24" (600 mm) high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" (380 mm) tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" (600 mm) or wider TTF's 48" (1,200 mm) high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" (380 mm) tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" (600 mm) or narrower TTF's 48" (1,200 mm) high or greater, width of deck is unpredictable Many sections may exceed criteria

The trail of Prescott Park should utilize a consistent rating system. This will provide for a safer and more predictable experience for users. The IMBA Trail Difficulty Rating System is a basic method used to categorize the relative technical difficulty of recreation trails and should for the basis for a rating system in all City of Medford Parks.

The IMBA Trail Difficulty Rating System can:

- Help trail users make informed decisions
- Encourage visitors to use trails that match their skill level
- Manage risk and minimize injuries
- Improve the outdoor experience for a wide variety of visitors
- Aid in the planning of trails and trail systems

This system was adapted from the International Trail Marking System used at ski areas throughout the world. Many trail networks use this type of system, most notably resort-based mountain biking trail networks. The system applies to mountain bikers best, but also is applicable to other visitors such as hikers and equestrians. These ratings should be posted on trail signage and in all maps and descriptions.

Criteria to Consider

Tread Width

The average width of the active tread or beaten path of the trail.

Tread Surface

The material and stability of the tread surface is a determining factor in the difficulty of travel on the trail. Some descriptive terms include: hardened (paved or surfaced), firm, stable, variable, widely variable, loose, and unpredictable.

Trail Grade (maximum and average

Maximum grade is defined as the steepest section of trail that is more than approximately 10 feet in length and is measured in percent with a clinometer. Average grade is the steepness of the trail over its entire length. Average grade can be calculated by taking the total elevation gain of the trail, divided by the total distance, multiplied by 100 to equal a percent grade.

Natural Obstacles and Technical Trail Features

Objects that add challenge by impeding travel. Examples include: rocks, roots, logs, holes, ledges, drop-offs, etc. The height of each obstacle is measured from the tread surface to the top of the

obstacle. If the obstacle is uneven in height, measure to the point over which it is most easily ridden.

Technical Trail Features are objects that have been introduced to the trail to add technical challenge. Examples include: rocks, logs, elevated bridges, teeter-totters, jumps, drop-offs, etc. Both the height and the width of the technical trail feature are measured.

Trail Rating Guidelines

1. Rate Technical Challenge Only.

The system focuses on rating the technical challenge of trails, not the physical exertion. It is not practical to rate both types of difficulty with one system. Consider, for example, a smooth, wide trail that is 20 miles long. The technical challenge of this trail is easy, yet the distance would make the physical exertion difficult. The solution is to independently rate technical challenge, and indicate physical exertion by posting trail length, and possibly even elevation change.

2. Collect Trail Measurements

Use the accompanying table and collect trail measurements for each criteria. There is no prescribed method for tallying a "score" for each trail. Evaluate the trail against the table and combine with judgment to reach the final rating. It is unlikely that any particular trail will measure at the same difficulty level for every criteria. For example, a certain trail may rate as a green circle in three criteria, but a blue square in two different criteria.

3. Include Difficulty and Trail Length on Signs and Maps

Trail length is not a criterion of the system. Instead, trail length should be posted on signs in addition to the difficulty symbol. A sign displaying both length and difficulty provides lots of information, yet it is simple to create and easy to understand.

Likewise, elevation change is not a criterion. The amount of climbing on a trail is more an indicator of physical exertion than technical difficulty. Mountainous regions may consider including the amount of climbing on trail signs.

4. Evaluate Difficulty Relative to Local Trails

Trails should be rated *relative* to other trails in the region. Don't evaluate each trail in isolation. Consider all the trails in a region and how they compare to one another. This will help you rank the relative difficulty of each trail and will help trail users select an appropriate route. Trails will rate differently from region to region. A black diamond trail in one region may rate as a blue square in another region, but the ratings should be consistent locally.

5. Use Good Judgment

Rating a trail is not 100 percent objective. Its best to combine tangible data with subjective judgment to reach the final rating. For example, a trail may have a wide range of tread surfaces—most of the trail is easy, but some sections are more difficult. How would you rate it? Use your personal experience to consider all elements and select a rating that best matches the style of trail.

6. Consider Other Trail Qualities

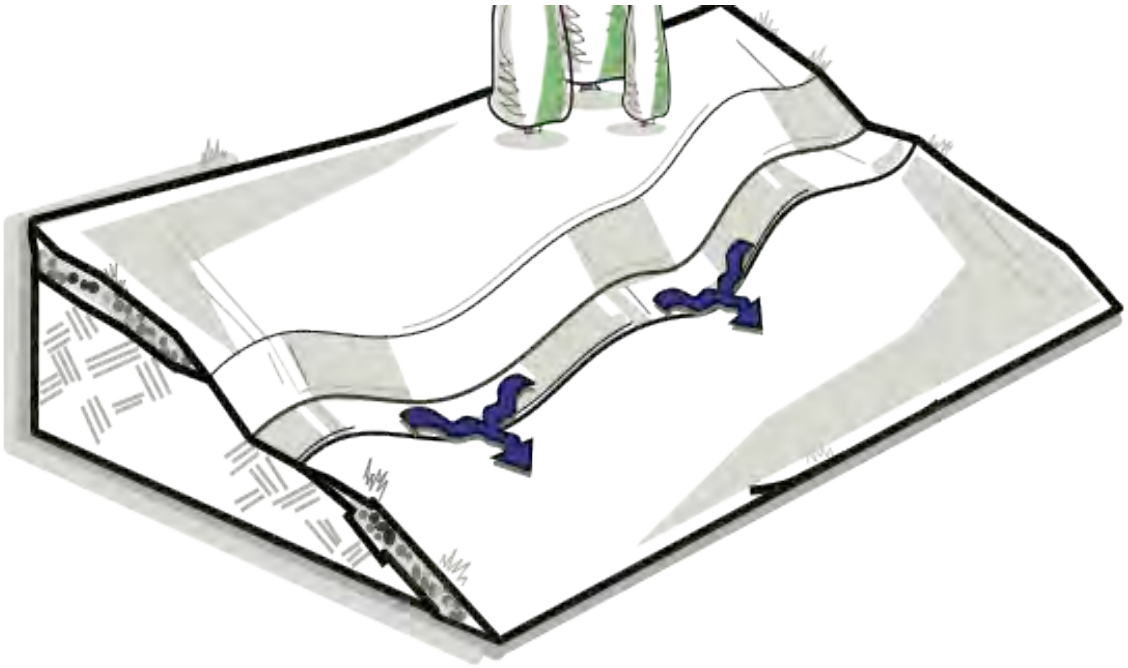
Don't forget to consider trail qualities beyond the objective criteria. A wide variety of features could contribute to a trail's difficulty. For example, **exposure**—the feeling of empty space next to and below the trail tread—provides an added psychological challenge beyond the steepness or roughness of the trail. A three-inch rock seems like a boulder when a 50-foot drop looms on your side! Other qualities to think about are **corridor clearance** and **turn radius**.

7. Use Common Sense and Seek Input

No rating system can be totally objective or valid for every situation. This system is a tool to be combined with common sense. Look at trails with a discerning eye, and seek input from trail users before selecting the rating.

Remember, a diverse trail network with a variety of trail styles is a great way to ensure happy visitors. Provide both easy and difficult trails to spread visitors and meet a range of needs. By indicating the length and difficulty of trails with a clear signage system, visitors will be able to locate their preferred type of trail easily.

Appendix D. - Sustainable Trail Guidelines



The Seven Essential Elements of Sustainable Trails

1. The Half Rule
2. The Ten Percent Average Guideline
3. Maximum Sustainable Grade
4. Grade Reversals
5. Outslope
6. Avoid The Fall Line
7. Avoid Flat Areas

1. The Half Rule

A trail's grade shouldn't exceed half the grade of the hillside or sideslope that the trail traverses. If the grade does exceed half the sideslope, it's considered a fall-line trail. Water will flow down a fall-line trail rather than run across it.

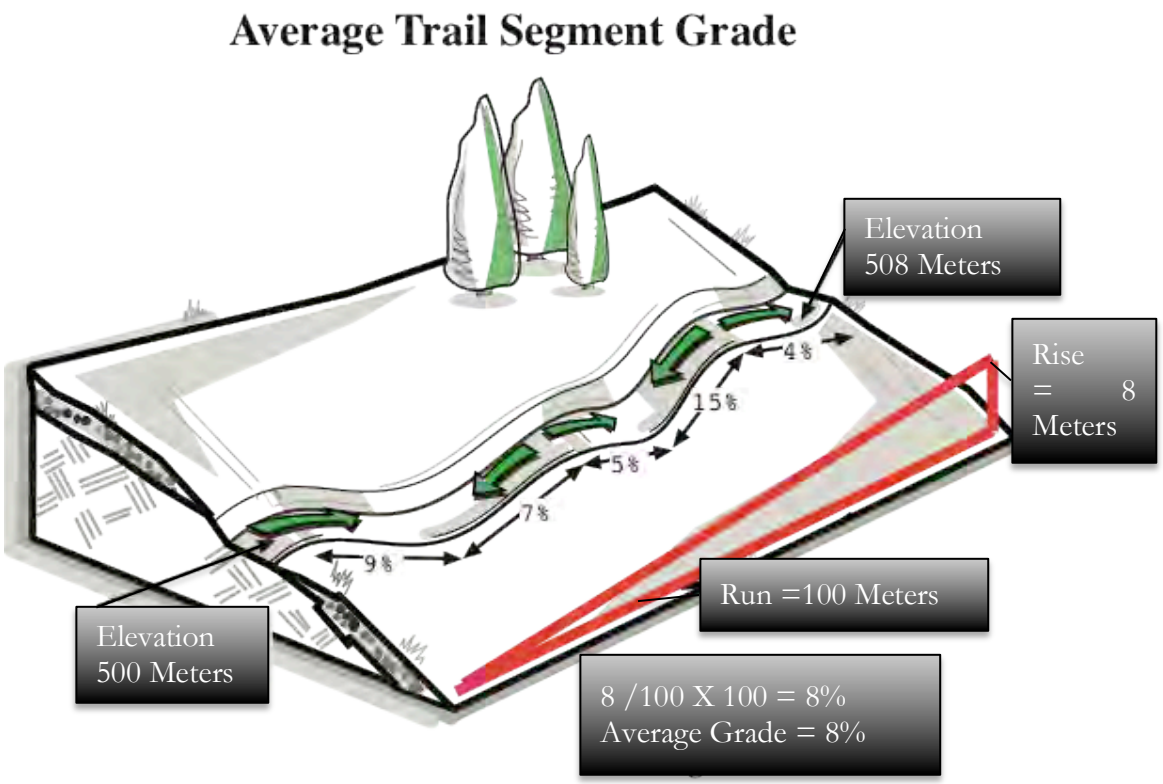
Measure the sideslope with a clinometer, then be sure to keep the tread grade below half of that figure in order to ensure good drainage. For example, if you're building across a hillside with a sideslope of 20 percent, the trail-tread grade should not exceed 10 percent.

There is an upper limit to this half rule: You must also apply knowledge about maximum sustainable grades. Very steep trails will erode even if their grade meets the half rule. For example, a trail with a grade of 24 percent that traverses a steep, 50-percent sideslope may be unsustainable even though it complies with the half rule.

2. The Ten Percent Average Guideline

Generally, an average trail grade of 10 percent or less is most sustainable, average trail grade is the slope of the trail from one end to the other. Many trails will have short sections steeper than 10 percent, and some unique situations will allow average trail grades of more than 10 percent.

A trail's average grade is calculated by dividing total elevation gain by total length, multiplied by 100 to convert to percent.



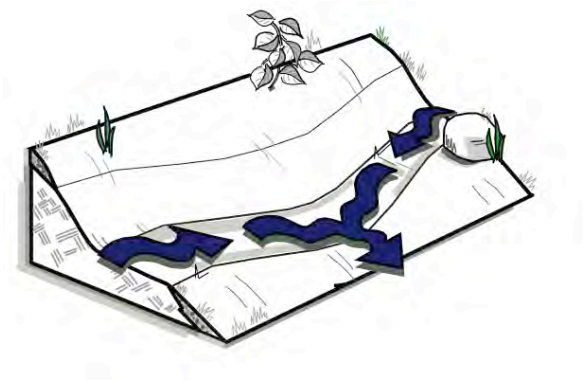
3. Maximum Sustainable Trail Grades

Maximum sustainable trail grade is typically about 15 percent; it is site-specific and fluctuates slightly based on several factors. The variables to be considered when setting your target maximum trail grade include:

- Half Rule
- Soil Type
- Rock
- Annual Rainfall Amount
- Grade Reversals
- Type of Users
- Number of Users
- Difficulty Level

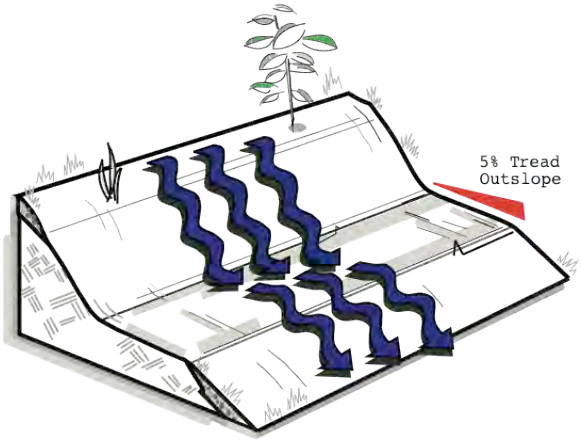
4. Grade Reversals

A grade reversal is just what it sounds like—a spot at which a climbing trail levels out and then changes direction, dropping subtly for 3 to 15 linear meters before rising again. This change in grade forces water to exit the trail at the low point of the grade reversal, before it can gain more volume, momentum, and erosive power. Grade reversals are known by several different terms, including grade dip, grade brake, drainage dip, and rolling dip.



5. Outslope

As the trail contours across a hillside, the downhill or outer edge of the tread should tilt slightly down and away from the high side. This tilt is called outslope, and it encourages water to sheet across and off the trail instead of funneling down its center. Outslope is one reason why contour trails last for years and years. IMBA recommends that all trail treads be built with a 5-percent outslope.



6. Avoid The Fall Line

Fall-line trails usually follow the shortest route down a hill – the same path that water flows. The problem with fall-line trails is that they focus water down their length. The speeding water strips the trail of soil, exposing roots, creating gullies, and scarring the environment.

7. Avoid Flat Areas

Flat terrain lures many trailbuilders with the initial ease of trail construction. However, if a trail is not located on a slope, there is the potential for the trail to become a collection basin for water. The trail tread must always be slightly higher than the ground on at least one side of it so that water can drain properly.

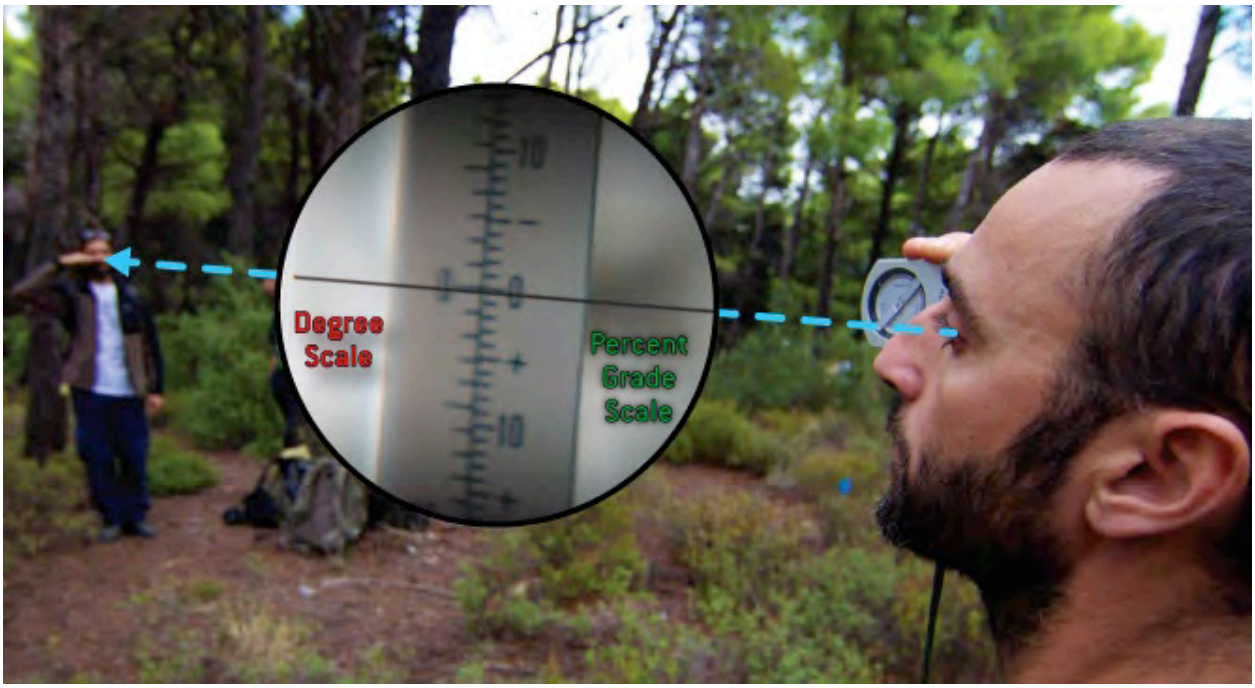
An ideal trail will simultaneously incorporate all seven sustainable trail principles.

1. The Half Rule
2. The 10 Percent Average Guideline
3. Maximum Sustainable Grade
4. Grade Reversals
5. Outslope
6. Avoid The Fall Line
7. Avoid Flat Areas

Techniques

1. *Using a clinometer*
2. *Building bench cut trails*
3. *Armoring*
4. *Drainage solutions*

1. Using a clinometer



5 Steps to using a clinometer

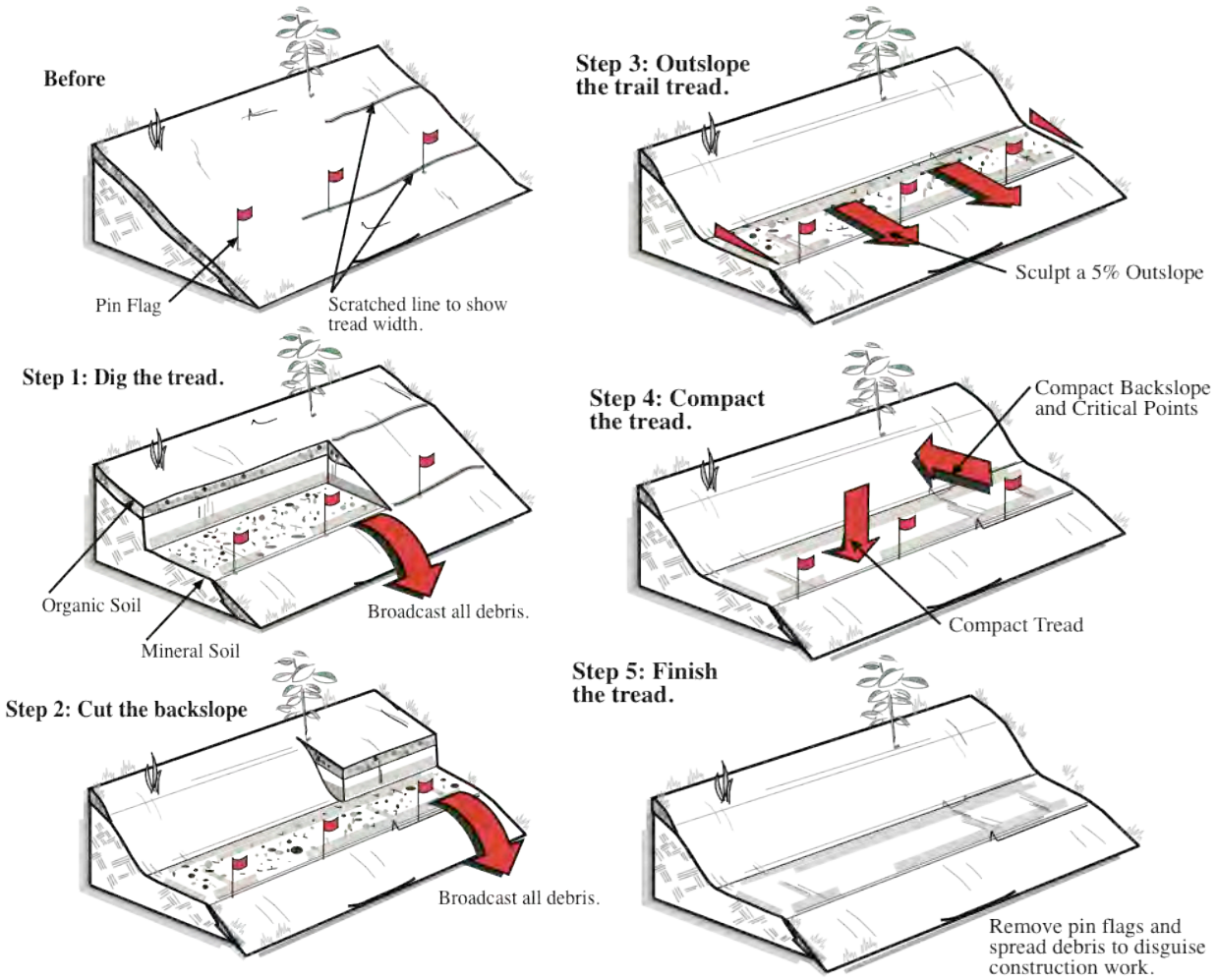
1. Work with a partner
2. Hold clinometer up to eye
3. Keep BOTH eyes open
4. "Zero out" with partner on LEVEL ground to determine site point on body.
5. On the trail, align the horizontal line with partner's zero point and read from scale on right side of viewfinder, Percent Grade Scale

2. Building bench cut trails

A bench is a section of tread cut across the side, or contour, of a hill. A **full bench trail** is constructed by cutting the full width of the tread into the hillside. The entire tread is dug down to compacted mineral soil. Do not cut partial bench trail except to avoid rock outcrops or over tree roots.

There are five basic steps involved in building a full bench trail.

1. Dig the tread.
2. Cut the backslope.
3. Outslope the trail.
4. Compact the tread.
5. Finish the tread.



3. Armoring

Armoring is a method of using large rocks to "pave" a trail and prevent erosion. Armoring is primarily useful in two situations. First, an elevated trail tread can be created above especially soft or wet terrain when no alternate route is available. Second, armoring can be used to harden the trail tread against user-caused erosion.

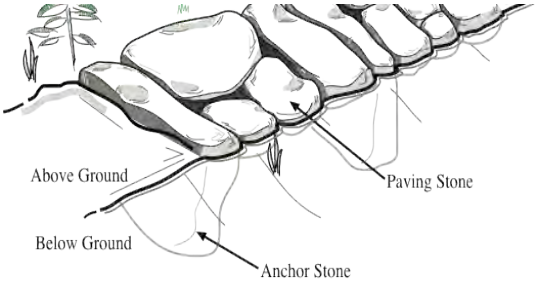
It is important to distinguish between user-caused erosion and water-caused erosion. It would be foolish to spend the time to armor a trail if water drainage issues haven't been effectively addressed. Water will destroy armoring by flowing under the rocks and undermining the foundation or by frost-heaving the rocks out of position.

Armoring Can Benefit A Trail By:

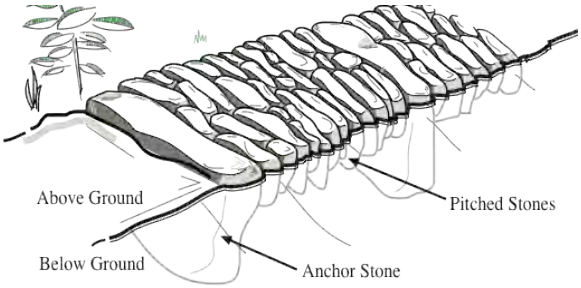
1. Hardening a contour trail in extremely rainy climates.
2. Stabilizing steep sections of contour trail with grades from 15 to 45 percent.
3. Reinforcing stream crossings.
4. Crossing a low-lying muddy or sandy area when a reroute isn't possible.
5. Hardening landing areas following jumps or drop-offs.
6. Toughening the trail surface on high-traffic routes to withstand user-caused erosion.

Four Ways to Armor Your Trail with Stone

Flagstone Paving
Large, flat-faced stones are placed directly on a mineral soil base or an aggregate foundation (a mixture composed of sand, gravel, pebbles, and small rocks, which is devoid of organic material). Each stone's largest and smoothest face is placed up, at grade, to form the tread surface. This is the most common and simple armoring technique.



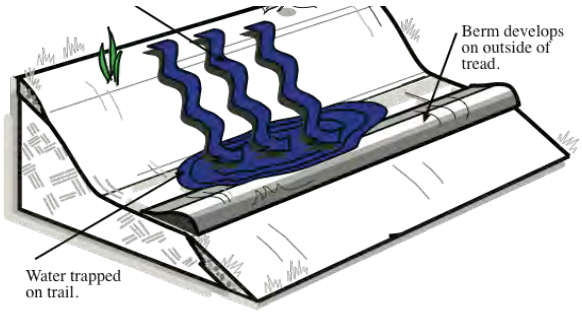
Stone Pitching
This is an ancient road-building technique in which medium-sized rocks are set on end, or "pitched" up on their side. The stones are hand-fitted tightly together, with aggregate packed into the gaps to tighten the construction. Think of a book in a bookshelf—only the spine is showing and the rest of the book is hidden. Modern trailbuilders in soggy Wales have revived and perfected stone pitching as a means of elevating the trail above the year-round mud in their country. It seems like a tough job, but stone pitching can often be more efficient than flagstone paving, depending on your rock selection.



Raised Tread Construction
Rocks can be used to elevate the tread above especially soft or wet terrain. First, a foundation of large rocks is embedded in the tread. Medium rocks follow and are locked into position. The tread is capped by aggregate, or 2 cm minus stone material. In essence, this is a turnpike made of stone. Trailbuilders in Wales use the term "raised camber construction" to describe the crowned tread designed to shed water. Make sure your rock turnpike drains and does not function like a dam, raising water levels on one side of your structure.

Boulder Causeway
Giant boulders and rock slabs can serve nicely as trail tread. Boulder causeways are essentially super-sized versions of the flagstone paving technique.

4. Drainage Solutions



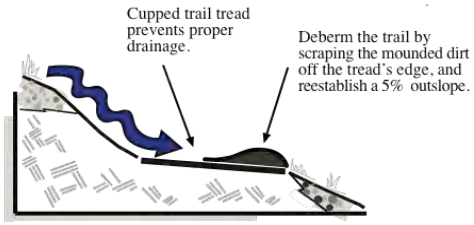
De-berming and Maintaining the Outslope

Even well built trails with proper outslope can lose their tilt over time and begin trapping and funneling erosive water.

There are two reasons for this:

1. The center of the trail may become compacted with use, resulting in a U-shaped tread that funnels water.

2. Loose material can collect on the outer edge of the tread, forming a berm that traps water.

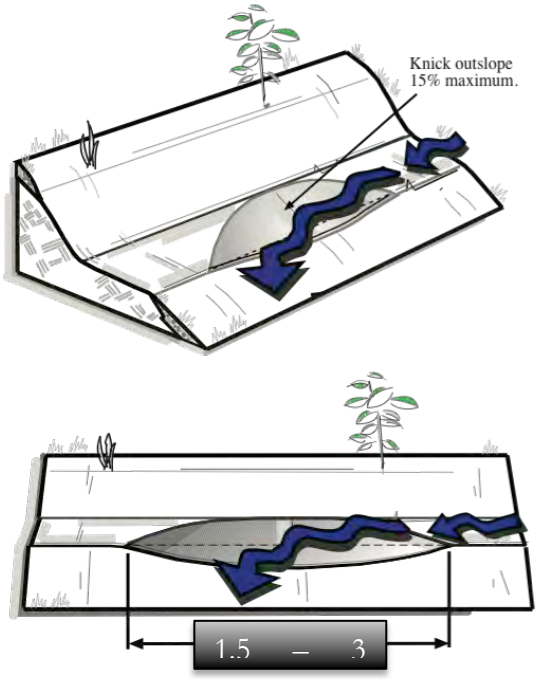


Fortunately, the remedy is straightforward. De-berm the trail by scraping the mounded dirt off the tread's edge, and reestablish a 5-percent outslope. This is a frequent maintenance job on most trail systems.

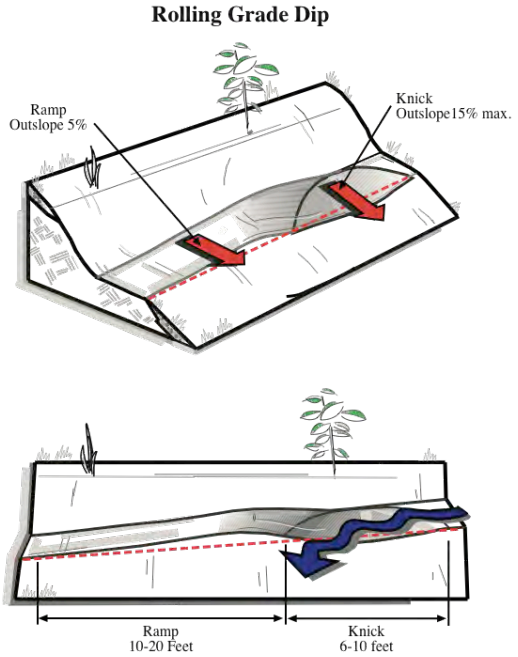
Note: Outslope is difficult to maintain in loose soil conditions. Loose soil lacks cohesion and is easily displaced to the sides of the trail by tires, feet, and hooves. Grade reversals are essential to insure proper drainage in these situations.

Knicks

A knick is a semi-circular, shaved-down section of trail, about 10 feet in diameter, which is canted to the outside. A knick is smooth and subtle; many visitors won't even notice its presence. The center of the knick is outsloped at about 15 percent, which is what draws water off the trail. For a knick to be effective, there must be lower ground next to the trail tread so that water will have a place to drain. Knicks are typically built on gentle sections of trail where water tends to puddle. Knicks also work well on non-cohesive soils such as sand, pumice, and decomposed granite.



Rolling Grade Dips



A Rolling Grade Dip (RGD) builds on the knick device. It features a similar outsloped depression in the tread, followed by a long, gentle dirt ramp. RGDs are sometimes described as a soup spoon lying on the trail; the scoop of the spoon is the dip in the trail, and the handle of the spoon is a gentle dirt ramp that follows. The dip should be longer than a bike (about 3 meters). The excavated soils from the dip are used to create the backup ramp that fortifies the dip. This ramp is long, 3-7 meters from tip to tail (depending on the steepness of the tread), and outsloped at 5 percent like normal tread. The total length of an RGD varies widely depending on the steepness of the trail tread, but most are somewhere between 3 to 10 meters. Proper placement of RGDs is crucial. Look for a natural roll or change in trail grade that can be accentuated. On steep trails, several RGDs may be needed. Fall-line trails may have to be rerouted if water is a constant problem, since it is impossible to convince the water to travel off the trail if the trail is the most direct way down. Don't place RGDs in turns.

When built properly, RGDs and knicks require only minor maintenance; each season you'll need to remove the leaves and silt that occasionally collect in dips and knicks. If left unattended, both designs will clog over time and become ineffective.

Appendix E. – PROFESSIONAL TRAILBUILDERS

- IMBA Trail Solutions — Chris Bernhardt
- Bellfree Contractors Inc. — Hans Keifer
- Casa Di Terra — Zachi Anderson
- Donald Hays Trail Contractor, Inc. — Don Hays
- Hanford ARC — Doug Hanford
- HILRIDE Progression Development Group — Rachel Lopes
- Old Julian Company, Inc. — Peter Schultz
- Richard May Construction, Inc. — Richard May
- Trailscape Inc. — Randy Martin