



CONTINENTAL DIVIDE NATIONAL SCENIC TRAIL ADOPTER GUIDE

PRODUCED BY

Outdoor Stewardship Institute and the
Continental Divide Trail Coalition
Outdoor Stewardship Institute (OSI) is a program of
Volunteers for Outdoor Colorado.

Based on OSI Guide for Independent Stewardship for
Trails

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1: About Continental Divide National Scenic Trail Adopter Guide

1.1 Acknowledgements

OSI and the CDTC would like to acknowledge the people and organizations that volunteered their time and resources to authoring, editing, producing and piloting these training materials. The majority of this information is based on pre-existing sources, including the OSI Guide to Crew Leadership for Trails and other resources provided by Volunteers for Outdoor Colorado, Roaring Fork Outdoor Volunteers, USDA Forest Service, IMBA and CDTC

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Illustration and Photography Credits

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1.2 Purpose

This training was developed to teach the fundamentals of basic trail maintenance to volunteers adopting sections of the Continental Divide National Scenic Trail (CDT). The guide is based on the Outdoor Stewardship Institute (OSI) Independent Stewardship for Trails manual, which is intended to teach standard trail adoption and maintenance techniques to any interested volunteer group or land management agency.

When the course concludes, trainees will learn what it means to be CDT Adopter. Trainees will become familiar with CDT marking and signing standards and know how to identify and perform basic trail corridor, trail tread and drainage structure maintenance, as well as how to recognize and report on other more complex maintenance needs that are beyond the intended scope of this training. Trainees will also be taught basic safety and risk assessment and how to appropriately work with and represent partnering volunteer organizations and land management agencies. Individual land management agencies that manage the CDT may have their own established protocols. Ultimately, newly-trained Independent Stewards will need to check with these entities to get any additional training and information that is specific to that land management agency.

This is a basic course for independent trail maintenance. The limited scope of this course may not allow trainees sufficient time to practice all the skills covered. The Outdoor Stewardship Institute (OSI) recommends that trainees gain further confidence in their skills prior to working independently by mentoring under an experienced trail worker. We also recommend that a trainee's skills be evaluated by their sponsoring organization before being allowed to perform trail maintenance independently.

This basic course prepares CDT Adopters to engage in independent trail maintenance with a maximum of 2 un-trained volunteers.. Those wishing to learn more about crew leadership, trail maintenance and construction, or volunteer project management, should seek additional training opportunities with their sponsoring organization or the Outdoor Stewardship Institute.

1.3 About the CDT & CDTC

The Continental Divide Trail (CDT) is a congressionally designated trail spanning 3,100 miles along the spine of the Continental Divide across New Mexico, Colorado, Wyoming, Idaho and Montana. The trail traverses a variety of landscapes and settings that influence what trail maintenance is needed to support a long-lasting and sustainable trail through this scenic corridor.

The Continental Divide Trail Coalition (CDTC) is the primary 501(c)(3) non-profit coordinator, advocate, and lead private-sector partner for protecting, promoting, and completing the Trail. The CDTC works in partnership with the US Forest Service, National Park Service, and Bureau of Land Management to reach these goals.

The CDTC's Mission is to "complete, promote and protect the Continental Divide National Scenic Trail. The CDTC will do this by building a strong and diverse trail community, providing up-to-date information to the public, and encouraging conservation and stewardship of the Trail, its corridor, and surrounding landscapes."

The CDTC's Vision is to see that the 3,100-mile Continental Divide National Scenic Trail is renowned and revered natural resource for people to connect with friends and family, draw inspiration, and create outstanding personal experiences.

The CDT is a world-class national resource that inspires pride, passion, respect, creativity, community, and perseverance.

1.4 About CDT Adopters

The CDT Adopter program will be able to help establish long term stewardship of the CDT where committed, knowledgeable, and passionate individuals are able to perform routine trail maintenance on adopted sections and complete Adopter Report Forms multiple times a year, typically in Spring and Autumn. This program brings capacity to local land management agencies by engaging volunteers that require minimal supervision and coordination. CDT Adopters also increase the ability to inform the public on the uniqueness of their adopted section and its current condition. The CDT Adopter Program and CDT Adopters help fulfill the mission of the Continental Divide Trail Coalition with their commitment and dedication.

2: Agency Protocols, Safety & Risk Management

2.1 Know Agency and Organization Protocols

2.1.1 Working and Communicating With Land Managers and Volunteer Organizations



This unit reviews what information needs to be gathered by CDT Adopters before beginning trail maintenance efforts.

CDT Adopters may work with many different agencies and organizations. "Land management agency" refers to local, state, and federal government land management agencies.

"Organization" typically refers to non-governmental or non-profit groups that act as the sponsoring volunteer organization for trained CDT Adopters.

Undertaking CDT Adopter responsibilities requires gaining a high level of trust from the land management agency. Feel free to go in and meet your land managers to establish a positive relationship and become familiar with their needs and expectations. Every agency and organization has its own "**protocols**," or ways of doing business. These protocols typically include, among other things, requirements for volunteer safety and effective communication. Communication in this context can include:

- Understanding and establishing the agency or organization's maintenance needs and priorities;
- Protocols regarding contact with other trail users while undertaking trail work;
- Clear understanding of volunteer accomplishment reporting expectations; and
- How to report back on further needs observed while in the field.

Often, volunteers will be working for an agency through an organization and will need to know similarities and differences between protocols and requirements for each.

Finally, the CDT Adopter Training is meant to teach the base level skills, and in no way certifies an individual as qualified to work on his or her own without prior approval. Each agency will have standards on when and if an individual has demonstrated proficient skills, allowing them to work independently on public lands basic trail maintenance needs.

2.1.2 Getting Ready for Independent Trail Maintenance

, You will need to contact the land management agency directly to secure information and pre-approval. Some land management agencies may be familiar with your CDT Trail Adopter training and volunteer trail experience, but others may not. Remember that land managers need to understand the benefits of using CDT Adopters and you will need their strong support to gain approval for any volunteer trail maintenance activities you want to provide on their property. This may take some time and may not always result in success.

Before beginning trail maintenance work on your adopted section of the CDT, be sure that you understand the maintenance goals and trail standards set by the agency specific to the CDT. This should include knowing any specific, prioritized maintenance needs such as removing trees across the trail or other, woody vegetation overgrowth within the trail corridor. Be sure to also plan in advance where you will get the tools you need for the planned trail maintenance.

It is also critical to know any relevant land management agency or organizational safety protocols while undertaking trail maintenance. For more information about this important topic, please refer to the Basic Safety & Risk Assessment section.

2.1.3 Importance of On-the-Trail Demeanor

CDT Adopters volunteer their time and effort to the benefit of all trail users. In this role, they represent the interests of their sponsoring volunteer organization, the land management partner, and their own perspective as a trail user who wants to see the CDT maintained in great condition.

In order to continue the growth and effectiveness of the CDT Trail Adopter program, a friendly and professional demeanor is required for the times that you encounter trail users while you are undertaking or hiking to/from trail maintenance efforts on public lands. Remember that safety is always a primary concern in such encounters. Most often, you'll have time to step out of the way with your trail tools in hand, allowing the trail users to pass by with ease. Often, trail users may thank you for your volunteer effort, or ask about your work. When responding in such situations, here are a few important tips to keep in mind:

1. Be courteous;
2. Explain your work as simply maintaining the existing trail; and
3. Assure them that your volunteer work has been pre-authorized by the land manager.

Spreading the word about your training could very well inspire trail users to volunteer for future trail projects!

Before undertaking trail maintenance as a CDT Adopter, it is also important to understand other needs and expectations the agency or organization may have in your role as a trail “ambassador.” For example, you may be required to:

- Understand exactly how you will be expected to engage and interact with the public while performing trail work;
- Ask volunteers you are leading to get additional training;
- Invite other volunteers to become an organizational member or leader; and
- Ensure crew members evaluate their experience.

2.1.4 Agency and Organization Protocol Checklist

Before performing independent trail maintenance work, it is ESSENTIAL that you understand land management agency protocols and priorities and do everything you can to collect details.

Before you undertake independent trail maintenance:

1. Contact the sponsoring agency or organization.
 - a. Find out the appropriate liaison’s name, title, and other information.
 - b. Give the liaison YOUR contact information.
 - c. Ensure that you have approval to volunteer independently
 - d. If applicable, sign appropriate volunteer agreement or waiver
2. Contact the agency and/or organization liaison to make sure you have all the necessary information:
 - a. What does the stewardship area include? What trails are a high priority?

-
- b. What, if any, known maintenance needs are there?
 - c. What are the goals of the work? How much does the agency expect you to accomplish?
 - d. What is the background or context for the work? Why are you doing it?
 - e. Where do you get the tools for the work?
 - f. What are the specifications you need to follow (for example, desired trail clearances)?
 - g. Are there any special regulations for the area?
 - h. How are you expected to engage with trail users and other volunteers (i.e. is there any specific information you need to impart?)
 - i. Is there an existing, specific safety or emergency plan that you need to follow?
-

2.2 Basic Safety & Risk Assessment

	<p>The most important part of trail maintenance is your personal well-being and safety. Safety must be part of each workday; no stewardship work is so urgent or important that it cannot be done safely.</p> <p>Do you know your limitations? Do you have the skills you need? Every CDT Adopter is responsible for working in a safe manner and should point out unsafe practices and hazards to others.</p>
2.2.1 Important Terms Used in this Section	<p>A Hazard is defined as the “potential for harm.” In practical terms, a hazard is an unsafe act or unsafe condition that, if left uncontrolled, can result in an injury or illness.</p> <p>Risk Assessment is the qualitative and quantitative estimate of risk associated with various aspects of a trail maintenance project and should be completed and reviewed before performing trail maintenance. The risk assessment process should also be internalized and practiced continuously by CDT Adopters while working on the trail. Most agencies and organizations will have a formal Risk Assessment form that volunteers must complete prior to performing trail maintenance. In addition to the information presented in this section, a common risk assessment form, called a Job Hazard Analysis (JHA), can be found in Appendix B of this manual.</p> <p>An Emergency Plan should be in place for each day you are on the trail. The object of this plan is to provide volunteers with the information to adequately respond in the event of an accident or emergency. The plan may consist of the following elements: communication, medical response, evacuation, and follow-up. The sponsoring agency or volunteer organization may already have a plan in place. If available, obtain a copy and carry it with you. An example of an emergency plan can be found in Appendix C of this manual.</p> <p>Personal Protective Equipment (PPE), such as gloves, boots, hardhats, safety glasses, hearing protection, long sleeves and pants, must be used as appropriate for the task or if required by the sponsoring agency or organization.</p>

2.2.2 Safety at the Start of the Day: The Morning Safety Review

Whether working independently or with a small group, start the day with a safety review. Issues to address should include potential or known hazards that could affect the wellbeing of the CDT Adopter and any other volunteers or trail users. Examples of topics to review include:

- Environmental hazards
- Avoiding slips and falls
- Proper use of tools
- Dehydration
- Hypothermia
- Hazard trees
- Strenuous hiking/altitude sickness.
- Any existing required safety/risk assessment document (i.e. a Job Hazard Analysis)
- Review the emergency plan for the work day and the proper response in case of emergency

When working in a small group, also cover the following:

- Make sure all volunteers have appropriate footwear, clothing and other required personal protective equipment (PPE).
- Do they have their lunch, water, gloves, hat, sunglasses, and sunscreen as needed?
- Have they completed a waiver? (Or Volunteer organization/Agency agreement if required).
- Ask that volunteers notify you about any specific health concerns.
- Ask if anyone is certified in First Aid/CPR and, if so, what level of certification.
- Discuss the need to stay hydrated and consume fluids at least every half hour.

2.2.3 If An Accident Occurs...

- If accident warrants help, and cellular or satellite service exists, call or text for emergency assistance. Activate a Personal Locator Beacon if available.
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- If at all possible, one person should stay with the accident victim. The person with the highest level of medical training (i.e. primary medical provider) should stay with the accident victim.
 - Make sure you can give clear directions about the accident victim's location. Be prepared to send others (trail stewards, bystanders, etc.) to strategic locations as a flag, or to notify medical personnel.
 - Do not attempt anything medically that you or someone in your small group have not been trained to do.
 - When the accident victim has stabilized, contact your sponsoring volunteer organization to relay details of the accident.
 - Do not talk to the media. Refer them to sponsoring volunteer organization or agency personnel.
-

2.3 Tool Safety

Tools can make a trail stewardship experience either enjoyable or miserable, depending on whether the right tool is available at the right time and whether you know how to use tools safely. The information provided in this course gives the basics for hand tools in an independent trail stewardship setting. Only basic hand tools used for trail maintenance will be covered in this training.

There are many specialized tools available for trail work projects including rockwork tools, power tools, and motorized equipment. All of these specialized tools require training before using in the field and will not be covered in this component. It is essential to know what tools your agency or organization will allow on a trail maintenance effort.

2.3.1 Tool Talk



Prior to heading out on the trail as a CDT Adopter, it's always best practice to remind yourself to "CUSS" your tools. In the event that you are bringing along an additional volunteer or two on your day's trail maintenance effort, this acronym becomes a very important teaching strategy.

When working in a small group, the tools to be used during the day should be introduced in a logical order to allow an effective discussion of their use and safety. The order of tool presentation is up to the individual. However, certain subjects regarding tools must be covered. These subjects are referred to as "CUSS":

- Carrying tools
- Using tools
- Storing tools
- Safety with tools

"C" – Carrying Tools

There are basic safety requirements for carrying tools to and from the work site. Be alert and make sure the safety guidelines are enforced throughout the day:

- Always wear gloves while carrying tools.
- Safety sheaths should be properly in place on the tool.

-
- Pick up a tool and feel for the balance point. The balance point is the place where there is equal weight in front of and behind your hand. Carrying a tool at the balance point results in less strain on wrist and arms. Carrying a tool vertically requires tensing the wrist and provides minimal control over movement of the tool. The best possible control over motion of the tool is obtained when it is gripped at the balance point.
 - Always carry tools in hands with arms at sides. The blade or most dangerous part of the tool should point downward.
 - Never carry tools propped on your shoulder.
 - Tools should be carried on the downhill side of the trail. This is so that the tool can be thrown clear in case of a stumble or fall.
 - When it is necessary to carry tools in both hands, carry the heaviest or most dangerous tool on the downhill side.
 - Maintain a safe distance between people when walking to the work site. Everyone should be an arm and a tool-length from the next person on the trail while walking. Each individual in a group needs to be responsible for maintaining the correct distance from the person immediately preceding them on the trail.
 - If appropriate, and you are using a mountain bike or horse to access a remote trail maintenance location, be sure that your tools are safely stowed and secured in a manner that ensures that all sharp parts of the tool will not cause a hazard in the event of a fall. When biking, use portable tools designed for a special use case whenever possible, and use a tool trailer if one is available.
 - Watch where tools are pointed at all times.
 - Let the slowest hiker set the pace for the group.

“U” – Using Tools

Each tool has its proper and improper methods for use. Here are some of the general considerations when using tools:

Before using any tool, make sure you know what it is used for and how to use it safely

-
- Adopt the proper stance for using the tool. This will save strain on your back and make the tool more effective to use.
 - Establish secure footing before using tools. Be especially careful when working in wet, slippery conditions.
 - Maintain a safe working distance from others at all times.
 - Full “roundhouse” swings with tools are not acceptable.
 - Use all tools in a motion parallel to the body rather than towards the body.

“S” – Storing Tools at the Worksite

Tools are dangerous when not stored properly at the worksite; any tool is a potential risk. Here are some things to remember about tool storage:

- Concentrate all tools not currently in use in one area if possible.
- If accessing the trail to be maintained by mountain bike, be sure that your bike is placed completely off of the trail during your maintenance work.
- Store all tools off the trail on the uphill side of the work section so they are not a hazard, but can be reached easily. Store them with the handles pointed down towards the trail or work section, and the sharp or business end furthest uphill.
- Store shovels with the sharp edge towards the ground.
- Never sink axes, Pulaskis, picks, or similar edged tools into the ground or in stumps where they become dangerous obstacles, i.e., impalement and tripping hazards.

“S” – Safety with Tools

- Carrying, using, and storing tools present different safety issues. It is important to emphasize tool safety at all times. Remember these tool safety tips:
- Dis-CUSS tools in the morning and re-emphasize “CUSS” all day long.

- Be careful how you carry, use, and store tools at all times. Set a good example for your crew by always being “tool safe”.
- Always use proper personal protective equipment like hardhats, gloves, and safety glasses when using tools.
- Use the right tool, the right way, for the job at hand.
- Tools come in a variety of sizes, shapes, and intended uses. They are all dangerous if not treated with respect.
- Do not set a tool down “just for a minute” in the wrong place. It will become a hazard.
- Misused tools can break and are a danger to future users. They also cost time and money to repair.

2.3.2 Basic Risk Assessment



CDT Adopters are responsible for the safety of themselves and others, and therefore need to understand the basics of risk assessment. CDT Adopters should perform risk assessments before undertaking trail maintenance and constantly throughout their workday. They need to assess potential hazards while travelling to and from the maintenance sites, while performing maintenance at the sites, and even during rest breaks.

Risk management is a cognitive process of identifying, assessing, and mitigating risks or hazards. A risk assessment can provide a systematic approach that allows the ranking of risks. The level of risk is determined by three factors:

1. What is the Hazard?
2. What is the likelihood that the Hazard will occur?
3. What is the severity of the potential outcome of the Hazard?

Once you have identified and assessed the hazards of an activity, you can think about how to mitigate or lessen the likelihood or probability of severe consequences by developing abatement actions or controls, and making decisions about how to implement them. The decisions should be reevaluated and revised as needed if the situation or conditions change.

2.3.3 Risk Assessment Matrix

To help you identify and assess the potential risk of a hazard or activity, we have provided the following Risk Assessment Matrix.

In this suggested tool, there are four risk levels:

Low—First aid or minor medical treatment, minor system damage.

Moderate—Minor injury, lost workday accident, compensable injury or illness, minor system damage, minor property damage.

High—Permanent partial disability, temporary total disability in excess of 3 months, and major system damage, significant property damage.

Extreme—Death or permanent disability, system loss, major property damage.

Relative Risk Matrix	Severity			
	Negligible	Marginal	Critical	Catastrophic
Likelihood	Negligible	Marginal	Critical	Catastrophic
Frequent	Moderate	High	Extreme	Extreme
Probable	Moderate	High	Extreme	Extreme
Occasional	Low	Moderate	High	Extreme
Remote	Low	Moderate	Moderate	High
Improbable	Low	Moderate	Moderate	Moderate

The matrix also includes a Severity Scale that includes four levels from which to rate potential hazards or activities:

Severity Scale Definitions	
Negligible	Less than minor injury and/or less than minor system damage

Marginal	Minor injury and/or minor system damage
Critical	Severe injury and/or major system damage
Catastrophic	Results in fatalities and/or loss of the system

Finally, the matrix includes five options to rank how often a potential hazard or activity is likely to occur:

Likelihood Scale Definitions	
Frequent	Likely to occur often, continuously experienced
Probable	Likely to occur several times
Occasional	Likely to occur sometime
Remote	Unlikely to occur, but possible
Improbable	So unlikely, it can be assumed it will not occur

To understand how to use this matrix as a risk assessment tool, here are two examples:

1- The CDT Adopter has determined that there are small, loose rocks present along the trail. It is possible that the small, loose rocks could cause a volunteer to slip and fall to the ground. Using best judgement, the CDT Adopter assesses this risk as follows:

Likelihood: A CDT Adopter may slip and fall occasionally.

Severity: The steward may receive scrapes or bruises, but there is only a marginal risk that the steward would be more severely injured.

Relative Risk Level : moderate

2- The walk to the work site is located in an area that has a considerable number of dead trees that have been killed by insects. It is possible that a tree(s) could fall and hit a CDT Adopter. Using the matrix, the individual assesses this risk as follows:

Likelihood: There is a remote probability that a tree(s) may fall and hit an Adopter.

Severity: A falling tree hitting an Adopter could be critical to catastrophic.

Relative Risk Level: moderate to high

If the probability of risk and severity of consequences are both low for a given situation, a CDT Adopter may choose to do nothing to mitigate the risk other than following normal safety standards. If the severity could be high (even if the likelihood is low), we will probably choose to take some mitigating action.

When working independently and confronted with a high risk situation, it is important to err on the side of caution. In a situation as described above, when the likelihood of risk is relatively low, but the severity of the potential outcome could be high, CDT Adopters should adhere to safety standards already in place by following applicable agency protocols, work within their knowledge, abilities, and certifications, and should choose to leave the situation and report it later if the hazard has a significant probability of undesirable consequences.

2.3.4 Risk Assessment Exercise

Using the chart below and the following pictures complete your own risk assessment and follow up plan:

Risk or Hazard	Likelihood	Severity	Need to mitigate? Y / N	What measures are already in place?	What should be done?
1-Traveling along rocky trail – potential to slip and fall					
2-Hazard tree(s) along trail – potential to fall on volunteer					



2.3.5 CDT Adopter Safety Talk Checklist

When leading a small group of volunteers, there are many points CDT Adopters must cover to ensure the group is prepared to work safely throughout the day. Use this checklist to help ensure all relevant points are covered.

- Has everyone reviewed an up-to-date Risk Assessment?
- Have all individuals completed a liability waiver or volunteer agreement as required?
- Make sure all volunteers have appropriate Personal Protective Equipment such as boots, clothing, eye and ear protection, helmet and gloves.
- Does everyone have lunch and enough water?
- Does everyone have sun protection (hat, sunscreen, sunglasses, and lip balm?)
- Discuss the project goals, specifications, and context (refer to Know Your Agency and Organization Protocols).
- Specify the length of hike and type of maintenance.
- Explain any site- or project-specific hazards.
- Ask that persons with specific health concerns notify you about them in advance. Some items you should know about include: back problems, allergies (insect, plant, and medication), diabetes, heart and lung problems, epilepsy, and other serious physical conditions.
- Ask if anyone has emergency medical training. Ask if anyone is certified in CPR or Wilderness First Aid. Establish primary and secondary medical chain of command within the stewards.
- Explain to all volunteers the daily safety plan and the chain of communication for the project. (Refer to Know Your Agency and Organization Protocols). If available, select someone to act as an alternate leader to start the safety plan process should you become incapacitated.
- Explain “Coming Through!” or “Bumping By” and practice it at all times.

-
- Demonstrate why safe working distances are important. Be sure that people working near a hazard (chipping stone, lumber cutting, etc.) stay at a safe distance and are wearing eye and/or ear protection.
 - Hardhats should always be worn if there is any risk of head injury or if required by the agency.
 - Demonstrate how to lift with the legs and not with the back. Get help and/or tools to move heavy objects or leave the situation and report it later.
 - Reiterate through the day that volunteers need to drink water, even when they may not be thirsty (try to drink water every 15-30 minutes). By the time you feel thirsty, you may already be dehydrated. Enforce water breaks by taking them throughout the day.
 - Stress the need to wear sunscreen. Watch for sunburn throughout the day.
 - In areas where disease from insects may be a concern, stress the need to wear repellent and protective clothing.
 - Consider warm up and stretching exercises at some point before beginning maintenance activities. Use the opportunity to provide further information on additional safety issues.
-

2.4 CDT Adopter Reporting

Reporting volunteer work accomplished is an important part of CDT Adoption. Metrics gathered and successfully reported allow sponsoring volunteer organizations and land managers to readily:

- Calculate total volunteer days and hours for an individual, a trail system, or the program;
- Understand type and quantity of volunteer work accomplished
- Understand trail maintenance needs that should be scheduled for future group work sessions or additional independent trail stewardship.

When you become an official Adopter you are required to visit your adopted section *twice* a year (Spring & Autumn) to complete scouting, inventory, or maintenance in accordance with the Adopter Guide Trail Objectives and Specifications.

Each time you scout, inventory, or maintain your adopted section of the CDT, the CDTC requires you to submit a *Trail Adopter Report* which can be filled out online at: continentaldividetrail.org/trail-adopters/.

The *Trail Adopter Report* can also be mailed into the CDTC's office: 710 E 10th St Suite 200 Golden, CO 80401

The *Trail Adopter Report* was created for Adopters to easily record their accomplishments in an accessible and uniform manner. The CDTC uses adopter reports to inform land agencies of maintenance



The image shows a screenshot of a web form titled "Trail Adopter Reporting". The form has a purple header bar. Below the header, the title "CDTC Adopter Report" is displayed. A red asterisk indicates a required field. The form contains a label "Adopter Name *" and a text input field with the placeholder text "Your answer".

issues and also what basic trail maintenance is being completed in the field by CDT Adopters.

An example of an accomplishment reporting form with the type of information you may be required to collect and report, can be found in Appendix E.

When going to scout, inventory, or maintain your section of adopted trail keep track of these reporting items with notebook and pencil:

- Starting and ending points of scouted, inventoried, or maintained section.
- Hours of travel to the trailhead or access point.
- Hours spent hiking or maintaining (in the field) your adopted section
- The estimated feet (or miles) of scouted, inventoried, or maintained trail
- Work completed including number of drains maintained, signs installed, cairns built, trees cleared, corridor cleared (in feet), etc.
- Note any major maintenance issues not suitable for Adopters and inform the CDTC so they can develop a plan with the agency on how to best remedy the situation (this may vary depending on land agency partner).

2.5 CDT Adopters Daily Reminder

2.5.1 Prior to Trail Maintenance Efforts

CONFIRM that you have approval to work on your Adopted section of the CDT...

- Check with your sponsoring volunteer organization and/or land manager.
- Ensure you have signed all required liability waivers and agreements.

NOTIFY a friend or loved one of where you are going and when you will be back.

- Your sponsoring volunteer organization and/or land manager may also want this information.

CHECK condition of tools to **be sure that they are in working order.**

ENSURE you have a fully charged emergency communication device.

- This can be a cell phone, 2-way radio, satellite communication device, etc. Consider bringing a backup power supply or extra batteries.

When working solo, REMIND yourself of the heightened awareness required to reduce risk and maintain a safe experience when working alone. CUSSing (Carrying, Using, Storing, and Safety) your tools, and performing an independent safety review and risk assessment are of paramount concern in this situation.

When working with a small group, DISCUSS trail maintenance expectations, objectives and specifics of the selected trail, including how far/difficult the hike/ride is to the site of trail maintenance, and what type of work will be done.

When working with a small group, PROVIDE Safety / Tool Talk.

- Discuss safety and first aid.
 - Find out any special health needs within the group.
 - Make sure everyone has water, food, clothing, boots, and gloves for the day.
-

	<ul style="list-style-type: none"> • Determine if anyone has medical/first aid training, and explain your level of first aid training and where a first aid kit is located. • Explain the Safety Plan. • (CUSS) Carry, Use, Storage and Safety of tools being used that day. <p>LEAD Safety Stretch Exercises (may be done upon arrival at the worksite).</p> <p>HIKE/RIDE to the work site at a pace everyone can handle, with slowest up front. Check for proper tool Carry and Safety on the way to the site.</p>
<p>2.5.2 Ongoing throughout Trail Maintenance Effort</p>	<p>EXPLORE the maintenance site and discuss findings.</p> <ul style="list-style-type: none"> • Find out what talents, experience or expertise everyone may have. • Explain tasks and trail maintenance standards. Utilize project notes, if provided. <p>DEMONSTRATE trail maintenance techniques and tool use. Provide a short talk on trail terminology.</p> <p>DECIDE as a group which tasks each person would prefer to work on.</p> <p>PROMOTE a safe work environment.</p> <p>CUSS tools.</p> <ul style="list-style-type: none"> • Take breaks as needed. • Continually assess for risks. • Encourage everyone to work at a comfortable pace. <p>PROVIDE a positive work environment. Praise and recognize everyone's efforts. Utilize active listening techniques; give appropriate feedback.</p> <p>Keep in mind what work is NOT pre-approved for CDT Adopters: rock based water bars, trail re-routes (minor or otherwise), new trail construction, bridge / boardwalk / structure repair.</p>

TAKE NOTES (and photos - on your smart phone or other device) regarding trail maintenance accomplished and trail issues identified that require future efforts by a larger group's efforts (potential re-routes, huge trees across trail, bridge needs repair, etc.)

HAVE FUN!

2.5.3 End of Trail Maintenance Effort

WALK the trail maintenance site at end of effort to assess work accomplished.

- Gather tools, packs, clothing, trash, etc. so that nothing is left behind.
- Give thanks to everyone for a job well done and encourage them to volunteer again.
- Check tool Carry and Safety on the way back to the trailhead.

ENCOURAGE everyone to provide feedback on his or her experience. Have them fill out an evaluation form if one is available from your sponsoring volunteer organization. Share information with everyone on how they can become a trained Independent Steward!

SUBMIT your *CDT Adopter Report to the Continental Divide Trail Coalition*.

Whenever possible, include before and after pictures of work accomplished, as this will document the work accomplished and quality of the work.

3: Trails Overview

3.1 Trail Planning, Objectives and Standards



Knowing how trails are planned for sustainability, and understanding how different impacts and objectives influence maintenance standards, will enhance your ability to perform effective trail maintenance.

During the planning process, agencies will consider various environmental factors as well as establish goals and objectives for trail development. Trails vary considerably by area management objectives, intended user groups, environmental conditions, location, and past use patterns.

Developing sustainable trails is a planning objective for most agencies. Characteristics of a sustainable trail include:

- Supports current and future intended use with minimal impact to the area's natural systems.
- Produces negligible soil loss or movement with minimal impact to vegetation and fauna that inhabit the area.
- Pruning or removal of certain plants may be necessary over time.
- Accommodates existing use while allowing only appropriate future use.
- Requires little rerouting and minimal long-term maintenance.

3.1.1 Continental Divide Trail Objectives



It is also important to understand the objectives and intended user groups for a trail before beginning any trail work. Knowing how the trail is intended to be used will inform best maintenance practices. Objectives can be compromised or changed unintentionally through new construction, reroutes, or maintenance activities. For example, if a trail is designed as a universally accessible trail to an overlook but, during maintenance work a step or drainage dip is installed, the trail objectives have been compromised. Similarly, if a trail is intended for mountain bike and equestrian use and steps are installed, trail objectives will be compromised.

Specific Examples of trail objectives for *the Continental Divide National Scenic Trail* include:

- Provide a primitive and challenging recreation experience for trail users on each segment of trail (may include hikers,



equestrians, and mountain bikes. Some sections of the CDT are open to mechanized and motorized use.

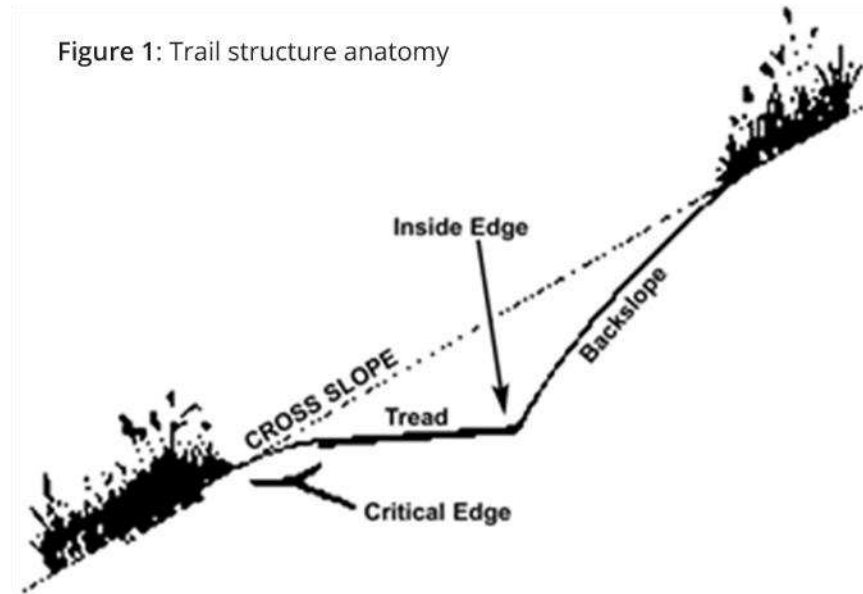
- A sense of remoteness and detachment from civilization.
- Opportunities to experience solitude, self-reliance, and community.
- Opportunities to experience the scenic, historical, natural, and cultural qualities of the CDT.



Trails can have impacts, both desirable and undesirable. Undesirable impacts can be environmental such as erosion, stream sedimentation and contamination, and habitat fragmentation or social such as conflict among trail users, attracting undesired users, etc. Desirable impacts include new and expanded recreation opportunities, increased understanding of conservation issues, and increased tourism revenues.

3.1.3 Trail Anatomy & Terminology

Understanding trail terminology will assist CDT Adopters in understanding trail issues while also increasing confidence in communicating trail concepts to others. Figure 1 represents the basic structural components of a trail, which are as follows:



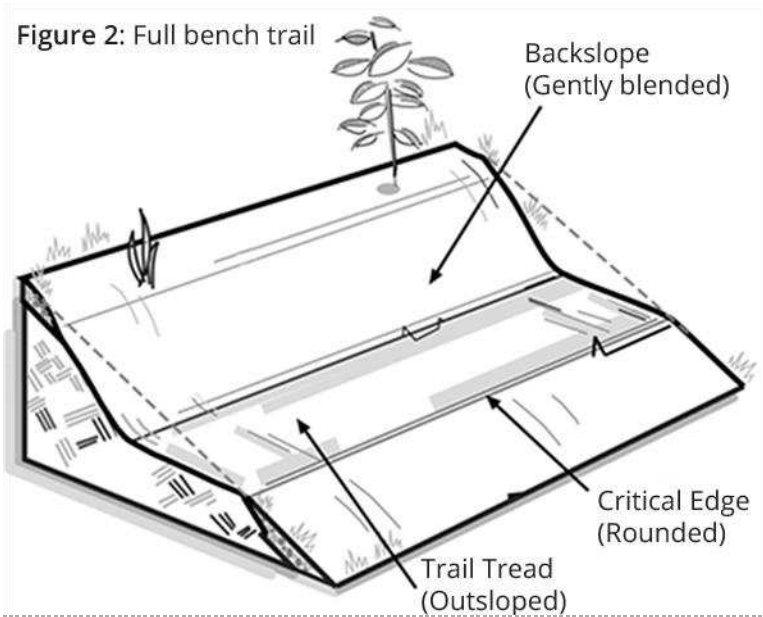
Cross Slope: The slope or gradient of the undisturbed hillside is called cross slope or sideslope. It is generally referred to in percent, not degrees. A good analogy is to alpine skiing terminology – fall line, or the line or path water follows downhill.

Backslope: The excavated slope rising above the inside edge of the tread is called the backslope. The slope is cut back to mimic the original hillside. The backslope is a merger or transition of the natural hillside cross slope with that of the tread. It is “laid back” or reclining into the native hillside. When vegetation returns, the backslope will blend into the hillside and the trail will seem like it has always been there.

Critical Edge: The rounded outside edge of the trail is called the “critical edge” because this is where critical trail maintenance problems usually begin. Rounding the outside edge helps water to flow off of the trail.

Tread: The tread is the surface of the trail on which users walk or ride. The tread may be either built as a “partial” or “full bench” trail. Partial bench trail is essentially cut-and-fill, where all or part of the trail is composed of excavated (loose) soil, which can be prone to erosion. Full bench construction (Figure 2) means the trail is built entirely on native mineral soil, and is less likely to erode.

The width of the CDT is 12”-24”. The land management agency will establish the width of the tread in their construction or maintenance standards for trails under their jurisdiction.

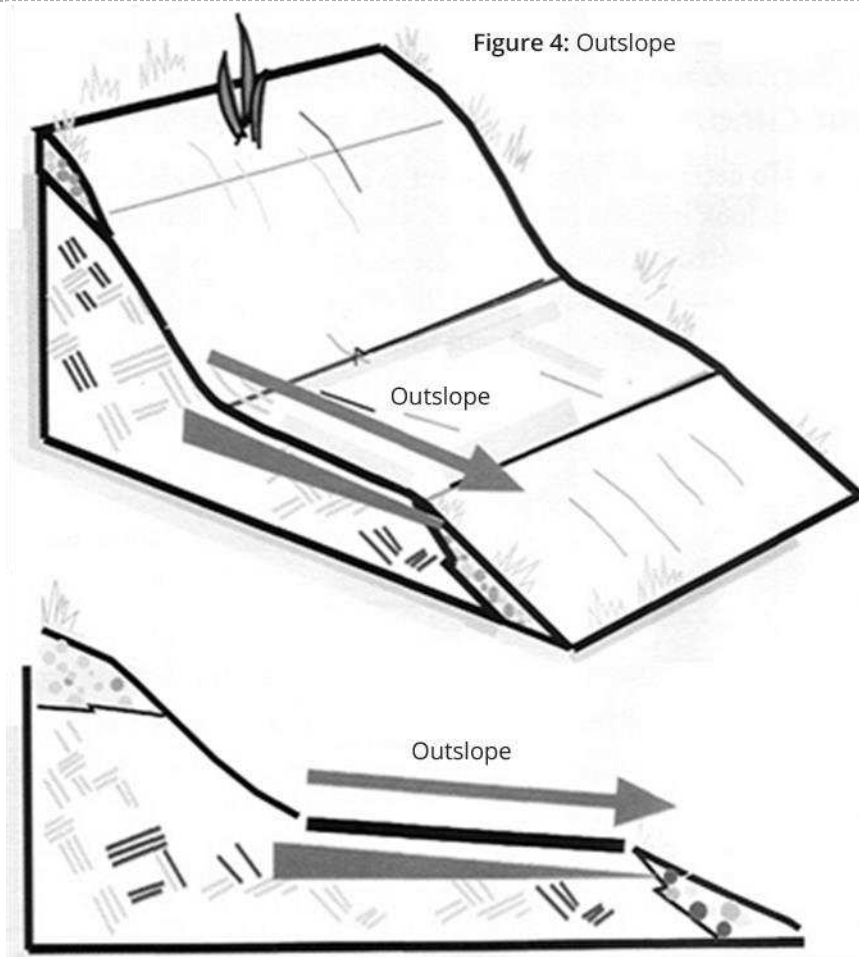


Sheet Flow (Figure 3): The ideal trail drainage pattern is called Sheet Drainage. Water flowing down the hillside simply crosses the trail and continues down the hill. If the slope of the trail tread is adequate, water will flow across the surface of the trail tread to the critical edge, moving away from the trail.

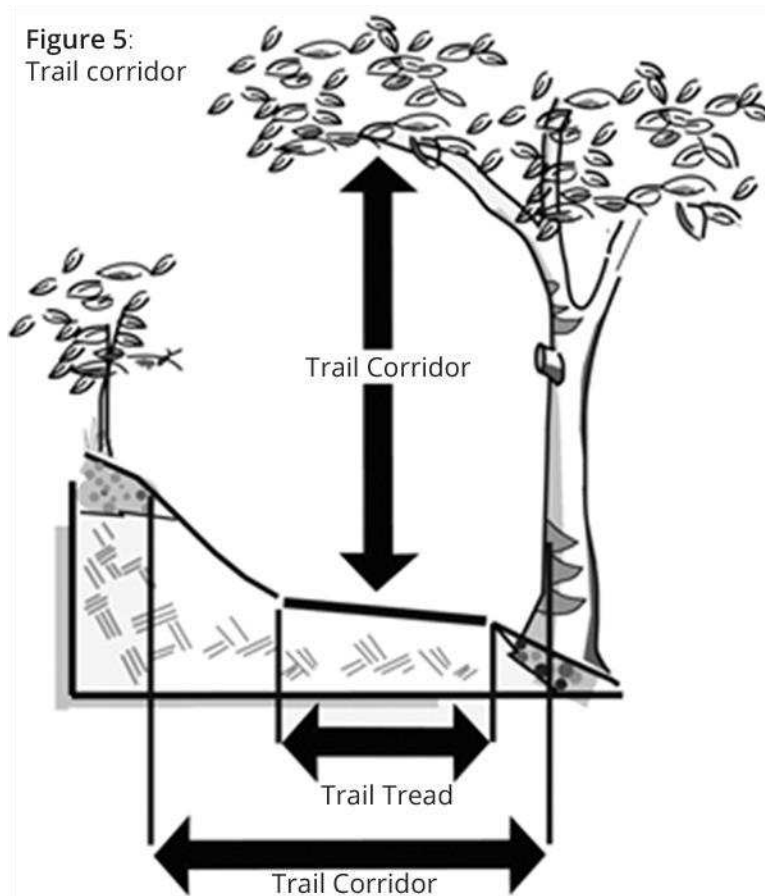
Outslope (Figure 4): Like the hillside, the tread slopes downward. Outsloping a trail is one technique to get water to flow across the tread rather than follow it or stay on the trail causing puddles. Trails that are insloped or have no outslope will tend to allow water to flow down the trail, causing erosion or a puddle on the trail which causes users to walk around the puddle, widening the trail. The trail tread is usually outsloped by 1" to 2" for every 12" in width of the trail tread. Hence, a 24" wide trail would have an outside edge 2" to 4" lower than the inside. Generally, outslope is good while insloped



tread is not desired with traditional trail construction. Note that insloped tread may be utilized for some modern trail types, but only in combination with aggressive outsloped drainage just a short distance down the trail. The CDT should have an outslope of 5%, with drainage features having an outslope of 15% where possible.



Trail Corridor (Figure 5): The area of passage of the trail, including all cleared and managed parts above, below and adjacent to the tread. This trail corridor is wider than the tread surface itself and is as high as necessary for the trail users. Trail corridors that blend in with the landscape and accommodate traffic will encourage appropriate trail use. When the trail corridor is not maintained, trail users will leave the trail tread and cause unnecessary trailside impact. The CDT has a trail corridor clearing of 6' wide by 10' high.

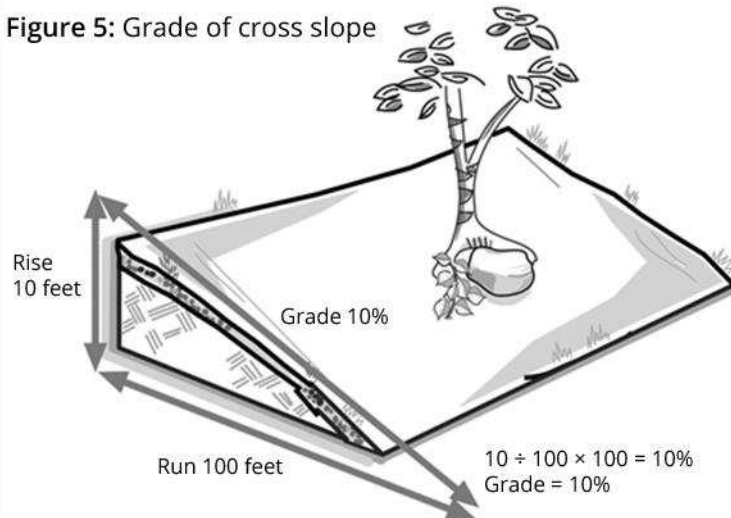


Grade:

The trail grade (Figure 6) is the amount of change in elevation of the trail from one point to another. The USFS defines grade as “the vertical distance of ascent or descent of the trail expressed as percentage of the horizontal distance, commonly measured as a ratio of rise to length or as a percent.” Grade may be measured for the entire trail but more commonly is measured by trail segment. In simplest terms, grade is the distance the trail rises (rise) over the

horizontal distance of the segment (run) and is usually expressed in percent. The target grade for the CDT is 5%-12% where possible.

Figure 5: Grade of cross slope



Design Surface: The design surface of the CDT describes what common obstacles are expected to uphold the remote, primitive identity of the trail. The CDT has a native design surface that may be continuously rough. Protrusions of 6" may be common and continuous. 12" obstacles may be common.

3.1.4 Continental Divide Trail Standards

Ultimately, the planning, objectives and impacts of a trail will influence the maintenance standards that are applied. Land management agencies have trail standards that relate to their physical characteristics, users, location, and environmental factors. The trail corridor height, tread width, grades, and surface will vary, depending upon the intended user groups, location, the projected usage level, and environmental factors such as soil type and drainage patterns. Agency standards promote trail objectives, sustainability, uniformity, minimal maintenance, and cost effective trails.

Environmental factors are also taken into consideration when establishing agency standards for trails. Topography, water features, drainage patterns, soils, wildlife, and vegetation can have an influence on land management agency standards.

The USFS has identified trail standards (Trail Class 3) specific to the CDT that relate to its physical characteristics, users, location, and environmental factors. Follow these trail specifications to ensure the

primitive nature of the trail while maintaining a level of sustainability and uniformity:

- *Tread width:* 12"-24"
- *Design surface:* Native; may be continuously rough. Protrusions 6" may be common and continuous. Obstacles 12" may be common.
- *Target grade:* 5%-12%.
- *Outslope:* 5%; Drainage feature 15% outslope where possible.
- *Backslope:* 1:1 target or < 45°
- *Trail corridor clearing:* 6' wide x 10' high.

3.2 Trail Maintenance

Land management agencies usually have maintenance plans with established maintenance standards and priorities for each trail. Agency personnel, volunteer organization staff and representatives, and/or trail adopters will regularly inspect trails to locate and identify problems such as safety concerns, areas of excessive erosion, vandalism, blowdowns and potential segments of trail for re-routing. The maintenance trail crew's task is to correct those problems according to the established maintenance standards and priorities.

KNOW THE AGENCY STANDARDS BEFORE BEGINNING MAINTENANCE WORK ON ANY TRAIL

3.2.1 Purpose of Trail Maintenance



- To restore tread and the trail corridor to a safe, usable condition.
- To repair trails damaged by flood, avalanche, fire, user abuse, or heavy use.
- It is cost effective to keep trails in good shape. Failing to care for trails can lead to extensive maintenance, closure, or complete loss of trails.
- To increase visitor safety and reduce liability risk.
- To protect the resource by reducing unwanted impacts.

Trail maintenance is a critical activity to ensure the success of a trail program. Trails built without conformance to sustainability concepts will require more maintenance and cause more resource damage. Finding solutions for erosion problems, boggy areas, loose soils, and widening or braiding of trails requires experience and skill. Serious problems need to be reported to the agency and CDTC so they can develop a plan on how best to remedy the situation

3.2.2 Priorities in Trail Maintenance

Lacking a specific land management agency maintenance plan, the following four priorities can be used to determine which tasks to complete and in which order:

1. Correct unsafe situations. This could mean repairing impassable washouts along a trail on a steep and exposed

hillside or removing blowdown from a steep section of an equestrian trail.

2. Correct natural resource damage – erosion, sedimentation and off-trail trampling, for instance.
3. Restore the trail to the planned design standard. This means that the ease of finding and traveling the trail matches the construction standard for the recreational setting and anticipated user group. Actions may range from simply cutting back the encroaching vegetation to repairing eroded tread or failed structures.
4. Be careful to not change the “character of a trail” when performing maintenance as this is part of the planned design standard. A good example is a more technical biking trail where having more rocks and obstacles is desirable.

At the work site, determine what projects can be accomplished as basic maintenance, what projects can be deferred, and what projects will need major work. Always inform the land management agency and CDTC of any work completed and tasks needing attention.

3.2.3 Basic Trail Maintenance

Only basic trail maintenance will be included in this training module. More advanced techniques such as construction of most drainage structures, turnpikes, and rock walls are outside the purview of CDT Adopters and are offered in advanced skills OSI training modules. Only hand tools will be used in performing basic maintenance techniques.

The topics covered in detail are:

Trail Corridor Maintenance

- Plant removal
- Pruning

Tread Maintenance

- Re-establish alignment
- Remove roots and stumps
- Remove rocks
- Remove slough and berm

- Improve backslope

Drainage Structure Maintenance

- Surface water control
- Types of drainage control structures
- Maintaining a swale, knick, dip or waterbar
- Installing a knick

3.2.4 Trail Corridor Maintenance

Plant removal

Plants growing into a trail corridor or trees falling across a tread surface are a threat to user safety and trail integrity.

Encroaching plants such as thistles or dense willows may make travel unpleasant or even completely hide the trail. If people have trouble traveling through the trail corridor, they will likely impact surrounding areas by traveling off of the established tread. It doesn't take a full obstruction of the tread to push users to one side or the other. Anything that impinges on the user's visual perception of how clear the trail is will push them to one side or the other. For example, a low branch that comes to within a foot of the tread, when it is about at eye level, will subconsciously push the user to the other side of the trail.



The CDT corridor must be 6' wide and 10' high from the centerline of the trail. A thoughtfully cleared corridor can benefit the user experience. Some plants aid in the visual appeal of a trail, while others cause users to widen the trail. Consider what should stay and go to maintain the natural ambiance of the trail. Try to avoid making a thoroughfare and keep in mind the CDT experience. Within the trail corridor, plant material and debris are cleared all the way to the ground. Large trees and boulders within this corridor are obvious exceptions and shall remain. The critical corridor dimension is the safe, unhindered passage of the user (hikers, stock, OHV, horses fully packed and with a rider, if applicable.)

Some trail corridors may need to be cleared several times a year while other trail corridors may only need corridor maintenance once every few years depending on the type of vegetation near the trail. For example, a trail in a scrub oak area requires more frequent corridor clearing than a trail in a lodgepole pine forest.

Trail corridor maintenance can also be accomplished at the same time a volunteer or staff person is performing a monitor and evaluation of trail conditions.

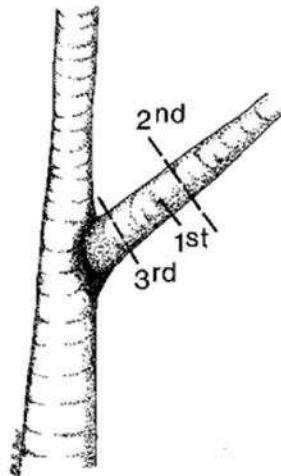
Only remove trees or shrubs that are 6-inches in diameter or less and can be cut with loppers or a hand saw.

- Walk away from trees that are larger than 6-inches in diameter. Felling standing trees (including snags) or large branches are statistically one of the most dangerous activities in which a trail worker can engage. Do not consider felling trees unless you have been trained and certified.
- Mark any hazardous trees that you are unable to safely remove and inform the land management agency representative and CDTC.
- If you find a fallen tree lying parallel with the trail and the trunk of the tree is not within the clearing limits, you can leave it in place and prune the limbs flush with the trunk.

Pruning of the trail corridor provides an unimpeded passage for trail users.

- For a clean pruning cut, use the three-cut method (Figure 6) that allows for a clean cut and prevents the limb from peeling bark off the tree as it falls. Use the three-cut method to remove large limbs (2 inches or more in diameter). Make the first cut about 8 to 12 inches up the branch from the collar on the underside of the branch. Make the second cut on the top side opposite the first cut, and the third cut to remove the stub flush with the limb collar. (Most trees have a pronounced collar where the branch meets the trunk. If the branch is cut just short of the collar, the bark will cover the cut as the tree grows.) Do not use an ax for pruning. Loppers and saws are best for pruning as using an ax above knee height can be very hazardous.

Figure 6: Three-cut method



- Trim back all limbs to the trunk and cut intruding brush back at the base of the plant rather than in midair at the clearing limit boundary. Cut small trees and brush flush with the ground leaving nothing that could impale or grab trail users, their stock or their equipment.
- Prune the entire circumference of the tree, not just the side facing the trail
- If over half of a tree or any other large plant needs pruning, it is usually better to cut it down instead (Figure 7).

Figure 7: These trees should have been removed rather than pruned.



- If a limb is too high or too large to cut at its base, try to cut it at a “fork” of the branch as close as possible to the trunk.
- Never rub dirt or duff into the cut on a live tree or shrub. Microorganisms (pathogens) in the soil can be introduced through the exposed cut.
- Dispose of cuttings and vegetation in an acceptable manner. Whenever possible, branches, limbs, and especially small trees should be moved out of sight of the hiker or rider on the trail. Often a small clearing behind a tree or shrub will suffice to deposit cut limbs. Take special care that the cut, butt-end of a tree is not visible from the trail.
- Some land management agencies may want cuttings piled up for wildlife habitat. In addition, some agencies may have concerns relating to wildfire that direct how the slash is to be disposed. Other agencies may require that vegetation be spread below the trail to impede runoff.

3.2.5 Tread Maintenance



Tread maintenance ensures a solid, outsloped tread is established and enough protection is provided to keep it in place. Remember that multiple use trails, primarily those that include bicycle traffic, will sometimes leave obstacles to provide additional challenge to bicycle riders or limit bicycle speeds, as long as these clearly do not present a hazard to foot traffic.

Tread work requires maintaining the CDT to its desired width of 12"-24". This means removing slough and berm and filling ruts, holes, and low spots. This may include removing obstacles such as protruding roots and rocks, however, take care not to change the CDT's natural and scenic character... Do not leave any exposed roots or root stubs, as exposed roots usually die. Cut these root stubs 3" to 5" below the tread surface. It also means repairing any sections that have been damaged by landslides, uprooted trees, or washouts.

Tread maintenance aims for a solid, outsloped surface. Remove all the debris that has fallen on the tread including the sticks, stones and candy wrappers. Remove and widely scatter organic debris well beyond the clearing limits, preferably out of sight.

Remove roots and stumps within the tread surface

- A sharpened pick mattock or Pulaski is most often used to chop out roots. Cut the root 3" to 5" below the tread.
- Not all roots and stumps outside of the tread are problems. A stump may have been left during trail construction to help keep the trail from creeping downhill. Roots and stumps outside the tread but inside the clearing limits should be cut as flush to the ground as possible to eliminate tripping or impaling hazards.
- Leave roots that are important to holding the tread or critical to the health of the tree and that are not a tripping hazard. Some large, exposed roots may require ramping the trail over them using rocks and fill dirt.

Remove rocks within the tread surface

- Rock removal ranges from shoveling loose cobble to moving large rock off the tread.
- When moving large rock, think first. Plan where the rock should go, and anticipate how it might roll. Communicate

with other workers about how the task is progressing and what move should occur next.

- The two most common injuries in rockwork are pinched (or smashed) fingers and tweaked (or blown out) backs. Work safely when removing large rock!
- Do not throw or kick rock off the trail. Always place or roll a rock to a safe location. An out-of-control rock might hit someone below.
- Always keep your back straight and lift rock with the strong muscles of your legs.
- Not all rock within a tread surface needs to be removed. If it is not a tripping hazard, you can leave them.

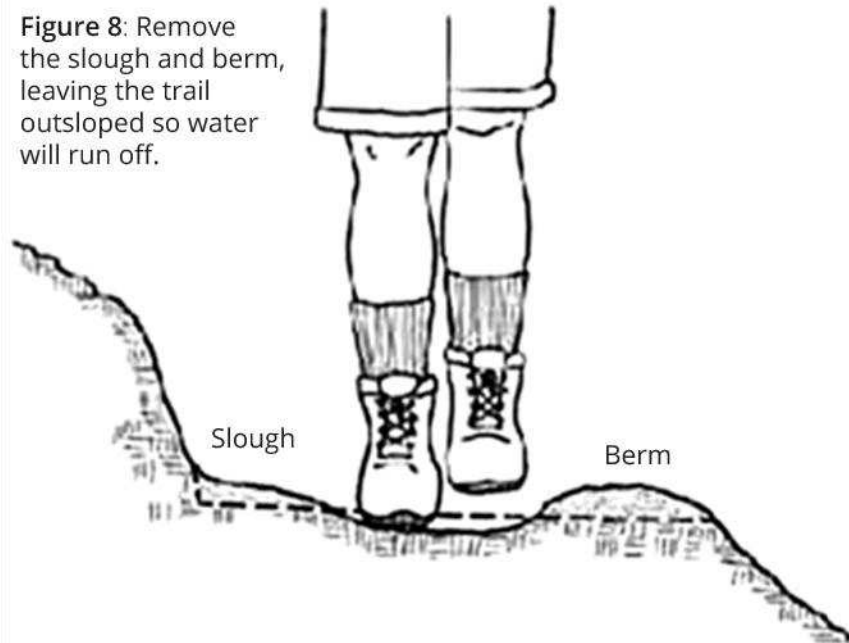
Remove slough and berm

Berm formation is the single largest contributor to erosion of the tread surface and its removal is the most important task for trail maintenance. Berm is soil that has built up on the critical edge of the tread, forming a barrier that prevents water from running off the trail. Berms are a natural consequence of tread surface erosion and re-deposition or inadequate compaction during construction.

Berms may form a false edge. A false edge is unconsolidated, unstable material, often including significant amounts of organic material that has almost no ability to bear weight. This is probably the least stable trail feature and a major contributor to accidents.

Remove slough and berm (Figure 8) that has formed on the tread or is blocking the critical edge. Slough is soil, rock, and debris that has moved downhill and built up on the tread, narrowing it. Slough needs to be removed. Leaving slough may cause the trail to “creep” downhill as users are forced off the tread.

Figure 8: Remove the slough and berm, leaving the trail outsloped so water will run off.



- Loosen compacted slough with a pick mattock or Pulaski, then remove the soil with a shovel or McLeod. Use excess soil to fill holes in the tread or on the downhill side of waterbars and drainage dips where it won't be washed away.
- Blend the slope of the tread into the backslope area.
- The outside berm along the trail tread must be periodically removed. Removing berms also promotes natural drainage and runoff patterns. Remove and disperse any organic material and extra soil.

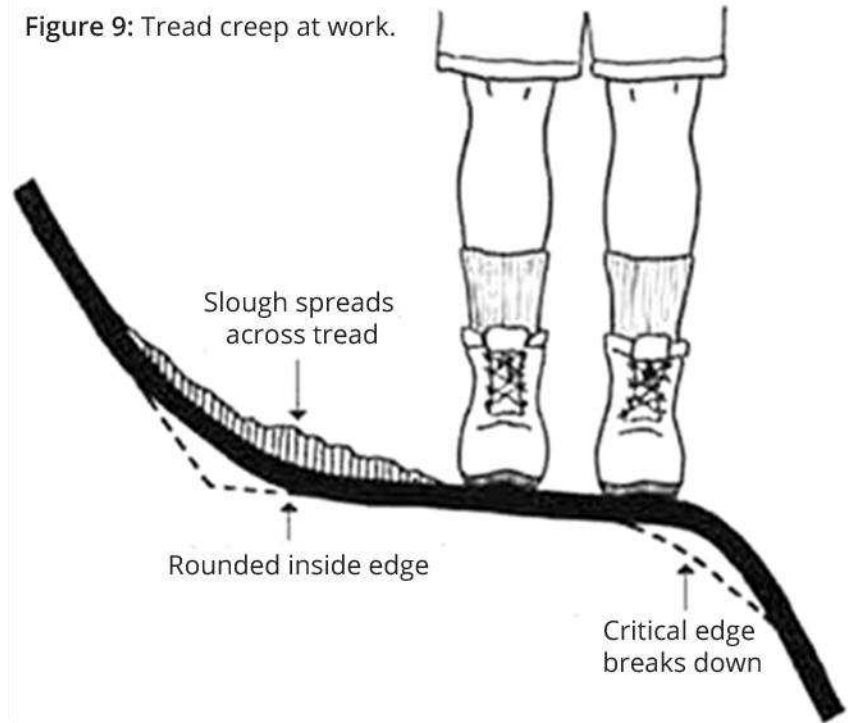


Reestablish the tread alignment

Most livestock, bicycle and ATV use, and some people have a natural tendency to follow the outside edges of trails. Additionally, any sloughing down from the backslope will make the trail edge the flattest place to walk. As the tread narrows, it causes trail users to travel closer to the outer edge. Another possible result is tread creep (Figure 9), in which the trail actually moves down the hill from its intended location within the established corridor. Other causes of tread narrowing and tread creep are constructing a trail that is too narrow or with backslopes that are too steep. The trail crew's job is to bring the trail back to its original location and width.

- Trees, log ends, rocks, and stumps left close to the downhill edge of the trail will keep animals and people to the middle of the tread. Good places for off-trail objects like this are at the crest of a hill, between the tread and a tree trunk, adjacent to a dip, steps or other structures, or along the inside edge of a turn in a trail. These “guide structures” should be outside the tread and not impede the natural drainage pattern across the tread surface.

Figure 9: Tread creep at work.



Improve the backslope of the trail

The backslope is an important interface or transition between the trail and the slope above the tread. The backslope controls how water enters the tread area and it is a distinct and recognizable boundary on the uphill side of the tread.

- The backslope, where at all possible, should not be too steep, but should be cut on an angle that allows for revegetation, blends into the slope of the hillside and prevents any free flowing water from leaving the ground and accelerating erosion. This may not be possible on a steep slope where a trail is cut into the hill. Do what you can to

avoid a vertical backslope. A vertical backslope can eventually cause sloughing of the soil onto the trail.

3.2.6 Drainage Structure Maintenance



The erosive force of water is usually the most destructive element acting upon a trail. A properly outsloped trail will allow water to flow across the tread rather than straight down the trail. However, a poorly laid out trail, maintenance problems, or local site conditions (such as steep trail profile grade) may allow water to be captured and the result will be water flowing down the tread. Proper maintenance of trails includes correcting drainage problems.

CDT Adopters must be able to analyze various trail drainage problems and develop appropriate solutions. The more fluent a CDT Adopter is in understanding the causes of a trail drainage problem, the better they can communicate the corrective work required for the situation. Always try to identify the source of the trail drainage problem. Often just looking uphill will help locate the source of a problem. Frequently, the solution to a drainage problem may be in a less obvious location away from where the problem is manifesting itself.

To effectively analyze a drainage problem, a CDT Adopter must understand the dynamics of water. Water erodes soil surfaces by picking up soil particles and carrying them. Water in the erosion mode will strip tread surface, undercut support structures, and blast apart fill on its way downhill. How much damage is done depends on the volume of water involved and how fast it is flowing.

If you slow water down, it loses its ability to carry soil and drops soil particles (deposition). If you abruptly turn or block water, it slows. This deposit ability is what helps create berms and fills in drainage structures. (This has some advantages if you are restoring eroded tread and use check dams to capture waterborne soil.)

Water can also affect soil strength. Generally, drier soils are stronger (more cohesive) than saturated soils, but it is also true that fine, dry granular soils can be washed or blown away. More experienced trail workers can identify basic soils in their areas and know their wet, dry, and wear properties.

Surface Water Control

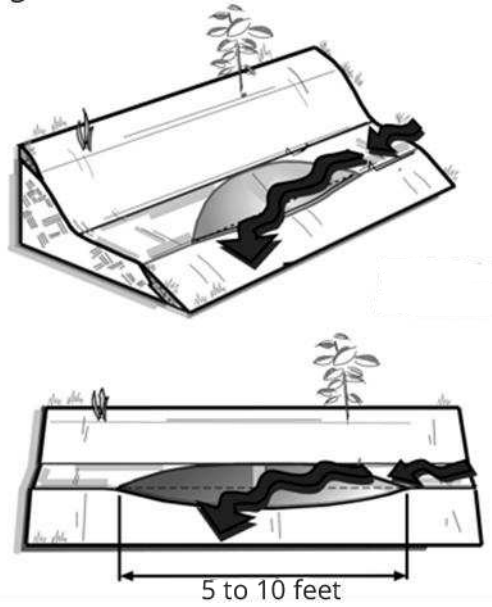
Flowing water erodes tread and support structures and can even lead to loss of the trail itself. Diverting surface water off the trail is part of an effective maintenance program.

The most effective drainage is designed and built during the original trail construction. A properly outsloped trail will allow water to flow across the tread rather than straight down the trail. A good drainage structure is relatively self-maintaining, requiring minimal care, but there will be times when more work is needed to promote effective drainage.

Types of drainage control structures

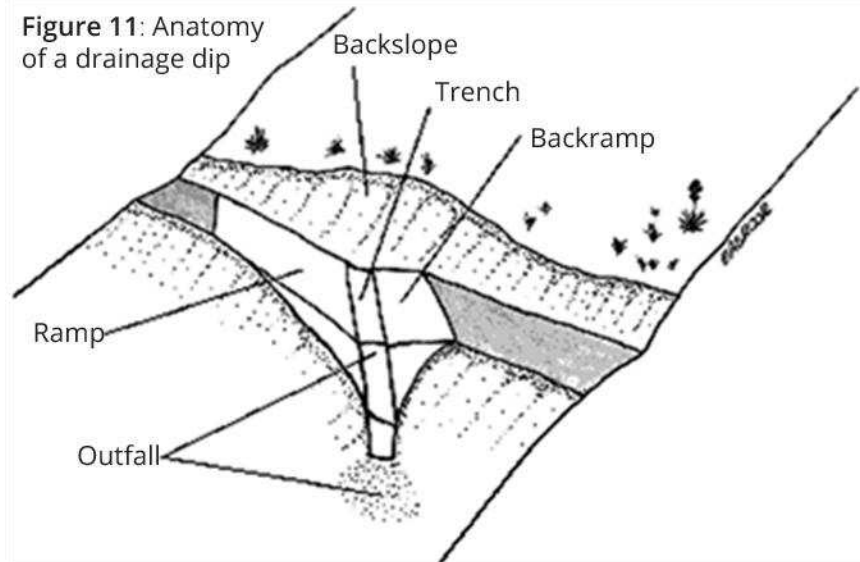
- **Grade reversal dip or rolling grade dip.** These drainage control structures use a reversal in grade to force water off the trail without the need for any other structures. This type of dip works best when designed and built where needed during the original trail layout and construction in places where water moving down the hillside is not intercepted and carried down the tread. Grade reversal dips are the most unobtrusive of all drainage structures if constructed with smooth grade transitions.
- **Knicks/swales.** (Figure 10) Shaved-down sections of tread with an exaggerated outslope. Used to shed water off a trail and is a useful remedy for wet spots on relatively flat trails without berms.

Figure 10: Knick/swale



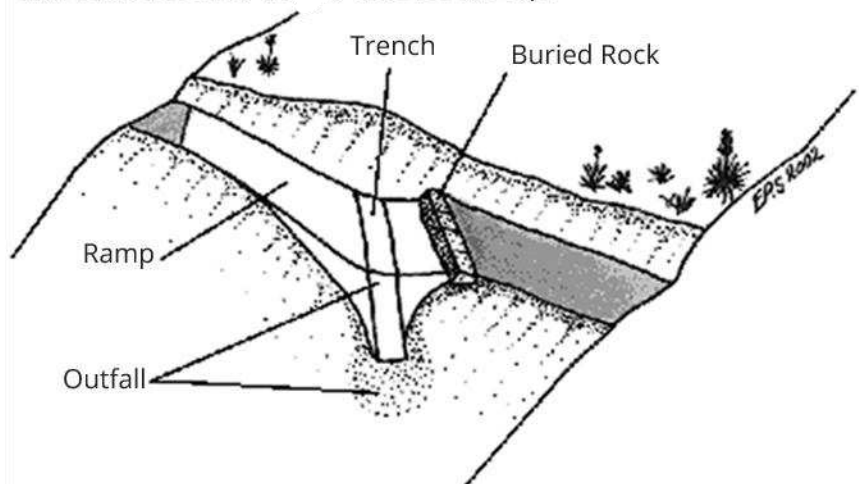
- **Drainage dip.** (Figure 11) A diagonal depression constructed in the trail to catch water running down the trail and to divert (at a 45 to 60 degree angle from the tread) the water off the trail. Usually constructed in a trail after the original trail layout and construction has been completed.

Figure 11: Anatomy of a drainage dip



- **Reinforced drainage dip.** (Figure 12) A reinforced drainage dip is a drainage structure which has a rock water bar buried under a layer of compacted soil at the top of the backramp.
- **Water bar.** An exposed stone or timber barrier set into the trail. The hardened barrier deflects water in case of major water flow. This type of drainage structure is no longer recommended for construction or use on trails, but previously constructed water bars need to be maintained or replaced.

Figure 12: Anatomy of a reinforced drainage dip.
In this example, the waterbar itself is a row of fitted and buried stones, which reinforce the dip.



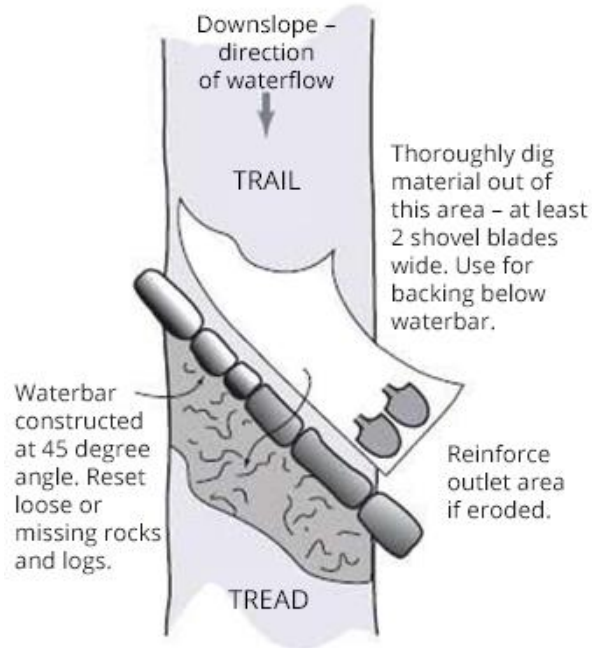
Maintaining a nick/swale, dip, or waterbar

The biggest maintenance issue for drainage structures is sediment build up. If a drainage structure clogs, water will find its way down the tread, creating erosion channels or puddles. The best drainage structures are self-cleaning, but realistically, most drains collect debris and sediment that must be removed. (Figure 13)

Most problem drainage structures are improperly installed dips and water bars. If water is slowed before it can exit the tread by hitting the backramp or stone barrier, sediment can build up. Inadequate outsloping of the trench and/ or the outfall, or an outfall that is straight or is too narrow can compound this. An effective outfall allows for an unimpeded flow of water off of the trail.

-
- When maintaining a water bar or dip, anticipate where the runoff goes and remove excess sediment where needed.
 - If not overly constrained by a berm or other obstacles reestablish or locate the outfall or drain outlet to naturally turn the water off the trail before it reaches the water bar or the backramp of the drainage dip.
 - Dig the outfall wide (up to two shovel widths) and outsloped so water does not slow before it exits the trail. Make sure outfalls do not allow water to return to the tread below the drainage structure.
 - Clear the outfall of all logs, rocks, and other debris, and even consider cutting logs and roots if needed to insure the flow of water off the trail. The exception is that some rocks, logs or other debris can be left to dissipate the energy of flowing water once it clears the tread.
 - Mineral soil removed from an outfall can be placed on the downhill side of the dip or waterbar on the trail and compacted. This will promote a smooth ramp up and over the dip or waterbar.
 - The ramp or downhill approach to the drainage structure will usually begin when possible at a minimum of five to six feet above (up to 10 to 20 feet for steeper trails) and will be a steady grade several degrees steeper than the trail and outsloped as much as possible.
 - Below the drainage structure, the approach will extend about five feet below the drainage structure and will be a steady and consistent grade across the entire width of the trail.
-

Figure 13: Maintaining a Drainage Dip or Water Bar



Appendix A: Common Trail Maintenance Tools Glossary

Pruning Saw



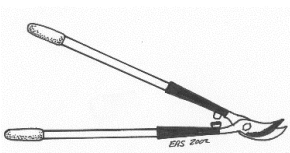
Pruning saws are useful for clearing small trees and trimming limbs (“limbing”). Pruning saws come in many sizes and consist of a handle with a tapering straight or curved blade. Folding saws are a common type of pruning saw.

When using any saw, let the saw do the work. Apply a little downward force with each stroke but not enough to bend the blade. Forcing the blade into the cut (or “kerf”) may bind or break it. Use as much of the length of the blade as possible; the saw will cut smoother and stay sharp longer. Do not twist the blade or try to bow it while sawing as the blade can break.

The teeth are sharp so wear gloves when sawing and keep hands clear of the cut and the blade. Be aware of the people around you to keep limbs from falling on someone. Carry the saw on your downhill side with the blade pointed down and sheathed.

Pruning saws are relatively small tools and are easily forgotten when packing up for the day. Keep the saw in a safe location (near or in your pack or near other tools that are being stored) when not in use.

Lopping and Pruning Shears



Lopping and pruning shears are similar in design and use. However, lopping shears have longer handles to improve reach and increase leverage for cutting thicker stems. Handles on lopping shears range from 26 to 36 inches long, and should be used on live limbs approximately 1 inch in diameter or smaller. Pruning shears have shorter handles and should be used on small branches with a diameter of approximately 3/8 of an inch.

A good rule of thumb is not to cut anything bigger than your thumb. Use a bow saw for limbs larger than 1 inch in diameter.

McLeod



The McLeod combines a heavy-duty rake with a large, sturdy hoe. McLeods work well for constructing trails through light soils and vegetation, and as finishing tools. They are inefficient in rocky or unusually brushy areas. Do not use the McLeod to chop turf or in rocky soil. The shaft attaching the head to the handle socket is relatively fragile.

To carry the tool, grip the handle near the head with the rake teeth pointing down, and carrying it on the downhill side as you walk. Store the McLeod with the tines pointed towards the ground.

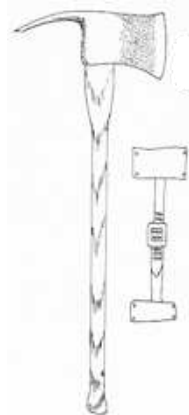
Pick Mattock



When using any pick, stand comfortably with your feet apart and one foot slightly forward. Grasp the handle with one hand near the head and the other hand near the end of the handle. Bend over and keep your knees bent. Work the pick like a Pulaski with short, deliberate, downward strokes. Let the weight of the head do the work. Avoid raising the pick overhead while swinging; this wastes energy and creates a safety hazard.

To seat the head, hold the tool by the end of the handle and tamp the head straight down against a rock until it is firmly seated in place. It is a good idea to do this before using any pick.

Pulaski



The Pulaski combines an axe and an adze hoe in one multi-purpose tool.

Carry the Pulaski at your side; grip the handle firmly near the head, and point the axe edge down.

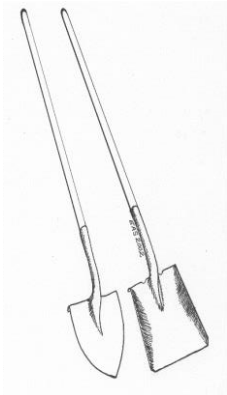
When using the adze hoe blade, stand with your back straight, knees bent, and one foot slightly forward. Hold the handle with both hands, and use short, smooth, controlled swings. Always work across the front of your body, roughly parallel with your shoulders. Let the weight of the head do the work. We rarely



use the axe blade (and NEVER below ground level). Instead, we use the grub or adze hoe end.

In cutting roots, use the hoe for all but the largest roots. Use the axe end to chop the largest roots only after the dirt has been thoroughly cleared. This is the only time you need to lift the head of the tool above your shoulders.

Shovel



Shovel blades are either square-edged for scooping or pointed for digging. When shifting or scooping materials, bend your knees and lift with your legs, not your back. Use your thigh as a pivot point. This makes the handle an efficient lever and saves your energy and your back. Carry shovels with the head forward. Grip the handle near the head and point it down.

Where to Get Tools

1. Local Tools Cache: Where applicable the CDTC has provided a tool cache open to all certified trail adopters to access specific tools and personal protective equipment. Please email the CDTC for permission to access.
2. USFS or BLM Partner: Your local land agency may be willing to lend out tools to local CDT Adopters. Call your land agency partner or Ranger District for more details.
3. Home Depot/Lowes: These big box stores provide simple trail tools at a reasonable price if an Adopter is looking to own their own tools.
4. Tools for Trails: Based out of Boulder, CO they provide name brand tools at toolsfortrails.com.
5. Forestry Suppliers, Inc: Nearly everything forestry and maintenance related can be found at forestry-suppliers.com.
6. Ben Meadows Company: Great selection on forestry supplies and equipment at Benmeadows.com

Appendix B: CDT Signing and Marking Guide

Prior to signing and marking the CDT, it is important for the Adopters to contact and work closely with the CDTC and land agencies (USFS, BLM, or NPS) to ensure appropriate and consistent signing practices along their adopted section of the trail. These extra measures allow uniformity along the entire CDT.

The CDT traverses a variety of landscapes and settings that influence which type of trail marker or trail sign to use. Generally speaking the CDT should be signed at road crossings, trailheads, trail intersections, and along areas for reassurance. There are always exceptions, but you can review many of them in the **2017 Continental Divide Trail Marking Guide**.

Appendix C: Example Job Hazard Analysis Form

U.S. Department of Agriculture Forest Service		1. WORK PROJECT/ACTIVITY Volunteer Activities	2. LOCATION District wide	3. UNIT South Platte RD		
COMBINED Risk Assessment and JHA References-FSH 6709.11 and -12 (Instructions on Reverse)		4. NAME OF ANALYST Bradt/Mitchell	5. JOB TITLE Recreation Management	6. DATE PREPARED 01/25/2016		
7. TASKS/ PROCEDURES	8. HAZARDS	9. ABATEMENT ACTIONS Engineering Controls * Substitution * Administrative Controls * PPE			10. POST ABATEMENT ACTION RISK RATING (from the Severity/Probability Matrix)	
				Severity	Probability	Risk Level
Vehicle Travel	Accidents	Everyone in vehicle must wear safety belts at all times. Drive defensively: look far down the road to get the "big picture" and avoid accident situations caused by the mistakes of others. Never exceed posted speed limits. Compensate for road and weather conditions. Passengers will never ride in the bed of a pickup truck. Tools and materials will always be secured before a vehicle is moved. Flammable liquids shall not be transported in passenger compartment, approved containers shall be used.				
Public contacts	Negative contacts	Observe the person and the surroundings on approach. Avoid hostile persons. Stay at least an arm's length away. If uncomfortable with the contact or situation, do not make initial contact, or if contact has already been made, back out of it. Position yourself so that you are not surrounded in a group. Do not antagonize a uncooperative visitor by word, deed or action. Do not make contact if drugs/alcohol are present. Don't exceed your comfort zone.				
	Dogs	If carrying a tool, keep the tool between you and the dog. Be assertive, but not aggressive. If owner is nearby, ask that the dog be leashed. If approaching a camp where dogs are present, call out on approach and have owner leash dogs before approaching.				

	Stock	When hiking and stock approaches on trail, stand on down hill side of trail with no sudden motions and speak calmly to stock users.			
General Safety	General	Safety is your first priority. Always stay within your skill level and comfort zone. Nothing we do is more important than your safety. Always let someone know where you will be for the day and the time you plan to return. Never depend on cell phone coverage to be available. Do not travel or work alone in isolated areas without a detailed emergency plan and radio. When traveling in remote areas, you should have a first-aid kit, compass and map, matches (waterproof), pocketknife, flashlight, extra food, warm clothing, signal mirror, and plenty of drinking water. Remain aware of your surroundings at all times. Be aware of elemental hazards and take appropriate actions (i.e. weather, avalanche, lightning, stream crossings, snags). Know the weather forecast. Carry and know how to use your map and compass. Work in pairs if possible. Basic orienteering skills are required.			
	Hydration	Always carry adequate water and stay hydrated. Always treat wild water through filtration, chemical treatment or boiling before drinking.			
	Slipping/Tripping	Boots are to have slip-resistant heels and soles with firm, flexible support. The required ankle support will vary with terrain. When contouring a steep slope, do not lean into the hill. This tends to loosen footing. Erect posture or slightly leaning out gives more secure footing. Plan ahead, select safe routes, watch out for changes in ground surface, slick spots, or unusual hazards. Select each step carefully and do not shift body weight until you are sure the spot is solid. If you feel yourself slipping, pick a landing spot. Do not stick your arms out to break a fall, roll with the fall. In heavy undergrowth lift your knees high to clear obstacles or walk around. When going downhill, keep most of your weight on your heels and shorten your stride. Do not run.			

	Blisters	Wear broken-in, well-fitting boots and clean snugly fitting quality socks. Protect tender spots with mole skin or adhesive tape when redness first appears. Treat blisters promptly.			
	Getting Lost	If lost, keep calm, don't panic. If carrying a cell phone or radio, try to make contact. Follow any roads, trails, telephone or power lines that may be present until you can determine you are moving in the right direction. As a last resort travel downhill parallel to a stream or drainage. Do not walk aimlessly. If unsuccessful in attempts to find your way, stay in one place, conserve your strength, and build a fire in a safe place so that smoke may be seen by searchers. If signal mirror is available have ready for immediate use. Select a warm shelter. Shelter, warmth and liquids are much more important than food. Prepare camp and gather firewood well before dark.			
	Allergic Reactions	If you have any known allergic reactions, carry the appropriate medicine to arrest the reaction (e.g. sting kit, medical inhaler).			
	Injury	Anyone doing strenuous work should perform stretching or other warm-up exercises appropriate to the work project or activity. If you sustain a serious injury while in the forest on foot, follow the guidelines for being lost, provide first aid as best you can. Keep calm and don't panic. Make yourself as comfortable as possible. If possible, report your location and wait for assistance. Walk to a location where you can be picked up if possible. If you need to move to a different location, do it slowly. Conserve your energy.			
	Weather Exposure	Conditions change quickly in the mountains. Wear sunscreen and carry raingear. Layering your clothing is the most effective way to dress for the woods. Clothing can be shed as you exert yourself and put back on as you cool down.			

	Lightning	Afternoon thunderstorms are common in the summer. Plan to be off high, exposed ground by early afternoon. If caught in a lightning storm, move to lower sheltered ground.			
	High wind	High winds can blow down standing dead trees (snags) and even snap healthy trees. Avoid burned areas with numerous snags during high winds. Also, be aware of wind chill factor in cold windy weather.			
	Insects	Be aware of bee and wasp nests. Use insect repellents and avoid areas with high concentrations of mosquitos (West Nile Virus). Periodically check for ticks (Lyme Disease, Tick Fever).			
Tools	Injures from improper use of tools	<ul style="list-style-type: none"> • Know proper handling, carrying, and use of tools. • Check that tools are properly maintained, clean, and in good condition. • Only sharp and properly maintained tools should be used. • Use proper tool for the job. • Never modify tools. Make sure all safety guards are in place during and after use. • Keep tools in a safe place on and off the job. When tools are not in use, place them in a predetermined location away from persons and with cutting edges shielded. • Never throw tools. Never direct the tool toward the body or anyone else's body. • Use appropriate PPE (i.e. sturdy footwear, gloves, eye & ear protection, long pants & sleeves, hard hat, shields, barriers, masks/respirators, etc) 			
Qualifications/ Training	Specific qualifications or certifications are required for many work	Examples are:Chain Saw Operation, Crosscut Saw Operation, Specialized Tools, Pesticide Use, Heavy Equipment, Driving. Before beginning any work project or activities, participants must be trained in the basic safety and heald precautions they need to follow. Participants must possess all required certifications such as First Aid/CPR, Sawyer, Drivers Licence prior to beginning activities.			

	projects and activities				
Lifting	Back strain	Use proper lifting techniques; bend knees when lifting; lift with legs and not with back; do not exceed your personal ability; "eyes to the sky" – look upward to keep balance and better alignment; do not twist or turn while carrying a heavy load.			
Wildlife encounters	Mountain Lions	If approached by a mountain lion, do not run. Face the animal and stand your ground. Raise your arms and look big. Speak loudly in a firm voice. Do not corner a lion, leave it a means of escape. Be alert for a second lion. If attacked, fight back.			
	Bears	Never approach bears or cubs, and never get between a mother bear and her cubs. Give bears plenty of room. Make noise and do not startle a bear. Do not run from a bear. If approached by a bear, raise arms and appear big. Make as much noise as possible.			
	Other	Avoid animals exhibiting unusual behavior or when young are present. Do not place animals in a situation they cannot leave easily. Always observe animals from a distance and don't feed them			
Backcountry camping	Weather, falling trees, rising waters, animals	Carefully select your campsite. Look up, look around. Sites should be free of; hazard trees, danger from rolling rocks and slides, danger from flash floods or rising waters, known animal problems or signs (tracks, scat, scrapes, kills and claw marks). Keep camp areas clean and food stored out of reach at a distance from camp.			
11. LINE OFFICER SIGNATURE		12. TITLE		13. DATE	

Appendix D: Sample Emergency Plan

Continental Divide Trail Coalition – CDT Adopter Program In the event of an emergency:

1. Check to make sure the scene is safe before entering to provide care.
2. In an urban/front country (less than one hour from definitive medical care) environment immediately call 911 for appropriate emergency personnel (fire, police, ambulance, etc.).
 - a. If electronic communications are not available runners leaving the field should be in groups of three if possible, but no less than two.
 - b. If you choose to send runners for help, always leave the person with the highest level of first aid training to attend to the injured person(s).
3. In a backcountry environment (one hour or more from definitive medical care), prior to requesting outside emergency assistance, and if time and conditions permit, each trail steward should have all information pertaining to the incident, including a "SOAP (Subjective, Objective, Assessment, Plan) Note" with vitals and patient information, and a detailed description of the patient's location.
 - a. Runners should carry a copy of all information pertaining to the incident including a SOAP Note with vitals and patient information, a detailed description of the patient's location, and emergency numbers on the Emergency Protocols Form.
4. If the weather becomes threatening, the trail steward will move the participants to the most sheltered or safest location that is reasonably available.

General Emergency Policies:

1. The trail steward with the highest level of medical training should respond to the incident or accident and treat the sick or injured person(s) utilizing only those treatment techniques for which he or she has been trained and certified. If a third party has a higher level of medical training and wishes to assume responsibility in treating the sick or injured party, trail stewards will, where appropriate, allow this person to do so and attempt to assist the third party as requested.
2. If trail stewards will require outside assistance in treating the sick or injured party on site (e.g. evacuation by litter and or higher level medical expertise and or equipment), then trail stewards should contact the appropriate County Sheriff's office and ask them to assist (see below for contact numbers and communication systems).
3. If CDT Adopters deem it unnecessary to contact the County Sheriff's office for assistance but still feel it necessary that the sick or injured party be evaluated by an individual with a higher level of medical training, then trail stewards should transport the sick or injured party to an appropriate medical facility

In the event of a life threatening emergency: Phone # 911

PREFERRED COMMUNICATION SYSTEMS

Communication Equipment & Policies (listed in the order in which they should be used):

Coverage listed here is of a general nature. There may be "dead spots" that are not known.

- Cellular Phone: Cell phones have intermittent coverage generally in areas with good lines of sight or at high points. Coverage is also available near towns including Idaho Springs, Georgetown, Grant, Shawnee, Bailey, and Conifer.
- Satellite Phone: If available, a satellite phone may be used when locations with good cell coverage or radio reception are deemed excessively far from the site of the incident or accident. Satellite reception may vary significantly depending on cloud cover.

- Personal Locator Beacons: PLB's are a manually activated personal safety device designed to alert search and rescue responders and allow them to locate you in the event of an emergency. Some PLB's can also be utilized for routine check-in, check-out purposes.
- Two-Way Radios: These can provide communication for up to 2 miles (depending on terrain, weather, and batteries) and can be used to communicate between the location of the incident and a location where outside communication is available via USFS radio, cell phone, or satellite phone.
- USFS Radio: If available, *volunteer shall make an effort to determine the general extent of radio coverage on the project.*

Appendix E: Sample CDTC Adopter Report Form



CDTC ADOPTER REPORT

Please complete 1 report per visit and return to volunteer@continentaldivide trail.org or PO Box 552 Pine, CO 80470

Adopter Name:
Additional Volunteers:
Agency Unit and District
Segment:
Trailhead or access point:
Type of visit: (scouting, inventory, maintenance, etc.)

OVERVIEW OF WORK: Please share the nature of your visit and what was accomplished

HOURS

Date	# Volunteers	Round Trip Hrs. Traveled	Hours Worked	Labor Value	# Days worked	Total Labor Value
				\$23.56/hour		
Totals				\$23.56/hour		

MAINTENANCE LOG

Total distance of Trail Maintained	
Area brushed	
# Trees Cleared	
Feet of Tread Maintained/reconstructed	
Drainage maintained	
Drainage Installed	
Other Structures installed: (please list):	
Signs installed	
Cairns installed	
Other:	
Other:	
Other:	

OR fill out our online Trail Adopter Reporting form at: <http://continentaldividetrail.org/trail-adopters/>

Appendix F: Sample CDTC Adopter Agreement Form & Liability Waiver



CDTC 2017 Adopter Agreement

ADOPTER + SEGMENT INFO

Adopter Name or Group Name: _____

Email: _____ Address: _____

Phone: _____

The Continental Divide Trail Coalition (CDTC) and _____ have agreed to enter into the following volunteer adopter arrangement:

I (We) accept the following duties of CDT Adopters as outlined in the CDTC Trail Adopter Handbook and commit to assisting the CDTC and responsible land management agency in achieving the goal of maintaining all trails to National Scenic Trail Standards. I understand the obligation as an Adopter to maintain the above listed Segment in accordance with the responsibilities of the agreement as follows:

1. Complete a minimum of 2 visits to the adopted Segment annually
2. Receive trail maintenance training if applicable and/or necessary
3. Conduct annual monitoring and inventory of Segment, reporting pertinent info to CDTC
4. Perform maintenance duties including:
 - a. Trail and Corridor Clearing
 - b. Drainage
 - c. Trail marking (signing, cairns, etc.)
5. Report trail problems to CDTC, requesting project support for large scale issues
6. Submit completed reports to CDTC following Segment visits
7. Follow all Safety procedures and protocols outlined by CDTC and Land Management Agencies.

*This agreement will renew annually unless terminated by the Adopter or CDTC.

By signing this Agreement, I, _____, agree to work with the Continental Divide Trail Coalition as a CDT Adopter on the above stated segment and to uphold the priorities and standards provided to me by the CDTC and the Land Management agency:

Adopter Signature: _____ Date: _____

—

By signing this agreement, CDTC agrees to support the accomplishment of the above stated goals and priorities:

CDTC Signature: _____ Date: _____

VOLUNTEER ACKNOWLEDGMENT AND ASSUMPTION OF RISKS & RELEASE AND INDEMNITY AGREEMENT

Please read in full, sign agreement and return to CDTC.

Please read this entire Acknowledgment and Assumption of Risks & Release and Indemnity Agreement (hereafter 'Document') carefully. All participants must sign this Document. For participants under 18 yrs. of age (hereafter sometimes 'minor' or 'child'), one or both parent/s or legal guardian/s (hereafter collectively 'parent/s') must also sign. In consideration of the Continental Divide Trail Coalition, a nonprofit organization, and its officers, directors, employees, agents, representatives, volunteers and all other persons or entities associated with it (collectively referred to in this Document as 'CDTC') allowing me to participate in activities that take place in the regions of the Continental Divide National Scenic Trail ('CDT'), participant and parent/s of a minor participant understand and agree as follows:

ACKNOWLEDGMENT AND ASSUMPTION OF RISKS

CDTC activities (which may be scheduled or unscheduled, and supervised or unsupervised) may include, but are not limited to hiking, backpacking, climbing, trail construction and maintenance, camping, participation in work or service projects related to the CDT, and travel to and from these activities (referred to in this Document as 'activities'). I (and my Parent/s, if I am a minor) acknowledge that the inherent and other risks, hazards and dangers (referred to in this Document as 'risks') of these activities can cause injury, damage, death or other loss. Parent/s of a minor gives permission for their child to participate in all activities and agree to discuss the nature of these activities and risks with their child. These risks include, but are not limited to:

Risks present in an outdoor or wilderness environment. These risks include travel in high altitude, mountainous or wilderness terrain both on and off trail. Participants' travel may be subject to storms; lightning; strong winds; fast moving rivers or other water bodies; difficult stream crossings; currents or whitewater; falling rocks; extremely hot or cold weather or water; snow and ice; snow slides and avalanches; fallen timber; stinging, poisonous or disease carrying animals or insects; poisonous plants; wild animals and other natural or man-made hazards. Hazards (both on land and above and below water level) may not be marked and weather is unpredictable year around.

Risks involved in decision making and conduct including the risk that a CDTC staff member, representative, volunteer, co-participant or other party may misjudge a participant's capabilities, health or physical

condition, or misjudge some aspect of instruction, medical treatment, weather, terrain, water level and/or route location. **CDTC uses volunteers to assist with, and sometimes lead its trips and projects.**

These individuals are not professional guides or leaders. In all activities, all participants share in the responsibility for their own safety and the safety of the group.

Personal health and participation risks. The risk that participant's mental, physical or emotional condition (disclosed or undisclosed, known or unknown) combined with participation in these activities could result in injury, damage, death or other loss. Although CDTC personnel may review participant's health and medical information, CDTC cannot anticipate or eliminate risks or complications posed by participant's mental, physical or emotional condition.

Work project risks. Participating in CDT work or service project can include risks associated with activities such as digging, lifting, construction and clean-up. Projects may include the use of tools and equipment (i.e. Pulaski's, shovels, rock bars, pick mattocks and McLeod's) that can cause injury resulting from use, misuse or malfunction.

Risks associated with travel. Travel can be on foot or by vehicle or other means and can be over rough and unpredictable terrain or via lakes and rivers, in snow, sleet, rain or other adverse weather conditions.

Risks connected with geographic location. Activities may take place in remote places, several hours from medical facilities, causing potential delays or difficulties in communication, transportation, evacuation and medical care. Although crew leaders may or may not have wireless communication devices, use of these communication devices in outdoor, mountainous and/or wilderness terrain is unreliable and inconsistent. Further, crew leaders may not be trained in first aid, CPR or wilderness medicine. Each participant must carry any needed medications and first aid supplies. Participants should bring first aid supplies recommended by their personal physician or medical care provider, including those to counteract potential serious allergic reaction (for example, anaphylaxis resulting from allergy to bee stings). The

risk that equipment used in an activity may be misused, or may break, fail or malfunction.

Risks arising from riding or recreating in areas where others may be using firearms, including the risk of being shot or struck by flying debris or by accidental discharge of a firearm.

Risks associated with cooking and camping. Risks include gas explosion, scalding or other burns associated with cooking over a gas stove or open fire, and water contamination in natural water sources. All water may be contaminated and should be disinfected, filtered or boiled before use.

Risks associated with free time. Participants will have free unsupervised time before, during and after the start of a trip and at various other times. During both supervised and unsupervised activities, all participants share in the responsibility for their own safety.

Risks regarding conduct. The potential that the participant, or other participants or third parties (e.g. driver, rescue squad, hospital) may act carelessly or recklessly.

Other risks generally associated with outdoor, recreation, education and/or service activities. These and other risks may result in participants: falling; being struck by lightning or objects; colliding with or impacting objects or people; experiencing vehicle collision, capsize or rollover; reacting to high altitude, weather conditions or increased exertion; becoming lost or disoriented; suffering gastro-intestinal complications or allergic reactions or experiencing other problems. These and other circumstances may cause hypothermia, hyperthermia (heat related illness), heat stroke or exhaustion, dehydration, frostbite, drowning, high altitude sickness, heart or lung complications, broken bones, paralysis, concussions, sunburn or other burns, mental or emotional trauma or other injury, damage, death or loss.

I (PARTICIPANT AND PARENT/S OF A MINOR PARTICIPANT) AGREE: I have accurately completed all required forms, agree to abide by the terms of those documents, and agree to obey all CDTC rules and policies; I have reviewed and understand all CDTC information and materials received, including the Volunteer Safety Information, and understand that CDTC representatives are, and have been available should I have further questions about these activities or the associated risks; If participant has any mental, physical or emotional conditions or limitations which might affect his/her ability to participate, I agree to disclose those to CDTC, and represent that participant is fully capable of participating without causing harm to him/herself or others; CDTC cannot assure participant's safety or eliminate any of these risks. Participant is voluntarily participating with knowledge of the risks. Therefore, participant (and parent/s of minors) assume and accept full responsibility for participant, 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 (and parent/s of minors), resulting from those risks, and/or resulting from participant's own negligence or other misconduct.

RELEASE AND INDEMNITY AGREEMENT

Please read carefully. This Release and Indemnity agreement contains a surrender of certain legal rights. I (adult participant or parent/s for themselves and for and on behalf of their participant child) agree as follows:

1) to release and agree not to sue the CDTC, with respect to any and all claims, liabilities, suits or expenses (including attorneys' fees and costs) (hereafter collectively 'claim' or 'claim/s') for any injury, damage death or other loss, in any way connected with my child's enrollment or participation in CDTC activities, or use of any equipment, facilities or premises. I understand that in signing this Document, I, my child, and anyone acting on my or my child's behalf, surrender our respective rights to make a claim against the CDTC for any injury, damage, death or other loss suffered by me or my child;

2) To defend and indemnify the CDTC ('indemnify' meaning protect by reimbursement or payment, including for attorneys' fees and costs) with respect to any and all claim/s brought by or on behalf of me or a family member for any injury, damage, death or other loss in any way connected with my/my child's enrollment or participation in CDTC activities, or use of an equipment, facilities or premises; and/or b) brought by a co-participant or any other person for any injury, damage, death or other loss to the extent caused by my conduct in participating in CDTC activities and/or using any equipment, facilities or premises.

This Release and Indemnity Agreement includes any losses resulting from the negligence (but not the gross negligence or willful, wanton or criminal misconduct) of CDTC, and includes claim/s for personal injury or wrongful death (including claim/s related to emergency or medical response, assessment or treatment), property damage, products liability, breach of contract or any other claim.

OTHER PROVISIONS

I (participant and parent/s of a minor participant) agree that Colorado law (without regard to its conflict of laws rules) governs this Document, any dispute I have with the CDTC and all other aspects of my relationship with the CDTC and that any mediation, suit or other proceeding must be filed or entered into only in Park County, Colorado. I agree to attempt to settle any dispute (that cannot be settled by discussion) through mediation before a mutually acceptable Colorado mediator. I authorize CDTC or Federal Land Management Agency staff, agents or representatives, other program participants, or other medical personnel to obtain or provide medical care for me/my child, to transport me/my child to a medical facility and to provide treatment they consider necessary for my/my child's health. I agree to the release (to or by the CDTC) of any medical records necessary for treatment, referral, billing or other purposes. I agree to pay all costs associated with medical care and transportation. I authorize the CDTC to use my/my child's photo for sale or reproduction in any manner CDTC desires, for advertising, display or other use. The CDTC reserves the right to remove any participant from a CDTC trip or project who staff or leaders believe, in their discretion, presents a safety concern or medical risk, or acts in any manner disruptive or detrimental to the group. If participant is dismissed or departs for any reason, participant (and his/her family) are responsible for all costs of early departure whether for medical reasons, dismissal, personal emergencies or otherwise. These costs include, but are not limited to: medical evacuation and costs, transportation costs, and accommodations, and compensation and costs for staff accompanying participant. This Document is intended to be interpreted and enforced to the fullest extent allowed by law. If any portion of this Document is deemed unlawful or unenforceable, it 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: I have carefully read, understand and voluntarily sign this Document and acknowledge that it will be effective and binding upon me, my minor children, spouse and other family members, and my heirs, executors, representatives, surrogates and estate. One or both Parent/s must sign below if participant is under 18 yrs. of age.

PARTICIPANT'S SIGNATURE _____ **PRINT**

NAME _____ **DATE** _____

PARENT/GUARDIAN SIGNATURE _____ **PRINT**

NAME _____ **DATE** _____

The following template is for use by sponsoring volunteer organizations. Customize underlined items. While this template is adapted from a Waiver used by Roaring Fork Outdoor Volunteers, please have your organization's legal counsel review and revise prior to use.

Independent Steward / Trail Agent Program AGREEMENT AND WAIVER

[insert current year]

PLEASE PRINT LEGIBLY

Name _____ Phone (h) _____ Email _____

Mailing Address _____ City / State / Zip _____

INDEPENDENT STEWARD / TRAIL AGENT PROGRAM - AGREEMENT

The Independent Steward / Trail Agent training was developed to teach the fundamentals of basic trail maintenance to volunteers working independently. Having completed the program's course, I know how to identify and perform basic trail corridor, trail tread and drainage structure maintenance, as well as how

to recognize and report on other more complex maintenance needs. Having completed the program's course, I understand basic safety and risk assessment and how to appropriately work with and represent my Sponsoring Volunteer Organization and Land Management Agencies in order to work within their protocols.

I understand that as a trained individual, I may engage with a maximum of 2 un-trained volunteers to accomplish basic trail maintenance. My training is not intended as a Crew Leader for Trails training. My training does not give me permission to re-route trails or build new trails. If I wish to learn more about crew leadership for volunteer groups, new trail construction, or volunteer project management, I will seek additional training opportunities with [insert Sponsoring Volunteer Organization(s)] or with the Outdoor Stewardship Institute.

I agree to abide by the rules and regulations of [insert SVO(s)] while participating in this program. I further agree to submit a timely report on the Independent Stewardship activities I conduct throughout [insert current year]. I will utilize the reporting structure provided to me by [insert SVO(s)], and will submit a report for each day or session that I volunteer my time as an Independent Steward / Trail Agent. I will report on the basic trail maintenance accomplished and also report on other more complex trail maintenance needs that can be addressed by [insert SVO(s)] and Land Managers on a scheduled basis. I will represent this program, [insert SVO(s)], and Land Managers in a positive light when I encounter other trail users.

Signature _____ Date _____

WAIVER AND RELEASE
THIS IS A RELEASE OF LIABILITY - PLEASE READ CAREFULLY BEFORE SIGNING

In return for receiving permission from [insert Sponsoring Volunteer Organization(s)] to participate as a volunteer with the Independent Steward / Trail Agent Program during [insert current year], I agree to assume all risks of loss and injury that may arise out of my participation and I agree to waive any and all claims against [insert SVO(s)] and the other parties described below.

I hereby release, and agree to indemnify and hold harmless [insert SVO(s)], program participants, and anyone else involved with this program and their respective agents, representatives, officers, employees, successors, assigns and insurers, hereinafter referred to collectively as "the Releasees", from any and all liability, claims, demands or actions or causes of action whatsoever, arising out of damage, loss or injury to my person or property, whether anticipated or unanticipated, while participating in any of the activities contemplated by this agreement, whether such damage, loss, or injury results from the negligence of the Releasees, their respective agents, officers, employees, successors, assigns and insurers or from some other cause. This release and agreement shall be binding upon me, my heirs, successors, assigns, administrators and executors.

I expressly acknowledge, represent and agree that expressly identifying and explicitly naming the respective agents, representatives, officers, employees, successors, assigns and insurers of the parties released, all of whom I intend to be released by this document, is a practical impossibility for the parties. The undersigned and the parties released herein expressly acknowledge that, for good and valuable consideration, the terms "respective agents, representatives, officers, employees, successors, assigns, and insurers", however used in this Waiver and Release Agreement are expressly and explicitly intended to include all and each and every individual, person, firm, entity and corporation who are now, or at any time may have been included in the specifically listed categories.

I realize that working within this program may involve the use of tools as well as other risks and hazards. I may be working around other program participants who may not be accustomed to this type of labor. I am aware of the risks and hazards inherent in participating and do hereby assume sole responsibility for all such risks and waive all claims against the Releasees, their respective agents, representatives, officers, employees, successors, assigns and insurers.

I grant [insert SVO(s)] and other program sponsors permission to utilize my image in photographic recordings of the project and I waive any right to claim compensation in exchange for participating in the program.

I agree to abide by the rules and regulations of [insert SVO(s)] while participating in this program. I hereby acknowledge that I have read, understood, and voluntarily agreed to the foregoing waiver and release agreement.

Signature _____ Date _____

Signature and contact email of parent or guardian if volunteer is less than 18 years of age:

Signature _____ Date _____

Printed Name _____

Person to contact in case of an emergency:

Printed Name _____ Email Address _____ Phone _____

Appendix F: Additional Resources

This training curriculum, focused on basic trail maintenance, is adapted from a more detailed, and more involved Crew Leader Training curriculum.

Crew Leader Training offers a deeper dive into trail design and alignment while providing a real understanding of new trail construction techniques. In order to lead a crew of volunteers in constructing a new trail, it becomes important to understand individual learning styles and listening skills while having a good handle on conflict and dispute resolution. As many volunteers on a given crew may be inexperienced in both trails and volunteering, knowing how to assess risks and avoid injuries becomes of paramount concern.

To learn more about new trail construction techniques and best practices for managing and leading larger groups of volunteers, as well as many other training opportunities contact Volunteers for Outdoor Colorado's Outdoor Stewardship Institute (www.voc.org).

IMBA (International Mountain Bike Association) and other regional Mountain Bike Associations offer trail maintenance workshops and hands-on field experience for those looking for a new perspective on trail construction and maintenance. One and two day courses are available throughout the West. Visit www.imba.com/ for more information.

Wilderness First Aid/ Wilderness First Responder courses are invaluable for Adopters doing trail maintenance solo or with a group of people. Some organizations that offer these courses include:

- NOLS (National Outdoor Leadership School), Lander, WY www.nols.edu/
- Wilderness Medical Associates, Portland, ME www.wildmed.com/
- Colorado Mountain Club, Golden, CO www.cmc.org
- SOLO Wilderness Medicine, Conway, NH www.soloschools.com
- University of New Mexico, Department of Emergency Medicine, International Mountain Medicine Center <http://emed.unm.edu/immc/education/index.html>

- Jackson Hole Outdoor Leadership Institute, JHOLI, <http://www.avalancheandwildmedtraining.com>

Crosscut Saw Training and Chainsaw Certification provide the basic technical knowledge required by public land agencies to use saws safely and effectively. These courses can be sought out by contacting your regional Forest Service Office for details or reaching out to land management agency partners who host such courses.

- Department of Agriculture, United States Forest Service (contact your Ranger District personnel), www.fs.fed.us
- University of Montana, National Wilderness Training Center, Missoula, MT <http://www.umt.edu/crosscut-sawyer/>
- Colorado Firecamp, Salida, CO <http://www.coloradofirecamp.com/>
- Sierra Blanca Wildland Fire Academy, Ruidoso, NM, <http://www.sbwacademy.com/>
- Volunteers for Outdoor Colorado, Denver, CO www.voc.org