



Friends of the Blue Hills (FBH)
Adopt-A-Trail (AAT) Handbook

Last Updated: February 4, 2013

PREFACE

Welcome to the Friends of the Blue Hills (FBH) Adopt-A-Trail Program and thank you for offering your time to maintain the trails of the Blue Hills Reservation. This handbook is designed to provide guidance to Adopters to work safely and correctly. The handbook is specific to our program but should also be used in conjunction with the resource materials listed in the back of the handbook.

CONTACT INFORMATION FOR THE TRAILS TEAM AND DCR

Friends of the Blue Hills:

- Caleb Blankenship – Trails Program Co-Chairman
 - Phone: 617.697.4388
 - Email: caleb@friendsofthebluehills.org
- Chris Mullin – Adopt-A-Trail Program Co-Leader
 - Phone: 617.412.9557
 - Email: chris@friendsofthebluehills.org
- Robert Shine – Adopt-A-Trail Program Co-Leader
 - Phone: 508.558.3390
 - Email: robert@friendsofthebluehills.org
- Website: <http://friendsofthebluehills.org/>

Department of Conservation & Recreation (DCR):

- Alexandra (Ale) Echandi
 - Phone: 617.698.1802 x219
 - Email: alexandra.echandi@state.ma.us
 - DCR General Information - 617.698.1802
 - DCR 24-hour Emergency - 617.722.1188

State Police: 800.525.5555

Local Hospital – Milton Hospital, 199 Reedsdale Road, Milton, MA - 617.696.4600

BACKGROUND OF FBH AND THE TRAILS PROGRAM

The Friends of the Blue Hills (FBH) is a non-profit organization dedicated to preserving and protecting the Blue Hills Reservation. In 2007, we initiated the Trails Program to maintain and improve the approximately 125 miles of trails of the Blue Hills, working in partnership with the DCR. Trail work events are conducted during the months of April – December and are open to all volunteers, regardless of skill level. On-the-job training is provided to all trail volunteers. In 2008, we added the Adopt-A-Trail Program, modeled after the successful Appalachian Mountain Club (AMC) Adopt-A-Trail Program.

WHAT IS THE ADOPT-A-TRAIL (AAT) PROGRAM?

The Adopt-A-Trail Program is designed to allow volunteers to take responsibility for regular trail maintenance on a trail or section of trail. We will provide training to all Adopters to ensure they are trained and confident to perform their work in a safe manner. The goal is to attract

volunteers that walk a section of trail on a regular basis who are willing to perform basic maintenance to keep that trail in great shape.

WHAT ARE THE ACTIVITIES PERFORMED BY AN ADOPTER?

The Adopter's trail responsibilities include:

- Clean drainage structures on the trail of obstructions such as dirt, rocks and branches. Structures include waterbars, culverts and ditches
- Remove branches that overhang the trail and downed branches and small trees
- Remove trash from the trail
- Propose additional water diversion structures to address current trail erosion problems
- Report major problems on the trail such as large tree blow-downs for follow-up by a trail work crew or DCR

Adopters will work on existing structures to perform their maintenance. Adopters must not construct new structures on their own. The plan for the new construction must be presented to DCR for approval. If you believe new construction is needed, please discuss this with the program leaders to determine how best to proceed.

The **Trailwork 101 Appendix** attached provides guidance about how to perform the trail work.

WHAT ARE THE REQUIREMENTS FOR AN ADOPTER?

- Each volunteer must attend one classroom training session (held in October each year) and attend at least two trail work events under the supervision of a trail work leader. Those volunteers with significant previous trail work experience may request a waiver for the work events.
- There is an Adopter Application that must be completed by the volunteer to request a trail for adoption. At that time, the Adopter can select a trail from the list of trails available. Applications are available at our website and from program leaders.
- Once the trail for the Adopter is assigned, it is expected the Adopter will visit their trail at least two to three times a year (i.e. in the Spring to clear any damage from the Winter, and Fall after the leaves drop).
 - Note: There are restrictions on trail work East of Rt. 28. Work on this section of the Reservation is limited to between November 1st and April 1st. Deadfall may be removed year-round from the trail to the side of the trail.

WORKING WITH DCR

Good communication between the FBH Trails Program and DCR is essential to maintain a good working relationship. Our leaders meet with DCR staff to discuss upcoming work projects and construction suggestions. DCR provides guidance and approval to allow work to be performed. Each new Adopter will have the opportunity to meet with our DCR contact (currently Ale Echandi) to discuss specific requirements the trail might have as well as to offer her thoughts about work needed on the trail.

Each year the FBH submits a permit application to DCR to obtain approval to conduct our trail work activities in the Blue Hills Reservation. A copy of the permit language with further guidance specific to our program can be found on our Trails Resources page.

DCR also provides trails guidelines to all the state parks. A copy of the **DCR Trails Guidelines and Best Practices Manual** can be found on our website. We encourage all Adopters to become familiar with these guidelines.

WHAT ARE THE BENEFITS OF BEING AN ADOPTER?

Adopters have an opportunity to learn new trail maintenance skills but also to develop leadership skills. Some Adopters will supervise volunteers and you may need to teach, motivate and guide them in a friendly, positive manner. These skills can be very useful in work and personal situations. Employers also love to see employees donating time to the community and will be impressed with your newly developed leadership skills. Many of our volunteers enjoy meeting new people and seeing new trails so make sure you leave time for some conversation among volunteers. For most of us, the primary benefit is the satisfaction you have from protecting the trails for future generations.

WHAT TRAINING IS AVAILABLE?

The FBH Trails Program conducts on-the-job training at their work events. In addition, other organizations such as the AMC and New England Mountain Bike Association (NEMBA) provide on-the-job training programs.

There are many resources available on the internet to provide additional information on erosion theory, maintenance techniques and proper tool handling & safety. Please see the Resources section in the back of the handbook for a partial list of resources available.

TOOLS

Adopters utilize a variety of tools to accomplish their work activities. The **Trailwork 101 Appendix** provides pictures of the tools you will use. The tools consist of digging tools such as pick mattocks, hazel hoes, iron rakes and shovels and brushing tools such as loppers, hand clippers and hand saws. DCR has a tool shed located at their headquarters on Hillside Street. Adopters will be provided with the combination for the lock and are expected to sign the log to take the tools from the shed. The tools should be returned to the shed at the end of the day. Please note in the log any tools that are broken or need repair.

We encourage all Adopters to acquire a selection of tools such as hand clippers, iron rakes, shovels, etc. for your use on the trails. This would save a stop at the tools cache before and after your work event. Many people already have these tools in their garage for work around the home.

REPORTING REQUIREMENTS FOR WORK ACCOMPLISHED

Adopters must complete an electronic work report and forward the report to program leaders for inclusion in the trails database. Reports should be submitted within two weeks of the work to facilitate timely review and feedback from program leaders. A copy of the work report can be found on our website, and at the end of this handbook.

The work report will collect pertinent information on the work you've accomplished on the trail. We track the name of the trail, description of work completed, names of the volunteers who

worked on the trail, hours worked, any work remaining and major problems that require assistance (such as large downed trees).

Our trails database is a tremendous tool that allows everyone the ability to look up each trail to view an assessment of the trail, a map of the trail and work reports detailing work performed over the years. The database is organized by section of the Reservation and then by trail. Go to the Trails Resources page on our website and explore this powerful tool.

PROGRAM LEADERS

The Adopt-A-Trail program leaders are experienced volunteers (and Adopters) who work with Adopters to provide guidance for work on the trails. They will walk the trails with Adopters when the trail is assigned to discuss problem areas and to offer possible solutions for the problems. Adopters should feel free to communicate your ideas and questions to the program leaders.

Program leaders will periodically review the work reports submitted by the Adopter. They may walk the trail with the Adopter (time permitting) to provide feedback or may just walk the trail alone and provide feedback via email or telephone call. The goal is for the leaders to provide constructive feedback to the Adopter to enhance the Adopters future work activities.

WORKING ALONE / WORKING WITH OTHERS

Adopters may work alone or may bring a few volunteers to work with them on their trail. Working with a group of friends or family often enhances the experience while providing an improved level of safety. Adopter should be prepared to provide training and guidance to their volunteers. It is imperative the work be done safely and correctly. Volunteers are welcome (and encouraged) to attend FBH trail work events to learn the skills necessary to work on the trail.

Adopters are responsible for the activities of their volunteers. Supervising a large group of volunteers who are learning new skills can be very challenging. As a result, we suggest Adopters do not bring more than four volunteers with them unless the volunteers have previous trail work experience or additional leaders are available. If you desire to bring more than five individuals in for a work party, please notify Ale at least 2 weeks in advance as a safety precaution. It may be possible to provide additional leaders for your work event. This should be coordinated, in advance, with the Trails Co-Chair.

We require Adopters and their volunteers to sign a release form at each event to acknowledge the work they are performing is not without some risk of injury. A two-page copy of the release form is located in the back of this handbook. Please make sure all the information of the release form is filled out completely. This release should be mailed to the Trails Co-Chair at the end of each event.

SAFETY ISSUES

Adopters are expected to work in a safe manner and supervise those who join them on the work party for their trail. It is recommended that you take a cell phone with you in case of emergencies, although many places in the Reservation may not allow a clear signal. The emergency phone number for DCR and the State Police should be pre-programmed into your phone for quick access. In an emergency situation, dial 911. We also require Adopters to carry

a first aid kit to handle basic injuries such as cuts and sprains. We recommend safety glasses when working on the trail to guard against eye injury.

Each work event should be preceded with a safety discussion with your volunteers. The discussion should include a demonstration how to use the tools correctly. You should review the “Circle of Danger” concept to remind volunteers to make sure they are aware of who is around them when working, to avoid injury. Adopters should discuss the procedures in case of an emergency so the plan can be initiated quickly. It is also a good idea to ask if anyone has a medical condition such as an allergy to bee stings. Offer the opportunity to see you privately so they can speak to you confidentially. Volunteers should also be reminded to check for ticks and to watch for poison ivy. The Reservation is home to poisonous snakes, so volunteers should be reminded to be careful about putting their hands under rocks where the snakes may reside.

The first priority in case of an emergency is to get appropriate care as soon as possible. If someone must go for help, someone should also stay with the injured party until help arrives. All injuries should be reported to the Trails Co-Chair within 48 hours. The report should details what happened, who was involved and the outcome. A copy of the report is located in the back of the handbook.

MULTI-USE TRAILS

Trails in the Blue Hills Reservation are used by a variety of trail users including hikers, runners, skiers, snowshoers, horseback riders and mountain bike riders. Please consider the users as you perform maintenance. While hikers are very comfortable with waterbars, some waterbars can present a hazard to other types of users. Rolling dips and grade reversals may provide safer alternatives to wooden waterbars, which may become slippery when wet. The NEMBA website offers a variety of water diversion structures serving the multiple users of the trails.

FINAL THOUGHTS

We suggest all Adopters (and their volunteers) carry a map while maintaining in the Reservation and to offer assistance to other trail users. Adopters should consider themselves trail ambassadors and we hope you engage users to discuss your work on the trails. Many users will inquire about your work and may even thank you. Please direct them to our website to obtain more information or to register for a work event. We will provide all Adopters with an identification card to identify you as a Trail Adopter and you should have them with you when performing work on the trail.

Thank you for your interest in the Adopt-A-Trail Program. We are very excited to grow the program and look forward to working with you.

RESOURCES

❖ Appalachian Mountain Club (AMC)

- The AMC offers many classes for trail maintenance, first aid and leadership development. They also conduct work parties where you can learn new skills.
 - Find a work party or skills session at:
<http://www.outdoors.org/conservation/trails/volunteer/trailopps/vol-crews-schedule.cfm>
 - Find a copy of the AMC Trail Adopter’s Handbook at:

- <http://www.outdoors.org/pdf/upload/vol-adopter-handbook-2.pdf> .
- Learn about the AMC Adopter-A-Trail Program at:
<http://www.outdoors.org/conservation/trails/volunteer/adopt/index.cfm>
- ❖ **New England Mountain Bike Association (NEMBA)**
- NEMBA has an extensive schedule of trail maintenance almost every weekend.
 - Visit their site at www.nemba.org for a listing of work events or educational materials.
- ❖ **International Mountain Bike Association (IMBA)**
- IMBA has lots of information about trail maintenance with mountain bike riders in mind.
 - For a listing of their articles on trail building and maintenance, go to:
<http://www.imba.com/resources>
 - IMBA produces a colorful book called Trail Solutions: IMBA's Guide to Building Sweet Singletrack. The book is a complete guide from trail design and construction thru maintenance. Plenty of detailed drawings to guide the maintainer.
- ❖ **California State Parks and Recreation**
- Cal. State Parks has a nice website for trail maintenance that includes erosion theory and basic maintenance at:
<http://www.foothill.net/fta/work/maintnotes.html>
- ❖ **State of New Hampshire, Bureau of Trails**
- The website has a selection of trail maintenance articles at:
<http://www.nhstateparks.org/partner-and-community-resources/trails-maintenance-resources/>
- ❖ **National Trails Training Partnership**
- The Partnership has an extensive collection of articles on Trail Building, Management and Advocacy at:
<http://www.americantrails.org/resources/index.html>
- ❖ **U.S. Department of Transportation, Federal Highway Administration**
- The Recreational Trails home page has an extensive list of publications and links available at:
<http://www.fhwa.dot.gov/environment/rectrails/index.htm>
 - Visit the site at to order FREE publications that are very informative. I recommend the last three items on the list (Trail Maint DVD, 2007 Notebook and Wetland Trail Design).
<http://www.fhwa.dot.gov/environment/rectrails/trailpub.htm> .
 - Extensive summary of hand tools for trail work at
<http://www.fhwa.dot.gov/environment/Fspubs/05232810/toc.htm>
- ❖ **Washington Trails Association**
- Nice guide to trailwork at <http://old.wta.org/~wta/cgi-bin/wtaweb.pl?6+tw+index>
- ❖ **The Rucksack – A Wilderness Trippers Portal**
- Great selection of links including trail building and maintenance first aid, hiking, and bush skills at <http://therucksack.tripod.com/trailbuilding.htm#trailbuildinglinks>

❖ **Professional Trailbuilders Association**

- Their website has a great resources listing including books with write-up at <http://www.trailbuilders.org/resources/weblinks.html>

❖ **New York/New Jersey Trail Conference**

- Trail Maintenance 101 at <http://atfiles.org/files/pdf/NYNJMaint101.pdf>

Friends of the Blue Hills

Trail Volunteer Work Report

Work date (mm/dd/yy):

Report date:

Your name:

List Volunteers working with you:

Trail Name/description (one trail name only):

Section Name (select one from the drop down list): Blue Hills

Work Completed (Please be specific with location of work. Note hazards & potential hazards addressed if applicable):

Total Hours (# of people x hours worked):

Work Remaining:

Other comments (areas of concern, wildlife sightings, trail markings and signage condition, need for re-route, possible encroachment):

Forward completed electronic form to: Dexter Robinson @ dexpdoc@gmail.com

Activity: _____ Leader(s): _____ Activity Date: _____

FRIENDS OF THE BLUE HILLS VOLUNTEER-LED ACTIVITIES
ACKNOWLEDGMENT AND ASSUMPTION OF RISKS & RELEASE AGREEMENT

PLEASE READ THIS ENTIRE DOCUMENT (hereafter “Document”) CAREFULLY BEFORE SIGNING. All participants must sign this Document. For participants under 18 yrs. of age (hereafter sometimes ‘minor’ or ‘child’), parent/s or legal guardian/s (hereafter collectively ‘parent/s’) must also sign. In consideration of the services of the Friends of the Blue Hills Charitable Trust, a not-for-profit corporation, organized and existing under the laws of Massachusetts, including all officers, directors, employees, representatives, agents, independent contractors, volunteers (including leaders and co-leaders), members and all other persons or entities associated with it (collectively referred to in this Document as FBH), I (participant and parent/s of a minor participant) acknowledge and agree as follows:

FBH volunteer-led educational and/or adventure activities may include, but are not limited to hiking, backpacking, camping, maintenance of trails and facilities, canoeing, kayaking and transportation or travel to and from activities (referred to in this Document as ‘activities’ or ‘these activities’). The leaders of these activities are volunteers. They are not paid professional guides or leaders. In all activities, all participants share responsibility for their own safety and the safety of the group. Participants (and parent/s of minors) take responsibility for having appropriate skills, physical conditioning, equipment and supplies for these activities.

These activities include inherent and other risks, hazards and dangers (referred to in this Document as ‘risks’) that can cause or lead to injury, property damage, illness, mental or emotional trauma, paralysis, disability or death to participant or others. Some, but not all of these risks include: hazardous and unpredictable ground, water or weather conditions; misjudgments made by leaders, co-leaders, participants or others; travel in remote areas that may cause potential delays or difficulties with transportation, evacuation and medical care; equipment that can fail or malfunction; the potential that the participants or others (e.g. co-participant, driver, medical and rescue personnel) may act carelessly or recklessly. I understand that FBH staff, leaders or other personnel cannot assure participant’s safety or eliminate any of these risks. Participant is voluntary participating with knowledge of the risks. Therefore, participant (and parent/s of minors) assume and accept full responsibility for the inherent and other risks (both known and unknown) of these activities, and for any injury, damage, death or other loss suffered by participant, resulting from those risks, and/or resulting from participant’s negligence or other misconduct.

I (adult participant, and/or Parent/s for themselves and for and on behalf of their participating minor child) agree to release and not to sue FBH (as FBH is defined above) in regard to any and all claims, liabilities, suits, or expenses (including reasonable costs and attorneys’ fees) (hereafter collectively ‘claim’ or claim/s), including claim/s resulting from FBH’s negligence (but not its gross negligence or intentional or reckless misconduct), for any injury, damage, death or other loss to me or my child, in any way connected with my or my child’s enrollment or participation in these activities, or my use of FBH equipment, facilities or premises. I understand I agree here to waive all claim/s I or my child may have against FBH, and agree that neither I, my child, or anyone acting on my child’s behalf, will make a claim against FBH.

I (participant and parent/s of a minor participant) agree that the substantive laws of Massachusetts govern this Document and all other aspects of my relationship with FBH, and that any mediation, suit, or other proceeding must be filed or entered into only in Massachusetts. This Document is intended to be interpreted and enforced to the fullest extent allowed by law. Any portion of this Document deemed unlawful or unenforceable shall not affect the remaining provisions, and those remaining provisions shall continue in full force and effect.

PARTICIPANT AND PARENT/S OF A MINOR PARTICIPANT AGREE: I HAVE CAREFULLY READ, UNDERSTAND AND VOLUNTARILY SIGN THIS DOCUMENT AND ACKNOWLEDGE THAT IT SHALL BE EFFECTIVE AND BINDING UPON ME., MY MINOR CHILDREN AND OTHER FAMILY MEMBERS, AND MY HEIRS, EXECUTORS, REPRESENTATIVES AND ESTATE. Parent/s must sign below, both in their capacity as a participant, and as Parent/s of any minor child identified below.

When completed, send copy to:

**Friends of the Blue Hills
Trails Program
PO Box 416
Milton, MA 02186**

FBH Member Yes _____ No _____

Name: _____

Email: _____

Address: _____

Signature: _____

FBH Member Yes _____ No _____

Name: _____

Email: _____

Address: _____

Signature: _____

FBH Member Yes _____ No _____

Name: _____

Email: _____

Address: _____

Signature: _____

FBH Member Yes _____ No _____

Name: _____

Email: _____

Address: _____

Signature: _____

FBH Member Yes _____ No _____

Name: _____

Email: _____

Address: _____

Signature: _____

FBH Member Yes _____ No _____

Name: _____

Email: _____

Address: _____

Signature: _____

FRIENDS OF THE BLUE HILLS

VOLUNTEER ACCIDENT REPORT FORM

Subject Name: _____ D.O.B . _____

Male/Female (circle one)

Subject Address: _____

City: _____ State: _____ Zip: _____

Phone: (____) _____ Activity/Facility: _____

Date/Time of Incident _____ Location of Incident: _____

Activity Leader: _____

WEATHER

Temp: (F) _____ Precip: _____ Wind:(mph) _____

Visiblity: _____

TYPE OF INCIDENT

(Check One)

- Injury
 Illness
 Other

Outcomes of Incident:

- 1. Did subject leave activity, facility or event? Yes/no Date:_____
2. Was outside assistance used? Yes/No Date:_____
3. Did subject go to a medical facility? Yes/No Date:_____
4. Did subject return to activity or facility? Yes/ No Date:_____

LOCATION OF INJURY

- Head Eyes Face Mouth Neck Shoulder
Chest Upper Back Lower Back Abdomen
 Pelvic Area/Hips Genitalia Upper Arm
Elbow Lower Arm Wrist Hand Finger
Buttock Upper Leg Lower Leg Knee
Ankle Foot Toe

RESPONSE

Were bodily fluids spilled? YES / NO

If yes, were universal precautions followed? YES / NO

(See below)

Universal Precautions for Blood and Bodily Fluids

- Use impermeable gloves if blood or body fluids containing visible blood are anticipated.
• Stop the bleeding, cover the wound and change the uniform if contaminated with excessive amounts of blood.
• Wash hands and skin after contact with blood.
• Clean any surfaces or equipment with appropriate disinfectant and clean clothes or skin with soap and water or an appropriate antiseptic.
• Use proper disposal procedures for contaminated clothing and equipment.
• Use a ventilation device for emergency resuscitation.
• Avoid direct contact with patient if you have an open skin condition.
• Follow accepted guidelines for control of bleeding and for any body fluids containing visible blood.
• Encourage all participants to use individual water bottles.

~ CONTINUED ON REVERSE ~

Friends of the Blue Hills Accident Report Form

Subject Name: _____

Narrative: In the following space please provide a brief, factual account of this accident. Describe any and all symptoms of injury and/or illness that subject exhibited Describe your response to the accident and/or your treatment of the patient. Attach any patient care forms or **Search and Rescue** (SAR) forms.

Report Prepared By: _____ Position: _____

Witnesses:

Outside Agencies Involved: _____

Signature: _____ Date Report written: _____

ACTIVITY PARTICIPANTS

Narrative: Provide an account of your involvement in this accident.
(Additional participants who can provide additional information should attach their narrative on a separate piece of paper)

Participants Signature: _____ Date: _____

When completed, send copy to:

Friends of the Blue Hills
Trails Program
PO Box 416
Milton, MA 02186

APPENDIX A

FRIENDS OF THE BLUE HILLS TRAILWORK 101

Introduction

This document focuses on multi-use trail maintenance theory and practice and is intended to be used as reference by trail maintenance crews. The primary goal of the maintainer is to keep the trail in a safe, sustainable manner and to minimize erosion of the treadway. This guide will provide a basic understanding of how trails are eroded and the methods to prevent and repair trail degradation. Also included is a summary of tools used to maintain the trails and a brief explanation about working safely. The reader is encouraged to consult other sources to expand their knowledge of the various facets of trail maintenance. Often, there are several options to address a trail maintenance issue so consulting a broad range of materials will lead to selection of the most appropriate option. The document does not provide enough guidance to install drainage structures but is appropriate to maintain existing structures.

❖ Trail Design

- Trails should be constructed to avoid grades greater than ten degrees except for very short stretches. Ideally, they should follow the contour of a hill or switchback across the slope, instead of heading directly up the slope (fall line). Trails should also be pitched (cross-slope) so water runs directly off the trail (perpendicular to the trail) instead of flowing down the trail.
- Width of trail varies from trail to trail. Fire roads may be ten feet wide while primitive trails may be just three feet wide.

❖ Erosion Theory

- Erosion may be defined as the removal of dirt and fill from the trail by means of wind or water. The goal of the trail maintainer is to minimize the removal of the dirt to reduce ruts and low spots where water may collect.
- Erosion control structures should be included in almost every trail where water may collect on the trail.
- Viewing a trail during a heavy, prolonged rainstorm provides a good understanding of how water is flowing on a trail and offers glimpse where the water may be diverted off the trail. The key to solving erosion problems is to determine where the water is originating. Water should be diverted off the trail at the earliest opportunity to reduce erosion.

❖ Erosion Control Structures

- The purpose of the erosion control structures is to move water away from the trail. Structures should be durable and easy to maintain with an eye to a minimal appearance.
- **Culverts**
 - These structures are large tubes or pipes that run under the width of the trail. Water flows in one side and travels down a slope to the other end of the pipe. The diameter of the pipe depends on the amount of water that must be moved.
 - A basin should be constructed on the inflow side to collect the water in front of the pipe. The outflow ditch should fan out from the end of the pipe to allow the water to disperse.

➤ **Waterbars**

- These structures are built into a trail at an angle (around 45 degrees) to divert water off the trail. Waterbars should be constructed of a durable material such as wood or stone.
- A trough should be constructed in front of the waterbar to collect the water and move it off the trail. The bottom of the trough should be about six inches below the top of the waterbar so water does not run over the waterbar.
- The outflow ditch should extend past the edge of the trail so water does not flow back on the trail.
- Wet waterbars may present a hazard to trail users so trail usage should be considered before new waterbar construction.

➤ **Grade Reversals & Dips**

- These structures are built into a trail and are usually much more durable than waterbars and require less maintenance. Dips are a simple “bump” in the trail, situated at an angle (around 50 degrees) with a trench in front of the dip to direct water off the trail.
- A grade reversal is a more substantial dip and may extend for six to ten feet down the trail. When constructed, grade reversals often include large rocks dug into the trail and then covered with dirt. A knick is constructed at the outslope edge of the trail to collect the water from the trench in front of the grade reversal. The knick should be about five feet wide so water can “sheet” off the trail instead of flowing out a narrow trench which can clog easily with leaves and debris.
- Grade reversals are favored over most drainage structures as they require minimal maintenance and make for safer passage by trail users.

➤ **Drainage Ditches**

- These structures run parallel to the trail and are used to transport larger amounts of water. The ditch may collect and transport water to a culvert to flow under the trail. Alternatively, the ditch may carry the water along the trail and then direct it off the trail on the same side as the ditch.
- The ditch should be cut deep enough to collect a good volume of water. The sides of the ditch should be gently sloped (no more than a 45 degree slope) to reduce the likelihood of erosion.

❖ **Tools**

➤ **Tool Safety**

- Each tool should be inspected before using to confirm there are no cracks in the shaft or loose tool heads. Do not use tools that are not in good order.
- Tools should be carried to the work site at waist level with the sharp end facing toward the ground. When traveling on the trail as a group, maintain a distance of ten feet between each person. Tools should never be carried on the shoulder as injury may occur if you trip or fall. If you start to fall, gently toss the tool away from your body.
- At the work site, the maintainer should ensure that the immediate area is clear of anyone who may be hit by the swing of the tool. This area is called the **Circle of**

Danger and represents the circle around the worker where the tool could hit someone entering the circle. The area should also be scanned for any overhanging branches which may impair the swing of the tool. If approaching someone working, announce your presence and let them stop before you approach closer.

- Get proper training from the trailwork leader if you are unsure how to use the tool properly and safely. Encourage the leader to observe your tool handling skills and offer feedback. Use the right tool for the right job. A shovel should not be used to chop away at a large root in the ground. Shovels were designed for digging and moving dirt – not chopping solid wood. A cutter mattock or Pulaski should be used for chopping roots.
- When using tools, be careful not to strain your back. When bending over to use the tool, keep your knees bent and shoulder width and your back flat. Any lifting should be with your legs, not your back.
- See the attachment at the end of this document for pictures of the tools listed below.

➤ **Digging Tools**

- **Pick Mattock/Cutter Mattock** – The pick is useful for loosening up soil and digging down several inches. The mattock blade is good for removing soil down an inch or two at a time over a wider area. The cutter blade is useful to cut and remove roots.
- **Adz Hoe (also known as Hazel Hoe)** – This tool has a wide blade for digging dirt out of ditches. Angle the blade and use the corner to dig deeper.
- **McLeod** – This forest fire-fighting tool has a flat, square blade with a sharp cutting edge and a sawtooth edge for removing small brush. Tool is very useful to tamp down loose dirt when building grade reversals.
- **Shovel** – Standard version with a pointed blade is very useful to remove large amounts of dirt and small rocks from one place to another.
- **Bow Rake** – This tool with steel tines is used to spread dirt and rocks around the trail. It is very helpful to remove larger rocks from piles of dirt and to scrape away organic materials from ditches.

➤ **Brushing/Pruning Tools**

- **Hand Clippers** - This tool is used to cut very small trees and branches up to one inch.
- **Loppers** – This tool is used to cut small trees and branches up to 1½ inches. Longer handles provide greater leverage to cut larger branches.
- **Bow Saw/Folding Saw** – This tool should be used to cut branches and small trees up six inches in diameter.
- **Pole Saw** – This tool has an extendable pole which allows the user to cut branches outside the reach of loppers or bow saw.

- **Swizzel Stick** – This tool has a serrated cutting blade at the end of a three foot handle. It is used to trim grass and very small brush.

❖ Digging Tips

- The goal of maintaining drainage structures is to remove dirt, leaves and rocks blocking the water flow. Water should collect in side ditches or the trench in front of the waterbar and then flow off the trail. Preventing the water flowing down the trail will reduce the amount of dirt removed from the trail.
- **For waterbars:**
 - Clean out organic materials like leaves from the trench and discard off the trail. Avoid making piles of debris and scatter the material off the trail. Organic material should never be included in a drainage structure.
 - Next, drag excess dirt from the trench over the waterbar and use it to fill in the downslope side of the waterbar. Do not clean out all dirt in front of the waterbar. There should be some dirt (about 3 – 4”) in front of the waterbar to prevent the waterbar from being eroded underneath. Ideally, there should be about a six inch height differential between the top of the waterbar and the trench in front of the waterbar. The ditch in front of the waterbar should be about 12 – 18 inches wide and should have a gradual slope from the trail into the ditch.
 - Avoid digging any deeper than necessary to remove excess dirt. Once the dirt is loosened-up, it is much easier for it to be washed away in a good rain. Always tamp down the disturbed dirt to reduce erosion in the future.
 - Remove any excess dirt from the outflow ditch and make sure there is a down slope from the trail out the outflow so water will flow easily. The outflow ditch should be at least 18 inches wide so leaves and branches won’t get caught in the ditch. The ditch should also extend far enough off the trail to prevent water from flowing back on the trails. Trim any roots that may impede water flow.
 - Excess dirt from the outflow area may be harvested and brought back on the trail to repair damage from erosion.
- **For grade reversals and dips:**
 - These dirt structures need periodic maintenance to ensure they collect water and transport it off the trail. Follow the same process as noted above including removal of organic material and excess dirt as well as improving the dip to maintain the height differential between the top and bottom of the dip.
 - Avoid creating steep sided ditches with a slope greater than 45%. These slopes tend to eroded very quickly filling in the ditch.
- **For culverts:**
 - Each culvert requires a visual inspection to make sure there is nothing inside the culvert blocking water flow. Remove any excess material from the culvert. It is recommended to leave a couple inches of dirt in the culvert (especially at the inflow side) to prevent the culvert being undermined.
 - There should be a shallow basin in front of the culvert to collect water. On the outflow side, the ditch should fan out to reduce the speed of the water flowing through the culvert. If the water flows pretty fast through the culvert, you may want to add some rock in the outflow ditch to reduce the potential for erosion.

➤ **For puddles and wet spots:**

- In flat areas, water often collects in puddles on the trail. As people seek to avoid the puddle, they walk around the puddle which widens the trail. Over time, dirt gets pushed to the side of the trail creating a side berm which helps to retain water on the trail.
- One way to eradicate the puddle is to make sure the side berm is removed and the trail is cross-sloped so water flows off the trail. The berm must be scrapped down with the excess dirt being moved onto the trail to create the slope. The dirt must be tamped down to prevent it being removed with the next rain. When the berm is removed, it should be replaced with a wide slope off the trail.
- Another way to remove the puddle is to dig out the dirt and debris down to a depth of four or five inches, fill in the hole with crushed stone to improve drainage and back fill with dirt. Use the dirt to add a slope to the trail so water can drain off the trail.

➤ **Maintenance vs. Construction**

- In most cases, a little maintenance will return the trail to a well functioning trail. In some cases, an existing structure may need to be replaced or a new structure may be needed. When new structures are needed, the Section Leader or Trails Co-Chair must be notified to get their input. A form has been designed to collect the necessary information for submission to Department of Conservation and Recreation (DCR) to get approval before a new or replacement structure can be constructed.

❖ **Brushing/Pruning Tips**

- The goal of brushing and pruning is to remove any branches that are overhanging the trail. Trail width varies from trail to trail. Primitive trails may only be three to four feet wide while fire roads may be ten or twelve feet wide. The height to brush the trail also varies depending on the trail users. For hikers, a clearance of eight feet high is appropriate while equestrian trails may require clearing branches up to a height of ten feet.
- A common way to think of brushing is to take a door four feet wide by eight feet high and walk down the trail. Every branch that hits the door should be trimmed back. Keep in mind that snow on the branch will push it lower.
- Another question that comes up is whether to trim a branch or to remove the whole tree. If a single branch can be removed from the tree, that is preferred. If you must remove many branches on one side of the tree, it may be better to remove the whole tree. White pine trees tend to have many branches and removing the trailside branches leaves an ugly tree remaining with all the branches chopped off one side. Small trees should probably be removed as they will only present problems later as they grow and spread out.
- When removing a tree, make the cut as close to the ground as possible. When removing a branch, cut the branch close to the trunk of the tree. If you look closely to where a branch connects to the tree, you will see some wrinkles around the branch called the branch collar. The cut should be made just outside the branch collar leaving almost no stub. This will allow the tree to heal properly. Leaving a stub on the branch looks unsightly and invites insect infestation.

- When removing larger branches, the first cut on the branch should be an undercut. If the undercut is not made, the bark may be damaged if the falling branch tears the bark. The undercut should be about half way through the branch and then the overcut can be made to remove the branch. Very large branches may require several cuts to remove most of the branch and then to make the final cut near the branch collar.
- Once the branch or tree has been cut, the branch should be dragged off the trail and into the woods, out of sight with the cut side facing into the woods. Multiple branches should be dispersed to avoid piles of brush just off the trail. Branches should be placed in contact with the ground to promote decomposition.
- Large, leaning trees represent a serious danger for hikers and maintainers. Only trained professionals should attempt to remove leaning trees. Please notify the Section Leader to discuss removal of trees leaning over the trail.

❖ Other Issues

➤ First Aid and Accidents on the Trail

- A first aid kit should be carried by the trail event leader to provide basic first aid for cuts and other trail injuries. All injuries received on the trail should be reported immediately to the leader to assess the degree of injury and to decide if medical attention should be sought.
- A cell phone should also be carried so that emergency medical care may be summoned, if necessary. Contact 911 if emergency care is needed and be prepared to provide complete information about the injured individual and their location.
- Leaders are encouraged to query volunteers before heading out on the trail, about any medical issues or allergies (like bee stings) so the leader is fully informed about potential issues volunteers may develop on the trail.

➤ Trail Hazards

- Leaders should be prepared to point out poison ivy to their volunteers (leaves of three, let it be) so they can avoid contact.
- Ticks are another danger that should be discussed with volunteers. They are often found in tall grass and bushes during all seasons except winter. Long pants and shirts are most helpful to avoid exposing your body to ticks. A complete inspection of the body should be conducted to look for evidence of the ticks. Medical care should be sought if the tick cannot be removed safely.

Closing

This document is meant to provide the basic information for trail maintenance. It is not a substitute for hands-on experience with an experienced maintainer. Always seek additional information and training to increase your knowledge. When you feel comfortable with the methods described in this handout, please pass on your knowledge to others. A reference list is included at the end of this document to provide additional information in print and on the web.