March 2018

MANAGEMENT GUIDANCE

SITING, CONSTRUCTION AND MAINTENANCE OF SINGLETRACK BICYCLE TRAILS ON FOREST PRESERVE LANDS IN THE ADIRONDACK AND CATSKILL PARKS

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I. Statement of Purpose and History of Bicycle Trails on the Forest Preserve

New York's Forest Preserve is a destination for various road and trail based cycling opportunities. This document provides guidelines solely for the management of Department of Environmental Conservation (DEC or Department) singletrack bicycle trails on land classified as Wild Forest in the Adirondack and Catskill Forest Preserve. It is intended to help land managers consistently design, construct and maintain bicycle trails and bicycle trail networks that protect natural resources and wild forest character while also providing a valuable recreational opportunity.

The Adirondack Park State Land Master Plan and Catskill Park State Land Master Plan dictate where cycling is a conforming use on Forest Preserve lands. Mountain bikers generally prefer riding on singletrack trails designed specifically for mountain biking[1]. Certain trails and roads designed for other modes of travel will continue to be an important part of the Forest Preserve trail network open to bikes. Mountain biking opportunities on lands classified as Wild Forest, Primitive (Adirondacks only), Primitive Bicycle Corridor (Catskills only) and Canoe (Adirondacks only) have historically been offered on existing trails and roads designed for other modes of travel. However, singletrack trails designed and built for mountain biking on lands classified as Wild Forest are the focus of this guidance.

II. Definitions

The following definitions apply to this guidance.

The term "rider" will be used interchangeablely with "cyclist" throughout the document. If another recreational pursuit is being described other than biking, it will be clarified accordingly.

Every effort has been made to use language in this document that is consistent with modern trail design and management terminology, while also being consistent with the Adirondack Park State Land Master Plan and Catskill Park State Land Master Plan.

"Bicycle": A non-motorized, human-powered, cycle designed or used for cross country travel on roads or trails.[2]

"Bicycle Trail": A marked trail, designated for travel by bicycles, located and designed to provide access in a manner causing the least effect on the local environment.[3]

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[1] Webber, Pete. (ED.). (2007). Managing Mountain Biking. 1st ed. Boulder, CO: International Mountain Bicycling Association. Pp. 18
Webber, Pete. (ED.) (2004). Trail Solutions. 1st ed. Boulder, CO: International Mountain Bicycling Association. Pp. 48

[2] The same definition for "Bicycle" is found in the Adirondack Park State Land Master Plan, December 2016. E-bikes are not considered bicycles for the purpose of this guidance.

[3] The same definition for "Bicycle Trail" is found in the Adirondack Park State Land Master Plan, December 2016.

“Braiding”: Multiple trail treads within a single trail corridor.

"Designed Use": The single Managed Use of a trail that dictates the design, construction, and maintenance of the trail.

“Doubletrack”: A trail that allows for two users to travel side by side or to pass without one user having to yield the trail. Doubletrack trails are often former woods roads.

"Managed Use": A mode of travel that is actively managed and appropriate on a trail.

“Shared Use”: These trails are designed primarily for one use but allow additional uses provided they are compatible with the primary use.

“Parallel Feature Trail (PFT)”: A side trail that leaves and returns to the main bicycle trail and includes a natural terrain feature that is uniquely challenging to ride.

“Singletrack trail”: A trail so narrow that users must generally travel in single file.

“Stacked Loop”: A trail system designed with several different loop trails knitted together to provide for a wide range of experiences and difficulties within a given area.

“Trail Corridor”: The area within which vegetation is managed and trail tread is established for a particular type of trail use or uses.

“Trail Tread”: The travelled ground surface within the trail corridor.

III. Planning the Trail Network

Protection of the Wild Forest setting and minimization of impacts to natural resources form the foundation for planning bicycle trail networks on Forest Preserve lands. The “trail styles” and “riding opportunities” described in this section reflect the interests of mountain bikers and how they can be accommodated in a way that upholds the fundamental values of the Forest Preserve. High quality mountain biking experiences are created through the development of riding opportunities that incorporate trail styles appealling to mountain bikers.

Riders routinely travel 15-30+ miles in a day with a preference for loop rides or long distance routes having minimal trail overlap. Mountain bikers generally prefer trail networks that begin and end within community areas such as Hamlets or at locations with some basic services. The point of entry into a trail network that is the closest to the community center is commonly a shared use trail.

This guidance does not specifically address every possible circumstance where a bicycle trail might be shared by other trail users or conversely, how another type of trail (i.e ski, snowmobile, equestrian, etc.) is shared with bikers. The following questions are provided here to offer a useful starting point for evaluating the many different shared-use trail scenarios that are possible in Wild Forest Areas.

Who is the trail designed for (what is the Designed Use) and who will be sharing it? E.g., cyclists, hikers, trail runners, equestrians, snowmobiles or skiers.

What is the character of the trail? Are soils on the trail particularly sensitive? How are the sight lines? How fast will users typically be travelling along the trail? Are trail users all travelling in the same direction? How rough is the tread surface? Is it especially difficult for trail users to pass each other due to the terrain?

When will the users be on the trail? E.g., at the same time, during different seasons.

Where is the trail located? E.g., Is the trail located close to a road or far from any roads? What land classification is the trail located in (i.e. Wild Forest, Intensive Use).

How often will encounters between different trail users occur, and are these encounters likely to have a negative impact on the experience that trail users expect to have?

Accommodating more than one recreational use on a trail can help accomplish resource protection goals by reducing trail development and environmental impacts. Forest Preserve trails are typically designed and maintained for hiking or snowmobiling. Less common are ski trails, horse trails, and accessible trails. The suitability of a given trail for users other than the designed use is determined by considering the criteria above. Regardless of how a given trail is managed for shared use, the design of the trail will be consistent with the Adirondack Park State Land Master Plan, the Catskill Park State Land Master Plan, the approved DEC trail guidance/policies, and the Unit Management Plan's objectives.

Not everyone experiences conflict in the same way. An inconsequential encounter along the trail for one person may be a significantly negative experience for someone else. Land managers cannot control how individuals experience conflict, but they can inform trail users when a trail is shared with other modes of travel. When trail users know what kinds of recreational activities to expect along the trail, they are more likely to make informed decisions about where to visit and can avoid circumstances that conflict with their recreational or experiential goals. Positive plain language (not just regulatory) signage at trailheads and in public communications materials should be used to explain when trails are shared and what is appropriate etiquette in those circumstances. The following sign is a good example of how trail users can be informed that a trail is shared.

Seemingly incompatible uses can share trails successfully under suitable conditions. Determining when and where those circumstances exist may not be immediately obvious. When high quality objective data on usage and conflict is limited or unreliable (i.e. a single anecdotal complaint), allowing for some sharing of trails with a plan for monitoring and data gathering is a sensible strategy that does not immediately require new trail construction or trail closures. Some trails can be shared successfully until a certain threshold in the number of users is reached. Alternatively, some trails are almost impossible to share due to the character of the trail, its location, and the type of use. The decision for a trail to be shared with cyclists (or not) should carefully balance land management goals, local community interests, and resource protection.

A. Trail Style

"Trail style" refers to Singletrack or Doubletrack. The distinctions between Singletrack and Doubletrack most important to mountain bikers are described in more detail below. Each trail style may be present in various forms throughout a trail network open to bicycles. The style of the trail does not indicate the degree of difficulty. Certain singletrack trails may be very easy to navigate on a bicycle while some doubletrack trails are exceedingly difficult, and vice-versa.

1.) Singletrack

Singletrack is the most popular trail style for mountain bike riding. Singletrack offers an intimate and engaging riding experience in a wild forest setting. Accordingly, Singletrack is the focus of this guidance. The following chart describes a spectrum of different kinds of singletrack and assigns a difficulty rating based upon trail characteristics.

Singletrack Trail Rating System and Characteristics[4]

	Easiest	Easy	More Difficult	Very Difficult	Extremely Difficult
Tread Width	36” or less	24”-36”	18”-24”	12”-18”	12” or less
Corridor Width	6-8’	6’	4’	4’	4’
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	15% or more
Maximum[1] Trail Grade	10%	15%	15% or greater	15% or greater	15% or greater
Obstacles	None	Unavoidable obstacles 2” tall or less	Unavoidable obstacles 8” tall or less	Unavoidable obstacles 15” tall or less	Unavoidable obstacles 15” tall or less
Bridges	bridges 48” or wider	bridges 36” or wider	bridges 24” or wider	bridges 24” or wider	bridges 24” or narrower
				Short sections may exceed criteria	Short sections may exceed criteria

[1] 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.

2.) Doubletrack

Guidance for the development of new doubletrack trails is not addressed in this document.

Former woods roads are found throughout the Forest Preserve. The history of these roads is typically associated with logging activities, prior habitation, or another purpose

[4] Adapted from *Trail Solutions: IMBA’s Guide to Building Sweet Singletrack*, International Mountain Bicycling Association, 2004.

that may not necessarily be associated with recreational access. Repurposing certain sections of former woods roads as trails may occasionally serve as the most low impact way to have a hardened trail through an area with poor soils or sensitive resources. However, converting existing doubletrack to singletrack or just maintaining doubletrack in its existing condition can require more extensive trail construction than building a new singletrack trail and decommissioning the doubletrack. This may seem counterintuitive, but when the existing doubletrack trail has a poor alignment, drainage problems, washouts, or other problems commonly encountered along former woods roads, the work required to make doubletrack sustainable can be intensive. For these reasons, repurposing a former woods road as a bicycle trail requires careful evaluation of the existing conditions before opening the trail to bike use. Additionally, doubletrack is generally less desirable to mountain bikers seeking a more intimate and engaging experience along a narrow trail. The following diagram exhibits how a meandering singletrack is preferable to relatively straight and unchanging doubletrack.

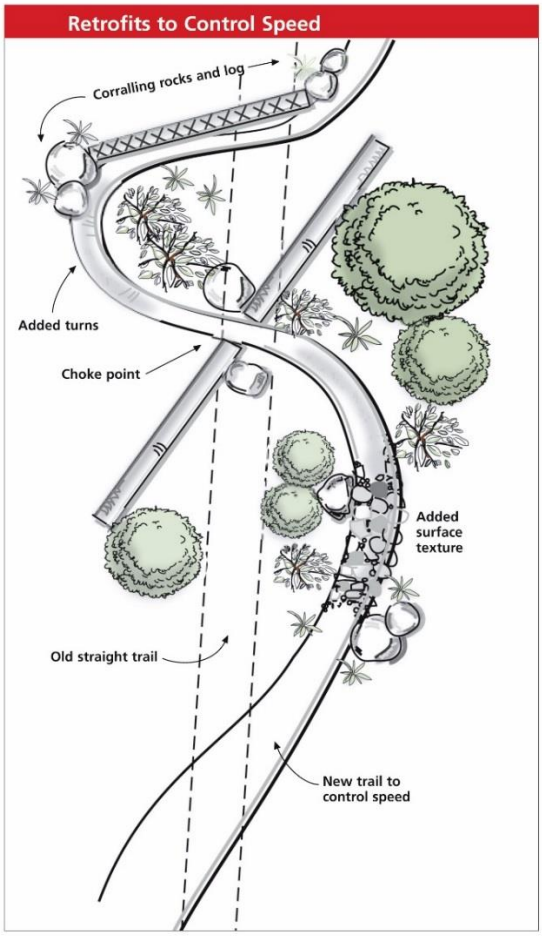


Diagram Courtesy of IMBA from Guidebook *Managing Mountain Biking* Copyright 2007

B. Riding Opportunities

Mountain bikers have diverse recreational and experiential goals associated with cycling. The riding opportunities described below reflect the different kinds of riding experiences that are available in the Forest Preserve. Riding opportunities that have been successfully implemented on Forest Preserve lands have informed these guidelines. Proposals to create new riding opportunities will be assessed by how well they can meet the criteria described in each of the sections below. No proposal for a new riding opportunity is perfect. However, recognizing the unique challenges associated with a proposal prior to implementation will increase the likelihood of success.

1.) Stacked Loop Network

Stacked loop trail systems are comprised of several different loop trails knitted together to provide for a range of experiences and levels of difficulty. Opportunities to experience a variety of terrain while exploring the landscape is what makes stacked loop trail networks appealing to riders of all abilities. The following principles should be considered to assist the process of evaluating appropriate locations of stacked loop trail networks.

- **Environmental:** Below 2,500 feet in elevation with well drained soils, and moderate slopes. Wetlands, sensitive ecological sites and communities identified by the New York Natural Heritage program, and deer wintering yards will be avoided.
- **Local Support:** The devotion of a local organization, municipality, or combination that is prepared to assist with trail maintenance and construction activities. Resources required for construction and maintenance of a stacked loop trail network requires this capacity.
- **Location:** Stacked loop trail networks are most appropriate where Forest Preserve lands abut municipal lands or publically accessible private lands, generally within two miles of hamlet boundaries or one mile from Intensive Use areas.
- **Trail Density:** Stacked loop trail networks outside of Intensive Use areas will be laid out to provide a buffer of vegetation, terrain, distance, or a sufficient combination thereof to minimize the view and filter out the sound of users on separate trails. Trails that have been laid out too close to each other may develop unplanned informal trails when users short-cut between separate trails. Planning a sufficient separation distance between trails prevents this problem from occuring. Individual trails of less than ½ mile in length should be avoided. The higher density of trails in a stacked loop network is acceptable when the wild forest character is retained.

In a stacked loop trail network, easier trails are typically closer to the trailhead and the more advanced trails are further afield, requiring more time and effort to access. Advanced riders are willing to cover more ground to reach trails that will challenge them.

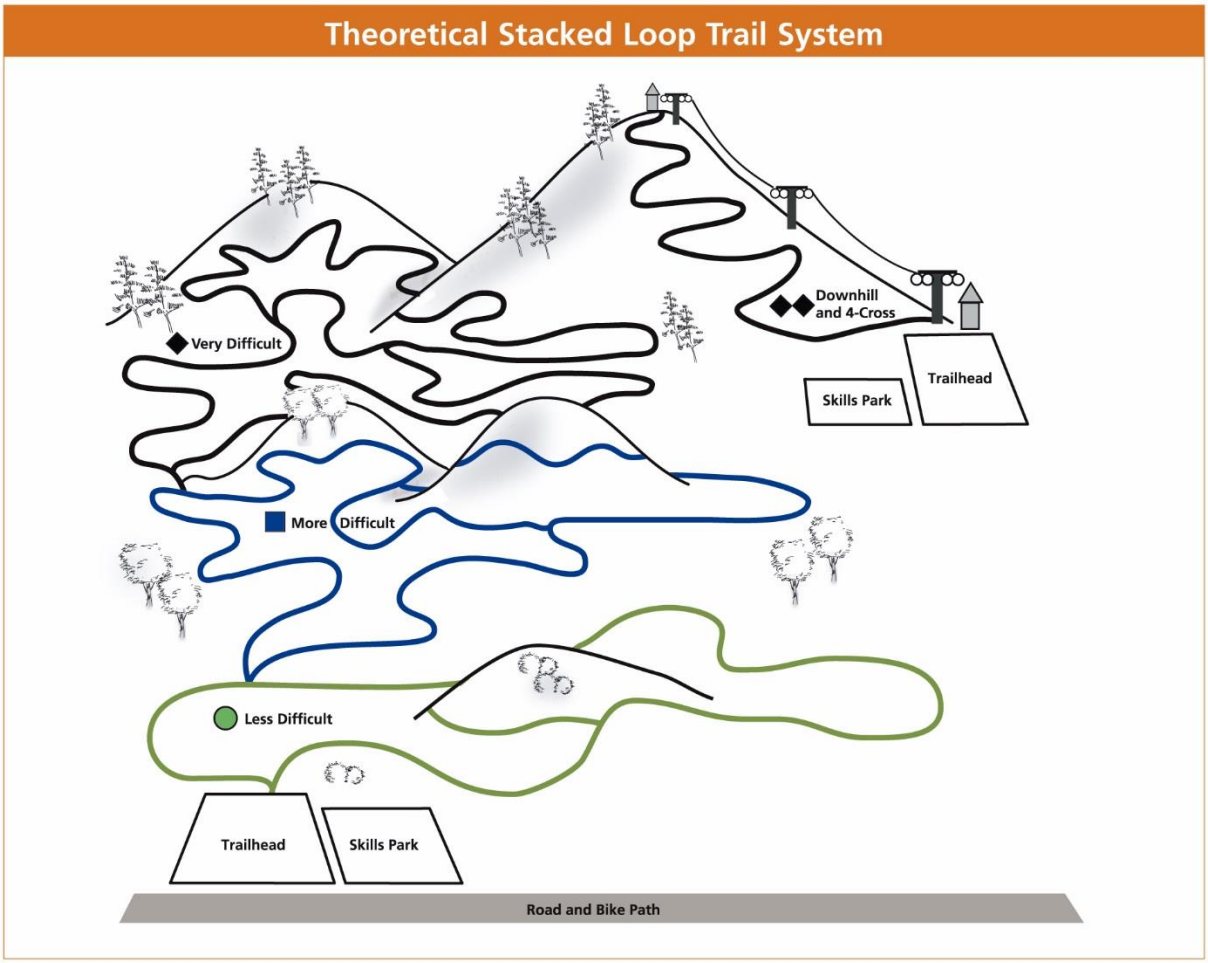


Diagram Courtesy of IMBA from Guidebook *Managing Mountain Biking* Copyright 2007.

2.) Long Distance Routes

Long Distance Routes connect Hamlets and provide access to compelling natural features. These will be planned on a regional scale and incorporate multiple communities. Planning for Long Distance Routes may occur in multiple UMPs and in complex planning initiatives. Long Distance Routes offer a sense of solitude, remoteness, and self-reliance. This cycling experience is a unique opportunity in the Northeastern United States. Newly developed remote bicycle trails will be “More Difficult”, “Very Difficult”, or “Extremely Difficult” according to the trail ratings defined in this guidance. Planning a Long Distance Route requires careful consideration of the

environmental principles described in the Stacked Loop Network section of this guidance. Long Distance Routes that connect Stacked Loop Networks or Hamlets will be prioritized during bicycle trail planning.

3.) Winter Cycling

Bicycles with oversized low pressure tires ("fat bikes") are well suited for travelling over packed snow surfaces. Fat bikes have established mountain biking as a 4-season activity. As one of the many variants of bicycles, fat bikes are subject to the DEC regulations specifying where bicycles are allowed on the Forest Preserve (6 NYCRR § 190.8(s) and 196.7). The popularity of fat biking in the winter months is growing, and the importance of planning and managing for it will increase accordingly. The guidance in section III of this document provides a framework for planning a winter cycling riding opportunity.

4.) Downhill/Freeride (DH/FR)

DH/FR Bicycle trails on the Forest Preserve are only appropriate in Intensive Use areas. DH/FR Bicycle trails are exclusively one way directional downhill, and contain multiple bike-specific features and obstacles such as table-top jumps, gap jumps, and ladder bridge drops. Typically a ski lift or shuttle road brings riders back to the top of this type of trail, but a designated climbing trail may also be available. Specific design considerations for DH/FR trails are outside the scope of this guidance.

IV. Guidelines for Bicycle Trail Design and Construction on the Forest Preserve

Bicycle trail design, construction and non-ordinary maintenance activities[5] will be carried out pursuant to a work plan developed by DEC staff. The following guidelines will be followed and reflected in the development of work plans. DEC staff may occasionally find it useful to enlist the assistance of a professional bicycle trail designer during the process of planning and developing new bicycle trails. Professional contractors or consultants may also be used to increase the capacity of the community to build and maintain trails by training volunteer groups and certain Department staff in trail construction and maintenance techniques. Professional and volunteer trail stewards alike will be provided a copy of this guidance prior to undertaking any work on the Forest Preserve.

A. Trail Alignment

Trails will follow the natural contours of the terrain as much as possible and will be laid out to balance and minimize necessary tree cutting, rock removal and terrain alteration. Maintaining appropriate grades in the trail alignment is critically important to assuring a stable tread surface resistant to the forces of erosion. Appropriate grades on bicycle

[5] Ordinary maintenance activities in the Adirondack Park are defined in the "Memorandum of Understanding between the Adirondack Park Agency and the Department of Environmental Conservation Concerning Implementation of the State Land Master Plan for the Adirondack Park" (APA/DEC MOU).

trails will vary depending upon soils, trail layout, tread hardening, drainage, weather patterns, and the type/intensity of use. Before a new bicycle trail alignment is planned, other successfully implemented trail alignments in similar circumstances should be carefully evaluated by taking note of the soil conditions, slopes, drainage, trail hardening techniques and maintenance cycles. Creating a high quality trail alignment requires having a clear understanding of what the desired outcome will be while simultaneously recognizing that trail alignments are inherently dynamic and the process of creating a quality trail that is consistent with this guidance does not end once a new trail is built. The trail alignment will evolve and change as usage, maintenance, and the weathering process work on the tread surface over time. It is commonplace for a bicycle trail alignment to require minor modifications after the initial construction phase is complete to assure that the tread width has stabilized, unforeseen drainage issues are addressed, and any newly exposed obstacles in the tread surface (roots and rocks may become more pronounced from soil compaction and frost action) are not causing tread creep or other issues. The first 5 years after a trail is newly built are the most critical because this is typically the time period within which the trail will experience the most change. Planning trail alignments with the assistance of riders and experienced bicycle trail builders with experience working in the local terrain is highly recommended.

1) **The Half Rule**

The half rule is a tool for understanding the implications of fall-line trail alignments that was popularized by IMBA in the 2000s through their guidebooks and trail trainer programs. Similar “rules” can be found in other trail guidance documents. The half rule can help answer difficult questions about what is an appropriate trail grade for the purpose of preventing erosion and long term tread stability. The “half” describes the relationship between the slope of the landform that the trail will traverse and the slope of the trail tread surface. **When the slope of the trail tread surface is half or less than the prevailing slope of the surrounding landform, erosional forces on the trail tread are reduced.** Described in another way, the further the trail alignment grade is from the fall line grade of the surrounding terrain, the more resistant the trail alignment will be to erosional forces. A strict adherence to the half rule will not eliminate erosion problems altogether nor will it assure that the trail alignment will serve the interests of mountain bikers, but it remains a useful tool for the purpose of understanding how erosional forces can affect the trail tread surface depending upon the character of the surrounding landscape. “Rule” is a misnomer because in practice this is a guideline.

2) **Slope Averaging**

The half rule is only useful when it is applied within the context of slope averaging. **The guideline for slope averaging is that the overall average slope of a bicycle trail should not exceed 10% unless the tread surface is uniquely suited to sustaining steeper grades.** This is a useful starting point for planning a trail alignment because it is applicable in many different environments. However, local conditions may vary, and certain soils (particularly very sandy soils) will not sustain a 10% average slope. Use a conservative approach to grades and let local knowledge and observation of how other trails in similar circumstances be your guide. Bicycle trails will occasionally include grades significantly steeper than 10%, but these sections of trail will be limited in their length, incorporate drainage features at regular intervals, or incorporate naturally durable surfaces resistant to the forces of erosion.

B. Tree Cutting

DEC policy requires that cutting trees should be minimized, but where cutting is required, trees must be identified, tallied and included in a work plan in accordance with DEC Program Policy LF 91-2 *Cutting and Removal of Trees in the Forest Preserve*.

1. Cutting of overstory trees will be avoided in order to maintain a closed canopy wherever possible. Large and old growth trees should be protected.
2. Cutting trees to expand a trail from its current width or otherwise improve a trail will be carried out only pursuant to a work plan.
3. All bicycle trails may be kept clear to a height of 8 feet, as measured from ground level.
4. No trees, except trees that due to structural problems or fallen/tipped conditions presenting an immediate hazard to the safe use of the trail will be cut outside the trail width.
5. Trees should be felled away from the trail to minimize the amount of material that needs to be moved. Felled trees should be delimbed and cut into short enough lengths to lie flat on the ground. Once delimbed and cut up, the short lengths should be dispersed and not left in piles next to the trail.
6. Trees removed from the cleared trail corridor that are not located in the tread surface will be cut flush to the ground.
7. No brushing will occur outside the cleared width of the trail corridor. Cleared tree trunks and limbs must not hinder trail drainage.

C. Grading

The trail tread surface should generally follow the existing contours of the natural forest floor whenever possible. Grading may be undertaken to facilitate natural drainage

without water bars. Grade reversals, dip drains, and trail alignments that facilitate drainage and tread stability are encouraged. Stone or log staircases, log ladders, or other trail structures suitable solely for hiking are inappropriate for bicycle trails.

D. Cross Drainage

Grade reversals, broad based dips, and earthen berm water bars are preferable to log and rock water bars. The catchment area for an earthen berm or broad based dip must be broad, gently sloping, and designed to capture water from the entire tread surface of the trail without obstructions. Similarly, the drainage ditch associated with the berm or dip must be broad (18” minimum width), gently and continuously sloped away from the trail, and devoid of obstructions. Debris (leaves, sticks, accumulated soil, etc.) should be cleared from drainage ditches to the extent necessary for functionality. The character of the surrounding landscape dictates the distance the drain must extend outside the trail corridor. When scouring or muddy conditions are present, the drain and catchment area may need to be armored with stone to assure the drainage remains functional. Earthen berms should only be constructed with compactable mineral soil.

E. Parallel Drainage

The character and dimensions of parallel drainage is the same as the drainage ditch associated with an earthen berm described in part D above. Parallel drainage works in combination with one or more cross drainage structures and is typically necessary when the trail is built on cross slopes with ground water close to the surface, or in locations with very little or no cross slope. Areas that require the use of parallel drainage should be avoided whenever possible.

F. Rock Removal

Rock removal may occur in the process of bench cutting, drainage construction, tread definition, and tread hardening. Stones may be used to strategically limit braiding, prevent widening and tread creep, and for trail structures such as turnpikes, rock causeways, check dams, and retaining walls. Stones used to narrow and define the tread will be set in a naturally random manner not compromising safe use of the trail. Excavated stones and earth not used for any of the aforementioned purposes will be dispersed outside of wetlands, water courses, and any other sensitive areas in a manner that blends with the surrounding landscape.

G. Side Slope Management

Soil characteristics will be carefully evaluated for depth to bedrock, depth to water table, and composition before any side slope management is undertaken. The elimination or reduction of side slopes by means of full bench cuts will be done only where soil conditions are deemed to be suitable. On rare occasions, stone or wood cribbing may be necessary to raise the trail tread above side slopes with particularly rugged terrain or poor soil conditions.

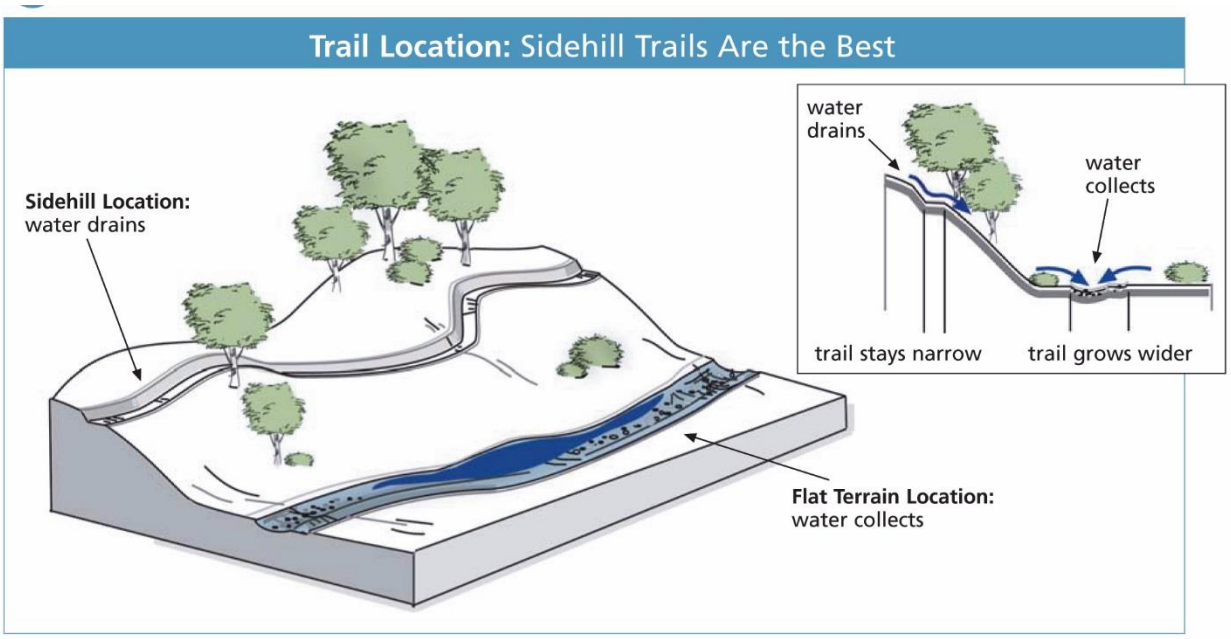


Diagram Courtesy of IMBA from Guidebook *Managing Mountain Biking* Copyright 2007.

H. Wetlands

Wetlands will be avoided. When wetland crossings or trail locations adjacent to wetlands are proposed, the trail will be designed to minimize potential adverse impacts. Any activity that may impact a wetland will be undertaken following Department, Adirondack Park Agency (in the Adirondack Park) and Army Corps of Engineers' permit requirements.

I. Parallel Feature Trail[6] (PFT)

Bicycle trails may include parallel feature trails (PFTs) that provide a technical element. These trails and associated technical features offer mountain bikers the opportunity to experience riding a challenging natural terrain feature. PFTs will be carefully sited to limit resource impacts while providing terrain and experience diversity within the bicycle trail network. PFTs also serve to control the development of unsanctioned social trails. PFTs may be significantly more challenging than the trail they are associated with. All PFTs will be consistent with the following criteria:

1. Do not interfere with other types of recreational uses allowed on the trail.
2. Rely upon natural features (boulders, ledges, logs, or other durable terrain features) to provide a uniquely challenging experience.
3. Are designed to minimize erosion and aesthetic impacts.

[6] Parallel Feature Trail guidance is adapted from: *"Authorizing Recreational Mountain Bike Trails on Provincial Crown Land, Operational Policy. Updated May 2013* and: *"Whistler Trail Standards Environmental and Technical Trail Features, Resort Municipality of Whistler First Edition 2003."*

4. Are no further than 50 feet from the main trail and no more than 150 feet in total length. If any portion of the PFT is further than 50 feet from the main trail or longer than 150 feet in length, it will be considered a separate trail.
5. Are located no closer than 0.25 miles to any other PFT.
6. Consist entirely of hand built trail that does not require tree cutting or elevated wooden structures of any sort. Naturally fallen trees and logs are not considered a wooden structure.
7. Are low-profile in appearance and cannot be mistaken as the main trail.
8. May have minimal signage to alert trail users to their presence and inform users of the uniquely challenging terrain.

The construction of a PFT does not require a UMP or UMP amendment. The construction of all PFT's must conform to the above guidance. If a PFT does not receive necessary routine maintenance it will be closed and rehabilitated. Closure of a PFT will follow best management practices for closure and rehabilitation of trails. The following diagram exhibits a conceptual PFT:

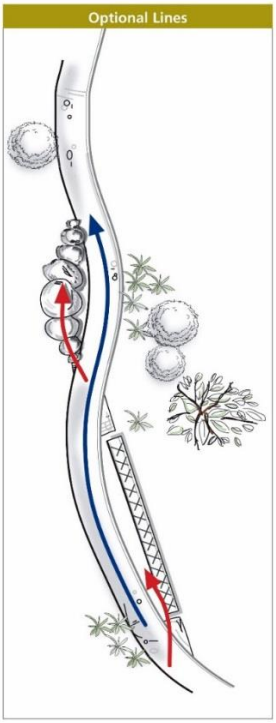


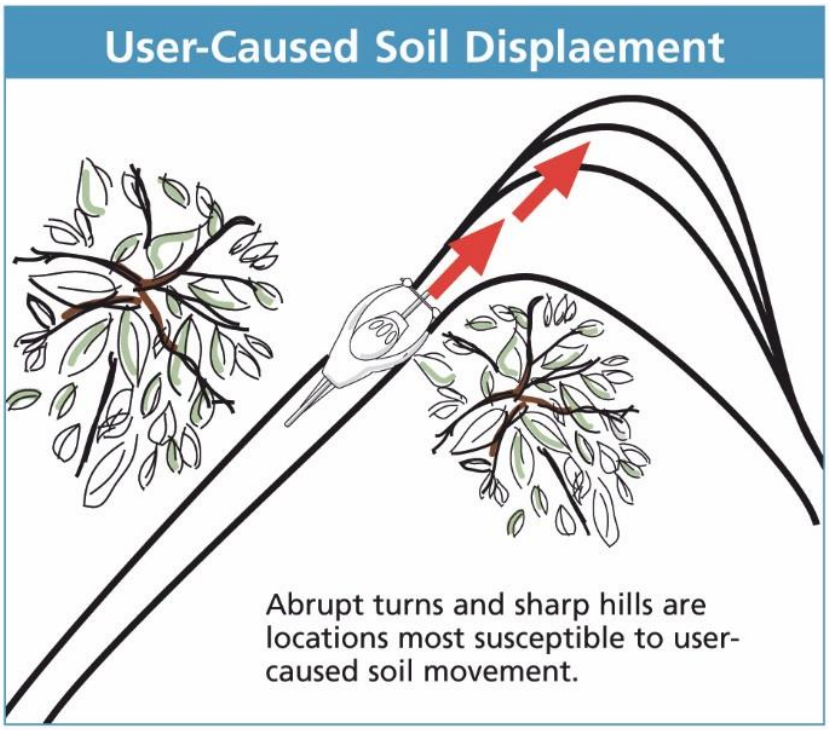
Diagram Courtesy of IMBA from Guidebook *Managing Mountain Biking* Copyright 2007

J. Insloped corners

Flat or out-sloped corners can be prone to ruts, widening, and tread creep from riders travelling to the outside of the corner and skidding to control speed and change direction**.** Modest in-sloping of certain corners keeps riders within the trail corridor, reduces skidding, and generally creates a more enjoyable and controlled riding experience. Bicycle trails may incorporate insloped corners where the aformentioned

problems are occurring or are likely to occur. All insloped corners will be consistent with the following criteria:

1. Trail alignments will incorporate naturally existing terrain whenever possible in order to provide the benefit of an in-sloped corner and minimize tread creep without requiring extensive terrain manipulation.
2. The highest point of any berm will not be higher than 2 feet above natural grade.
3. The entrance and exit from the berm will taper gradually back into the surrounding landscape and all portions of the berm that are not a part of the tread surface will be rehabilitated immediately following construction.
4. Only natural materials such as wood, stone, and soil may be used to construct in-sloped corners.
5. Stone and soil used to construct insloped corners will not be collected from streams, wetlands and other sensitive resources. Soil borrow pits must be closed and rehabilitated immediately following their use.
6. In-sloped corners will not be built in locations where the cross-slope grade exceeds 10%.
7. Sufficient drainage will be incorporated into the design of the corner so that water pooling on the tread surface does not occur.



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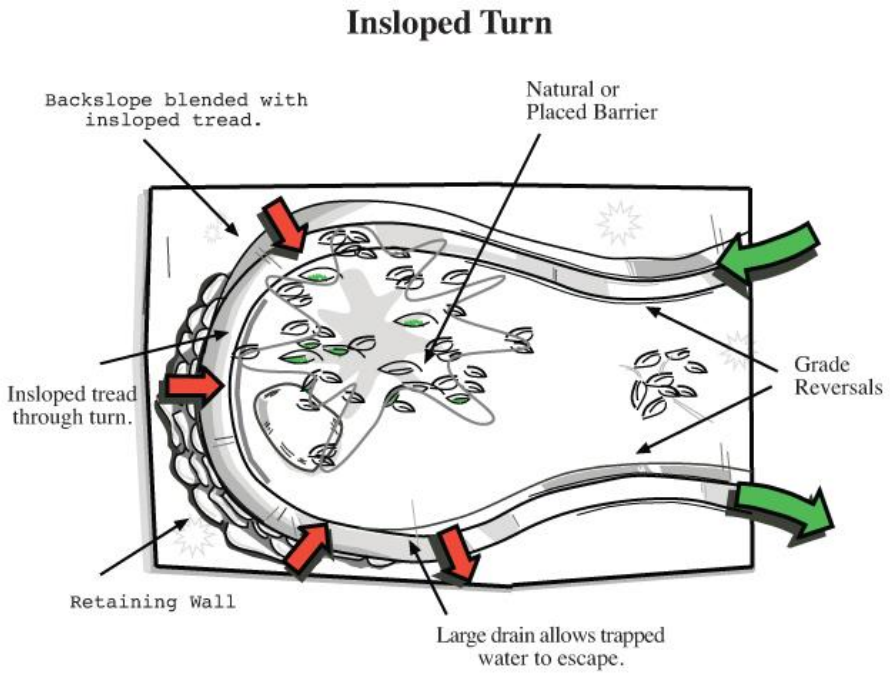

Diagram Courtesy of IMBA from Guidebook *Trail Solutions* Copyright 2004

K. Bridges

Bridges designed and built for bicycle trails will be long lasting, rustic in character, and minimally intrusive on the surrounding landscape. Trail bridges protect sensitive soil and water resources while providing a stable tread surface that suits the recreational needs of bikers. Observe the following guidelines when siting and designing bridges for bicycle trails.

1. Avoid bridges located within a corner. If a bridge must be placed in a location where the trail is changing direction, an insloped corner before the bridge may be used to direct riders across the bridge.
2. Provide a transition between the trail surface and the bridge decking that is condusive to a rolling bike tire and sheds water. If the transition is soft and organic soil, harden this transition zone with stone or gravel.
3. Minimize extensive ramp construction by placing sills and stringers below grade to allow the bridge deck surface to be as low as possible and preferably flush with the tread surface on either side of the bridge.
4. Maintain a sufficient opening under the bridge to allow for unobstructed water flow and light infiltration.
5. Rough-cut transverse decking is preferable to longtitudinal decking.
6. A hand rail may be required when the height of the bridge deck above natural grade exceeds 3'. Out-sloped handrails provide better clearance for handlebars and are preferred. Fourty four inches is the standard trail bridge handrail height.

7. Consider the trail's level of difficulty when planning for bridges. Consult an experienced bicycle trail designer whenever there is uncertainty about bridge alignment on the trail. The trail rating system provided in Part III. Section A Number 1 of this guidance provides recommendations for bridge width.

L. Soils

Soils characteristics need consideration as part of locating a new bicycle trail and conducting maintenance on existing trails. Trails should be located on soils that react well to human and natural forces. Ideal soils for bicycle trails will have the following physical properties: drain well, bind, and resist erosion. Soil properties and their general locations can be obtained from the Natural Resource Conservation Service (NRCS), site-specific soil assessments are important to confirm soil characteristics. Planners should consider the following properties when siting bicycle trails:

Sandy soils – Although sandy soils drain well, these soils are loose and lack cohesion. Bikers will try to avoid sandy soils, which may contribute to trail widening.

Silty soils – These soils bind well and can form a very firm trail. However, silty soils do not drain well and are susceptible to erosion if trail use occurs during wet periods.

Clay soils – These soils hold water and do not drain well. However, when dry, these soils can be very resistant to use. Similar to Silty soil, Clay soils are susceptible to rutting, erosion and damage if trail use occurs while the tread surface is saturated.

Loamy soils – Consisting of a balanced mixture of clay, silt and sand, these soils are ideal for bicycle trail construction. Loamy soils are generally well drained and compactible. Loamy soils, particularly those soils that include a gravel component, tend to be more resistant to displacement and erosional forces when compared to soils that are primarily composed of clay, silt or sand.

Organic Soils – These soils consist of fully or partially decomposed organic materials. Organic soils are generally uncompactable and highly susceptible to displacement and muddiness when saturated.

M. Traffic Direction

Single direction traffic bicycle trails may be utilized. Single direction trails may prevent potential collisions with uphill and downhill users, minimize concerns users may have regarding collisions with other users, and provide for greater opportunities for solitude. When managing traffic direction, a light-handed management approach, such as signage at the trailhead with recommended direction of travel, should be implemented first before a new regulation or rule is considered.

V. Guidelines for Bicycle Trail Maintenance on the Forest Preserve

A dry, stable, well defined tread surface is able to provide a high quality experience for trail users while simultaneously protecting natural resources. Maintenance activities on bicycle trails preserves the tread, controls encroaching vegetation in the trail corridor, and preserves wild forest character.

Trail maintenance may include removal of downed trees, cleaning of ditches and waterbars, clearing of brush, bridge repairs, and trail reconstruction in accordance with annual work plans. Annual work plans may include an annual clearing of loose organic debris (leaves) from the tread surface not to exceed 36" wide. Narrowing and defining the tread surface where tread creep or braiding is occuring may also be considered routine maintenance. Maintenance of Parallel Feature Trails will include mitigation of hazards in fall zones in addition to trail maintenance tasks described above. Trails susceptible to erosion and muddy conditions which cannot be relocated or sufficiently hardened may be temporarily closed until soil conditions improve.

VI. Guidelines for the Administrative Use of Motor Vehicles to Build and Maintain Bicycle Trails

Bicycle trails in the Forest Preserve will continue to be built and maintained primarily with hand tools. However, the Adirondack Park State Land Master Plan and Catskill Park State Land Master Plan allow for minimal use of motor vehicles (i.e landscaping equipment such as mini-excavators and material haulers) to construct and maintain bicycle trails in Wild Forest and Intensive Use areas. This section provides more detail regarding what is considered to be minimal use of motor vehicles on bicycle trail projects. Regardless of the tools used to construct and maintain bicycle trails (motorized or not), the design and the character of bicycle trails described in this guidance document remain the same. There is no difference in expected outcomes. Skilled trail crews working closely with experienced landscaping equipment operators can build bicycle trails that appear to have been constructed entirely by hand once they are completed. In the rare instances when motor vehicles are used, this section of the guidance will be followed to assure that the outcomes of bicycle trail projects are consistent with the rest of this guidance and Wild Forest character is preserved. Construction and maintenance of bicycle trails with the assistance of motor vehicles will be undertaken using the following guidelines:

Conservative Strategic Use: Whenever a reasonable and less intrusive alternative to using landscaping equipment for a bicycle trail project exists, it will be used first. Landscaping equipment should not be used if it can be shown that a trail project will not greatly benefit from the added efficiency of using the equipment on the site, or the

specific circumstances of the project dictate that temporary impacts to wild forest character created by the use of the equipment are unacceptable.

Equipment Size: Appropriate landscaping equipment will have a footprint (i.e track width) no wider than the trail corridor, and preferably 75% of the width of the trail corridor. In practice, a bicycle trail with a trail corridor 48" wide could be built using equipment with a 36" wide footprint.

Equipment Type: All landscaping equipment should be tracked. Mini excavators are preferable to exclusively dozer-style equipment for their ability to selectively shape and define the trail tread, cast and disperse spoils, and leave less clean-up and finishing work when operated efficiently.

Equipment Maintenance and Control of Invasive Species: Before including any landscaping equipment on a bicycle trail project in the Adirondack Park, the Inter-Agency Guidelines for Implementing Best Management Practices to Control Terrestrial and Aquatic Invasive Species on DEC Administered Lands in the Adirondack Park (IAG) must be reviewed. In addition to following the BMPs set forth in the IAG, Landscaping equipment will be maintained according to manufacturer's instructions and inspected daily to limit the risk of breakdown and/or the accidental release of motor oil, hydraulic fluid, or any other toxic materials into the environment.

Site Preparation: Soil conditions will be sufficiently dry and stable to assure that moving and operating equipment does not cause undue environmental impacts. All stormwater management devices required for the project will be in place and correctly installed prior to any earth moving activity at the project site. Trail crew leaders will carefully plan for the use of equipment in order to assure that site conditions are suitably dry and stable before any earth work begins. Whenever soft or sensitive soils must be crossed with landscaping equipment, turf protection mats, corduroy, or other temporary measures to offset rutting and soil displacement will be used.

Oversight and Operator Experience: All activities involving landscaping equipment will be directly supervised by DEC staff. The landscaping equipment operator on a bicycle trail project must have sufficient experience to safely navigate rugged terrain with minimal disturbance to soils and surrounding vegetation. All operators will review and understand this guidance prior to undertaking any work involving bicycle trails. Operators will not work alone. Trail crew workers assisting an operator will follow best practices for safely working in the vicinity of landscaping equipment.

Record Keeping: Proposed motor vehicle use will be described in a Conceptual Use Plan per CP 17, A Record Keeping and Reporting Use of Motor Vehicles and Aircraft in the Forest Preserve, or any successor policy.

Vehicle Identification: Any motorized vehicle used will display an official “DEC Administrative Use” sign, unless otherwise prominently identified as a DEC vehicle.

VII. Implementation and Review

Implementation of this Guidance is intended to establish singletrack bicycle trail management practices that conform to the guidelines and criteria of the Adirondack Park State Land Master Plan and Catskill Park State Land Master Plan. This guidance does not prevent the Department, via individual UMPs or other means, from providing more restrictive management where necessary to protect the character of Forest Preserve lands.