

Trails Technical Document #6

Trail Conditions Assessments – Analysis and Maintenance Guidelines

Prepared by
NYS Office of Parks, Recreation and
Historic Preservation
Planning Bureau
Agency Building 1
Empire State Plaza
Albany, NY 12238

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Trail Conditions Assessments – Analysis and Maintenance Guidelines

A primary goal for all New York State Parks Trail Systems is to develop sustainable trails that have minimal impacts on the environment, require little maintenance, and meet the needs of the users. This document is one of a series of technical documents developed by State Parks to provide standards and guidelines for trail design and development, accessibility, and trail assessment and maintenance techniques that help ensure a sustainable trail system. Additional topics include guidelines for trail signage, trail monitoring, and trail closure and restoration. The complete list of technical documents is provided on the web at:

<http://www.nysparks.state.ny.us/recreation/trails/technical-assistance.aspx>.

These documents were designed for use within New York State Parks but can be used as resources for trail projects outside of the Parks. Within State Parks, use of these documents for implementation of trail projects will be done in conjunction with a review and approval process as laid out in *Technical Document 7 - Trail Project Approval Process for NYS Parks*. These documents may be updated periodically. Additional documents will be developed in the future as part of this series.

This document presents general analysis and maintenance guidelines as a follow up to the trail assessment process (see *Technical Document 4 – State Parks Trail Assessment Process and Forms*). These are provided as very general guidelines to analyzing trail conditions assessments on natural surface trails and determining maintenance options to address specific situations. Final analysis and implementation steps should also consider the trail system as a whole, the natural resources of the park (including rare and endangered species and sensitive ecological communities, soil types), historic and cultural resources of the park, designated uses for the trail, and expected levels of use.

A trail maintenance plan is recommended to prioritize upgrades to the trail system. The following recommendations are specific to issues related to the trail tread. The *options* are not listed in any particular order. Different (or multiple) mitigation methods may be appropriate in different locations for the same type of issue. Additional information is generally collected during the assessment process. These are listed at the end of the document.

Water Assessment

A. Muddy Trail/Standing Water: muddy/wet area is isolated on the treadway. This is generally due to poor layout/design/location, poor construction, normal tread wear (compaction) and/or lack of trail maintenance. Water is trapped on the trail tread and does not flow off naturally.

1. Trail is located on a side slope

Options:

- Deberm (remove the built up soil along the trail edge next to the muddy/wet sections) on the down slope and reestablish an appropriate outslope
- Construct knicks, rolling grade dips or water bars along section of muddy/wet trail

2. Trail is located in a flat area

Options:

- Reroute trail to a nearby side slope using sustainable grades and techniques
- Armor trail tread with placed large rocks
- Raise the trail tread by constructing a bridge (including bog bridges), boardwalk or turnpike or by use of geogrids/geocells

3. Trail is located along the fall line (going straight down a hill regardless of grade) or the trail tread grade is more than half the side slope grade. Note: A sustainable grade is generally considered to be less than half of the side slope grade with a maximum grade of 15%.

Options:

- Construct knicks, rolling grade dips or water bars
- Reroute trail to follow contours; close fall line trail (see Document 3 – OPRHP Guidelines for Closing Trails)

B. Soggy Area: the trail and surrounding area is wet and muddy (not isolated on the trail tread). This is generally due to poor layout/design/location, poor construction, and/or changing climate/hydrologic patterns.

1. Trail is located through a classified wetland

- seek Natural Resource Staff advice

Options:

- Reroute the trail (generally a 100 foot buffer or more is considered appropriate for wetlands)
- Close the trail (see Document 3 – OPRHP Guidelines for Closing Trails)
- Raise the trail tread by installing turnpikes with culverts, boardwalks or bog bridges

2. Trail is located in general boggy area

Options:

- Reroute trail section to nearby side slope
- Armor the trail tread with placed rocks
- Raise the trail tread by installing turnpikes with culverts, boardwalks or bog bridges or by use of geogrids/geocells

Erosion Assessment

Erosion can be caused by a combination of trail use, gravity and water. It occurs most often and to a higher degree on trails with generally poor layout/design, poor construction, and/or lack of maintenance.

Determine the source of water. Usually, the source will be the watershed above the trail. In some cases it may be a storm water management issue if the trail is located near impervious surfaces/developed areas. Consider options to direct water away from the trail tread if applicable.

A. Erosion on/along the trail tread – water is trapped on the trail and has no way of flowing off of the trail tread.

1. Trail is located on a side slope and trail grade is less than half the grade of the side slope

Options:

- Deberm on the down slope and reestablish an appropriate outslope
- Construct knicks, rolling grade dips or water bars

2. Trail is located on a side slope and the trail grade is more than half the grade of the side slope

Options:

- Consider rerouting trail with sustainable grades (less than half the grade of the side slope but no more than 15%)
- Deberm on the down slope and reestablish an appropriate outslope
AND construct knicks, rolling grade dips or water bars
- If trail is steep and cannot reroute, consider armoring trail tread

3. Trail is located along the fall line

Options:

- Consider rerouting trail along contours with sustainable grades
- If constraints exist, construct knicks, rolling grade dips or water bars
- If trail is steep and cannot reroute, consider armoring trail tread; may include constructing steps

4. Major erosion consisting of deep gullies in the trail tread (wash out of trail tread)

Determine the source of water and alignment of the trail section. If water is funneling down the trail and causing deep gullies, chances are the alignment is at an unsustainable grade and/or located along the fall line. In each case, refer to Erosion Assessment above.

Consult with Landscape Architect and/or Park Engineer.

- If the trail is located near impervious surfaces/developed areas, it may be a storm water management issue. If so, mitigate the water source if possible and repair the tread. If the damage is extensive you may consider rerouting, closing and revegetating the trail per trail closing standards. See Erosion Assessment above.
- If the erosion was caused by an unusually heavy storm event, repair damage but also consider exploring ways of diverting water runoff in case of future events. See Erosion Assessment above.
- If caused by gradual erosive process and lack of maintenance over long period of time, see Erosion Assessment above.

B. Erosion across (perpendicular to) the trail tread – could be caused by a seep, funneled runoff from the adjacent hillside, seasonal stream crossing, for example.

Options:

- Armor trail tread
- Install an open or closed culvert
- Raise the trail tread by installing a turnpike with a culvert or a bog bridge

Other Assessment Information:

Blazing:

- A. Blazing is insufficient – it is hard to tell the alignment of the trail at a particular point.
- Mark trails such that the next waymark is clearly visible from the previous one. However, avoid placing waymarks so that more than one is readily obvious from the previous. One well-placed blaze or marker is better than several poorly placed blazes or markers.
 - Be sure to check trail markers in both directions, first from one direction and then from the opposite direction, in order to gain each perspective. It may not be appropriate to simply put markers on opposite sides of the same tree.
 - If cairns are used, they need to be constructed at similar intervals.
- B. Blazing is missing – markers may have fallen off or been stolen (nails or posts may still be visible); tree with painted blaze or marker may have fallen.
- Replace marker or blazes as appropriate whereas the next waymark is clearly visible from the previous one.
- C. Blazing is worn – Blaze or marker has faded enough that color and/or text is not distinguishable
- Refresh blazing or replace markers as necessary.

For additional information on **Signage**, see Document 2 - Trail Signage Guidelines for the NY State Park System.

Obstacles:

Downed trees and branches across the trail tread, ‘widow makers’ (trees leaning above/across the trail) and any other obstacle that is blocking the treadway are noted in the assessment process. This information is critical for park staff and maintenance volunteers to know locations and diameters of tree trunks to plan for appropriate maintenance equipment.

Structures:

An inventory of all bridges, culverts and erosion control devices is captured during the assessment process. The size and condition of each structure is recorded and can be used by staff/volunteers to assess effectiveness of structures and on-going maintenance needs.

Unimproved Stream Crossings:

The locations of unimproved stream crossings are recorded during the assessment process. These areas will need to be analyzed on a case by case basis whether wading, armoring or structures are needed to accommodate the designated uses allowed on the trail and the seasonal water flow.

Additional Comments:

This category can contain a variety of items, structures, or highlighted resources. Cave openings, scenic vista points, historic structures, unique rock formations and locations of invasive species are examples of what might be incorporated under additional comments. Depending on what is noted along the trail, different options are available for follow up. These items may be addressed through master planning or trails planning and/or through specific staff consultation (e.g. park manager and regional biologist regarding cave opening considerations, regional biologist regarding invasive species).

Resources

International Mountain Bicycling Association. 2004. *Trail Solutions: IMBA's Guide to Building Sweet Singletrack*. Boulder, CO.

New York-New Jersey Trail Conference, Inc. 2007. *Trail Maintenance Manual, 7th Edition, Revised*. Mahwah, NJ.

Proudman, R.D. and R. Rajala. 1981. *AMC Field Guide to Trail Building and Maintenance, 2nd Edition*. Appalachian Mountain Club in association with the National Park Service, National Trails Program. Boston, MA.

State of Minnesota, Department of Natural Resources. 2007. *Trail Planning, Design, and Development Guidelines*. Trails & Waterways Division, St. Paul, MN.

US Department of Agriculture. Forest Service. 2007. *Equestrian Design Guidebook for Trails, Trailheads and Campgrounds*. Missoula Technology and Development Center. Missoula, MT.

US Department of Agriculture. Forest Service. 2007. *Trail Construction and Maintenance Notebook*. <http://www.fhwa.dot.gov/environment/fspubs/07232806/index.htm>.

Williams, Peter B. 1998. "A Manual for the Assessment of Backcountry Trails." Institute of Outdoor Recreation and Tourism. Utah State University. Logan, UT. July 1998.