

# Trail Maintenance 101



# Why This is So Important

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Basic maintenance is what land managers and agencies struggle with the most.

Regular maintenance ensures the longevity and sustainability of a trail or trail system.

A well maintained trail allows the users to enjoy the experience.

- No muddy feet
- No brush in the face
- No trees to climb over or go around
- No getting off your bike, horse, ATV, etc.
- No getting lost, easy to follow signage

Volunteer maintenance can often be used as match for grant funding.

People stay on well maintained trails, but create user trails when the existing trail doesn't meet needs or expectations.

Trail users have a higher respect for the park, forest, trail, facilities, etc. when a trail is well maintained.



# Safety

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## There are inherent risks to working on trails.

- Rough, uneven terrain
- Environmental – bad weather, heat, cold, wind, sun, etc.
- Biological – bees, snakes, poison ivy
- Exhaustion – both from hiking and working, not all trails are a walk in the park

## Working on trails ups the ante.

- Swinging tools
- Sharp Tools
- Flying debris
- Cutting trees, limbs, branches, brush – Are you ready for when the cut is completed?
- Rocks – falling, rolling, lifting
- Multiple people to account for
- Exhaustion – heat exhaustion, dehydration, loss of concentration

What can we do to keep ourselves and other volunteers safe?



# Safety – Being Prepared and PPE

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## Be prepared for the day.

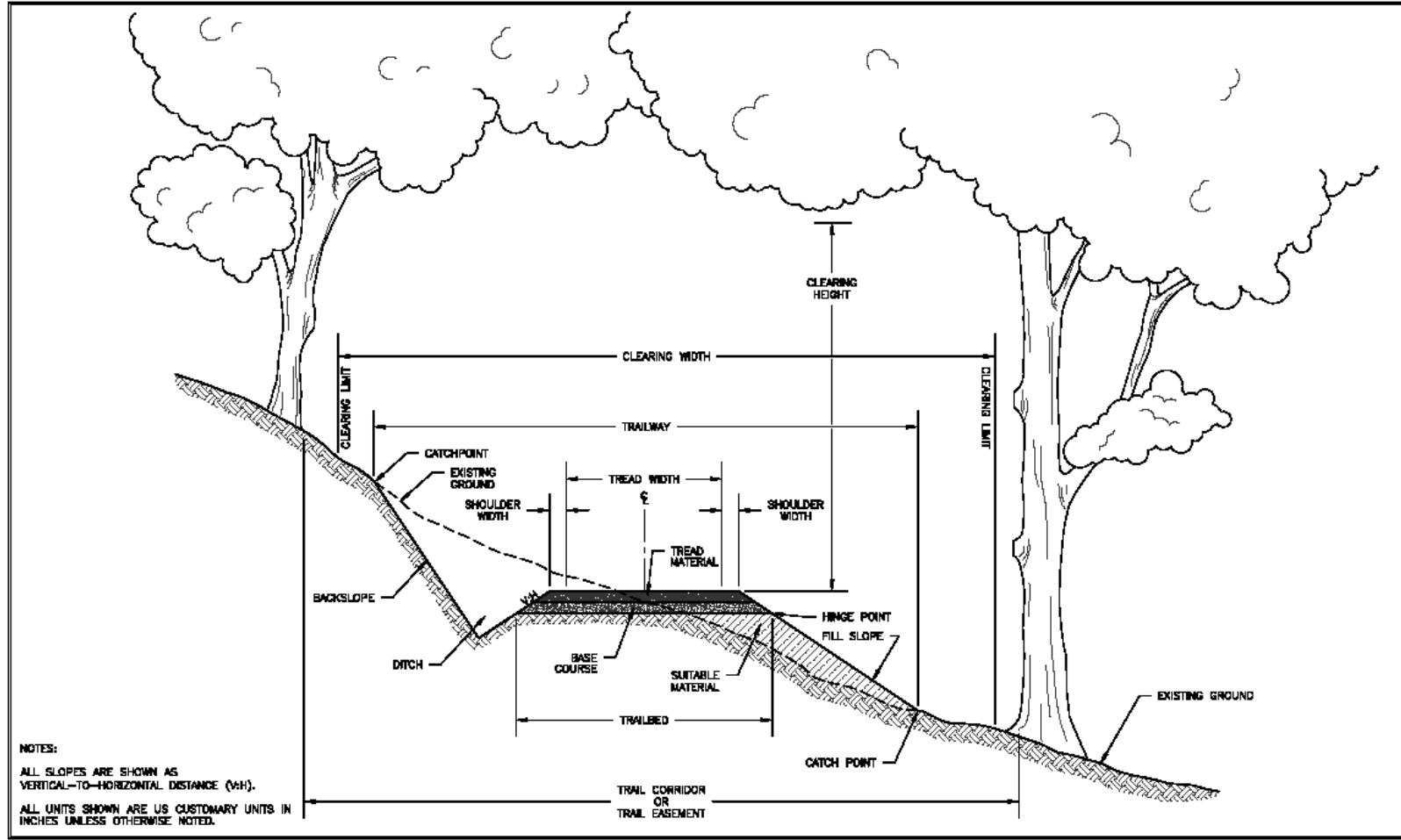
- Know the area you're working
- Know the weather and bring appropriate clothing – dress in layers
- Bring a map – cell phones don't always work
- Water and food
- Sunscreen
- Check-in/Check-out – have a buddy

## Personal Protective Equipment (PPE)

- Long-sleeves and long pants
- Sturdy boots – preferably leather and at least 6" tall. No sneakers
- Good work gloves
- Eye Protection
- Hardhat
- Chaps – are you running a saw?
- Ear protection



# Trail Diagram



NOTES:  
 ALL SLOPES ARE SHOWN AS VERTICAL-TO-HORIZONTAL DISTANCE (V:H).  
 ALL UNITS SHOWN ARE US CUSTOMARY UNITS IN INCHES UNLESS OTHERWISE NOTED.

U.S. DEPARTMENT OF AGRICULTURE  
 FOREST SERVICE  
**STANDARD TRAIL PLAN**

PROJECT NAME & LOCATION

DRAWING NAME  
**STANDARD TRAIL TERMS**

SECTION  
 910 - TRAILWAY

TYPICAL ID  
 STT

REVISION DATE  
 XX/XX/XX

NOT TO SCALE

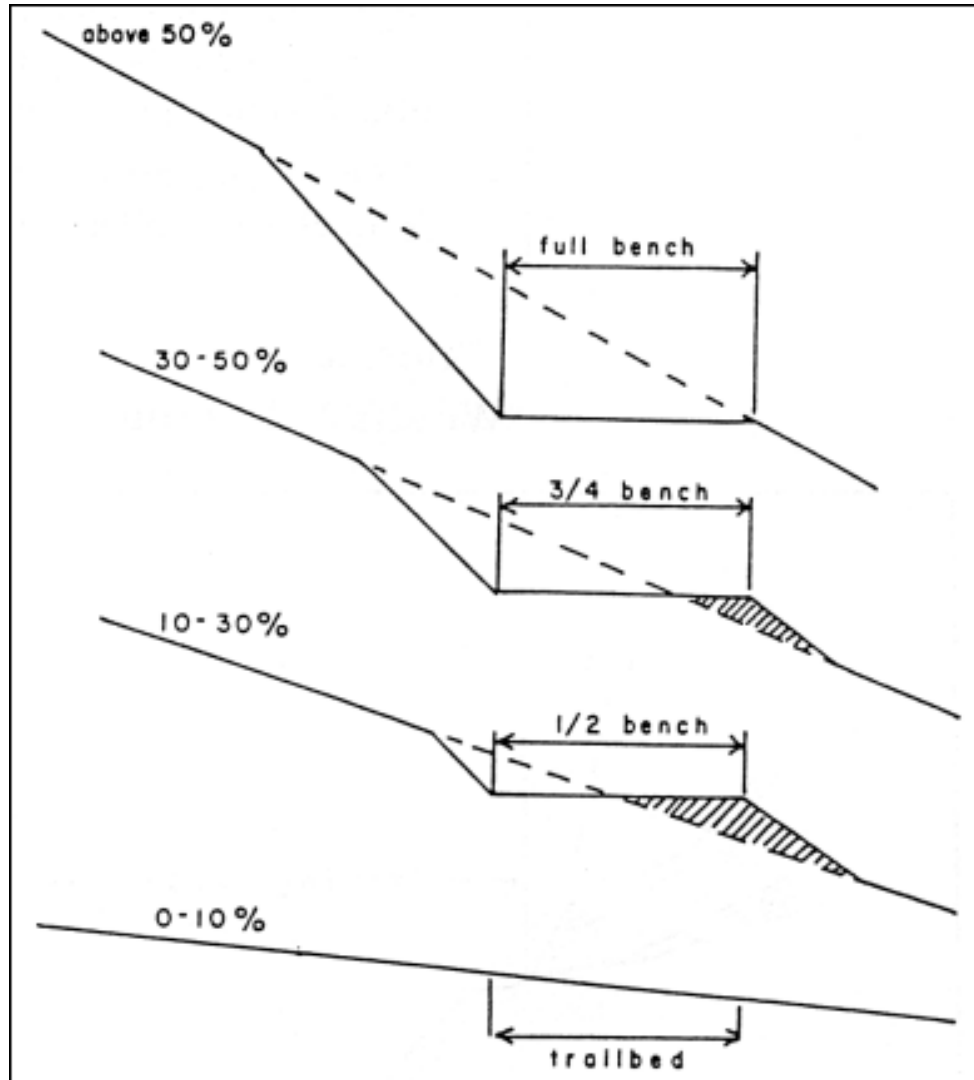
DRAWING NO.  
**STD\_910-01**

SHEET  
 OF

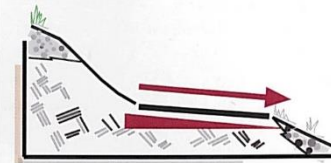


# Trail Diagram

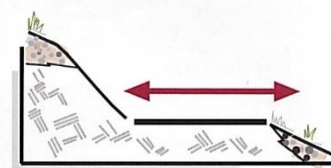
## Bench cuts and tread shapes



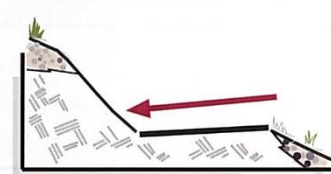
Outslope



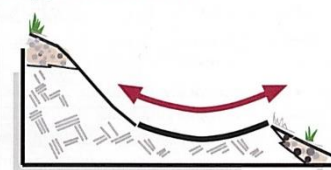
Flat trail tread



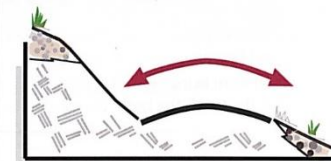
Insloped trail tread



Cupped trail tread



Crowned trail tread



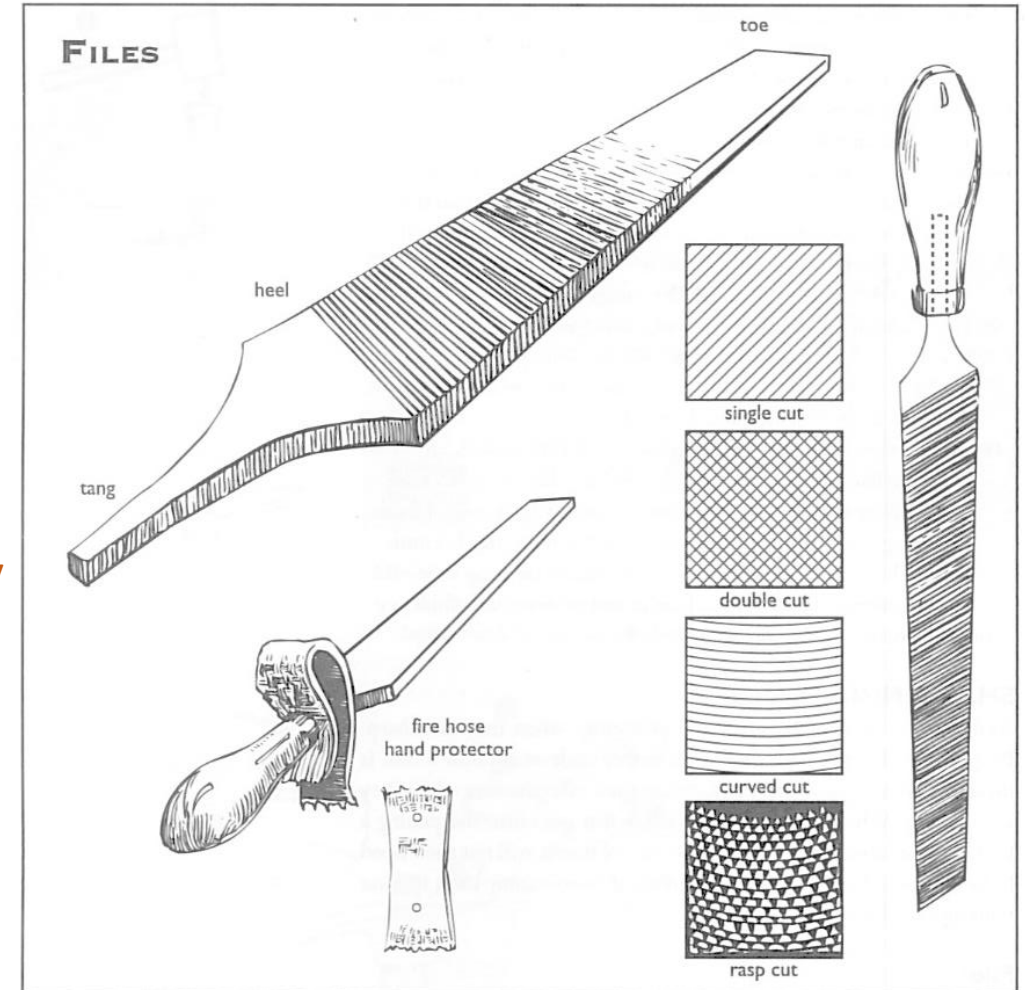
# Tools – Tool Maintenance

Properly maintained tools are safer and easier to use.

- Sharp
- Head secured to handle
- Handle without cracks, checks, or splits

## Sharpening a tool

- Is the tool meant to be sharpened?
- Secure the tool
- Protect yourself
- Sharpen only the correct bevel
  - Most tools are single bevel and should only be sharpened on one edge.
- Double bevel tools
  - Axe
  - Sandvik
- Use the correct file



# Tools

## Cutting Tools

- Axe
  - Single-bit
  - Double-bit
  - Boy scout
- Pulaski
- Saws
  - Handsaw
  - Crosscut saw
  - Bow saw
  - Pole saw
- Loppers
- Hand pruners
- Machete
- Sandvik
- Swizzle





# Tools

## Digging Tools

- Shovel
  - Long-handle
  - D-handle
  - Fire
- Pick Mattock
- Cutter Mattock
- Digging/tamping Bar
- Grub Hoe
- Adze Hoe



# Tools

## Other Tools

- Rock Bar
- Rock Hammers
  - Single Jack
  - Double Jack
  - Rock Pick
  - Chisel Edge
  - Spalling
  - Rifting
  - Stone Buster
- Hand Chisels
- Feather and Wedges
- Ratchet Winch – come along
- Griphoist
- Brush Cutter
- Wheelbarrow
- Buckets
- Canvas Bag
- Flagging



# Brushing

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## Clearing vegetation from established trails.

- Removal of limbs, trees, or bush
- Vegetation should not obscure the trail or line of sight.
- Allows a trail user to travel without going through or around trailside vegetation, even if weighted down by rain or snow.

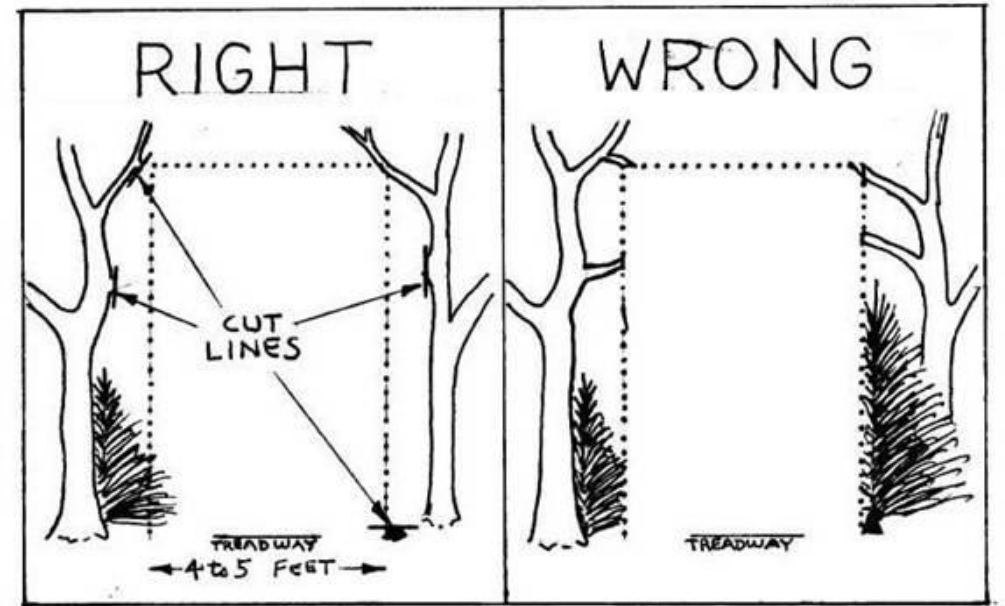
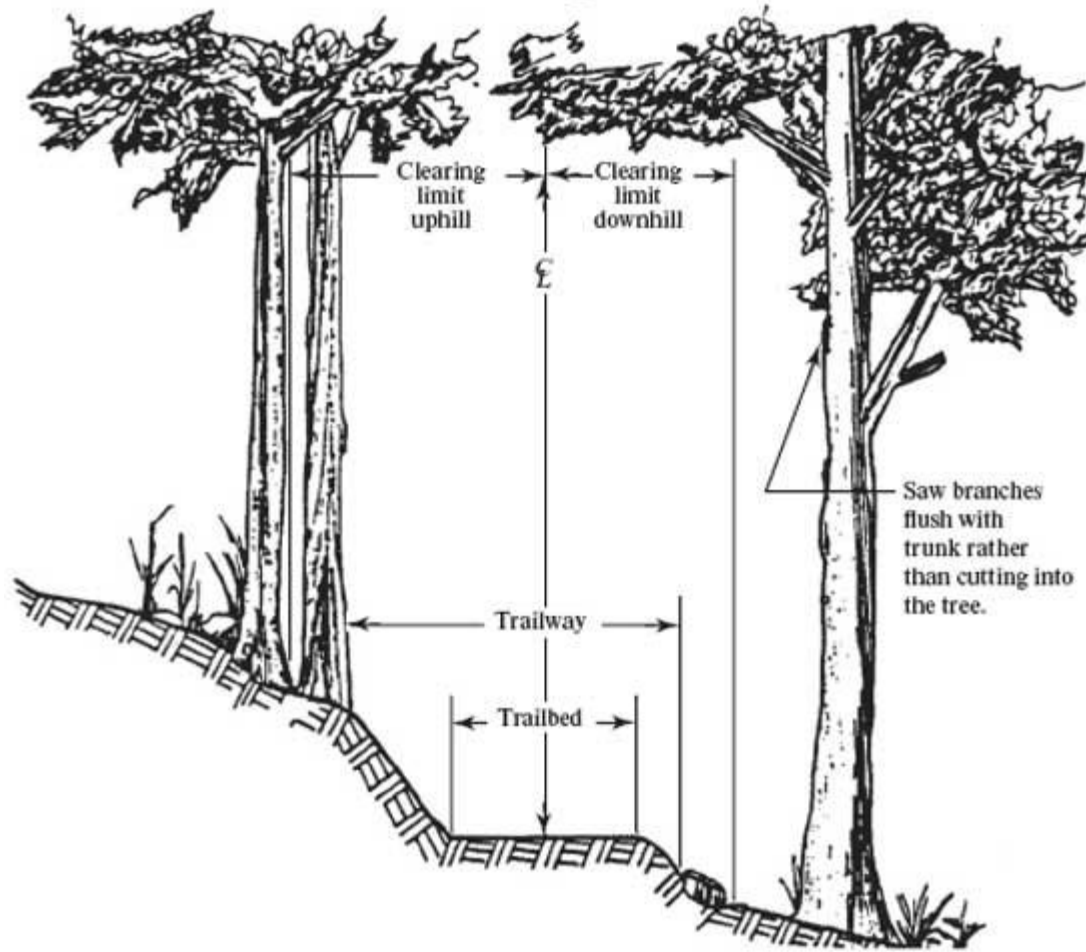
## Constant maintenance need for most of us here.

## Basic rules of thumb.

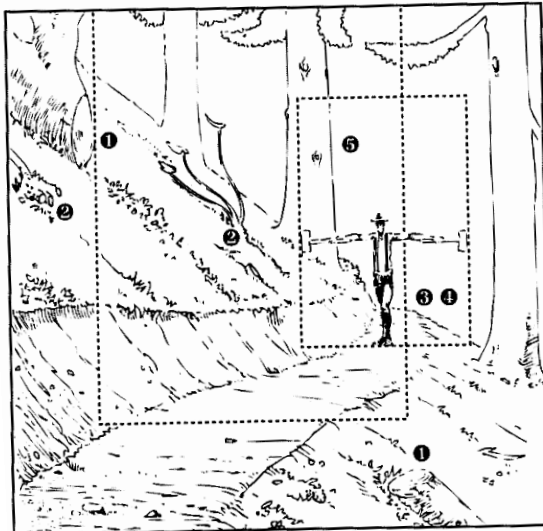
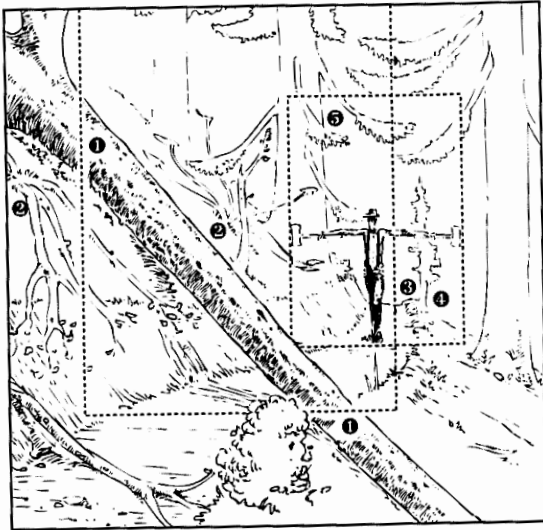
- Hiking trails – 8ft high and 6ft wide
- Bike, Motorcycle, or Equestrian trails – 10ft high and 8ft wide
- Cut more on the uphill side and leave more on the downhill side
- Keyhole method
- Prune or cut back properly



# Brushing

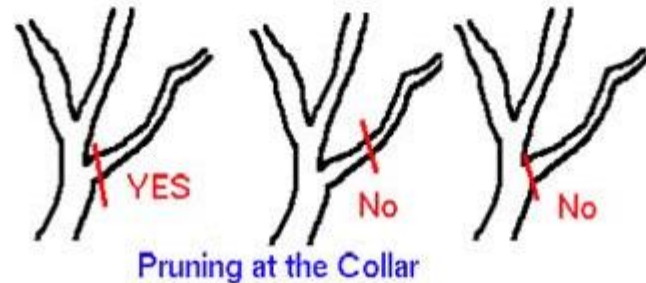


# Brushing



## Trail Brushing Maintenance ~ Key Elements to Good Pruning ~

- 1. Prune to the collar of any branch stem** for the health of the shrub and a more natural looking result. At the base of any branch, there is a wide section that contains a plant's natural healing agents. Any pruning performed away from this collar will expose the plant to a greater risk of infection. A cut at the collar will naturally heal. For large branches over 2" in diameter, cut from the bottom, then cut down from the top. This prevents tearing of the bark and helps reduce infection
- 2. Place debris out of view.** This element requires the extra effort of dragging branches under and around shrubs. Place the cut or butt end of the branch away from the trail. This will help disguise the debris. Each cut branch should touch the ground to promote decomposition, which means that brush piles are not appropriate. Never place brush in water drainage areas.
- 3. Pruning should be done sensitively** so that the trail appears natural and it does not appear as if a chain saw just blasted through. Trail users should not be aware that any maintenance work has recently been done. Multi-use trails should have 10' vertical and 5' horizontal clearance. Of course, there will be exceptions for the sake of protecting a particular tree or trail flow, for example.



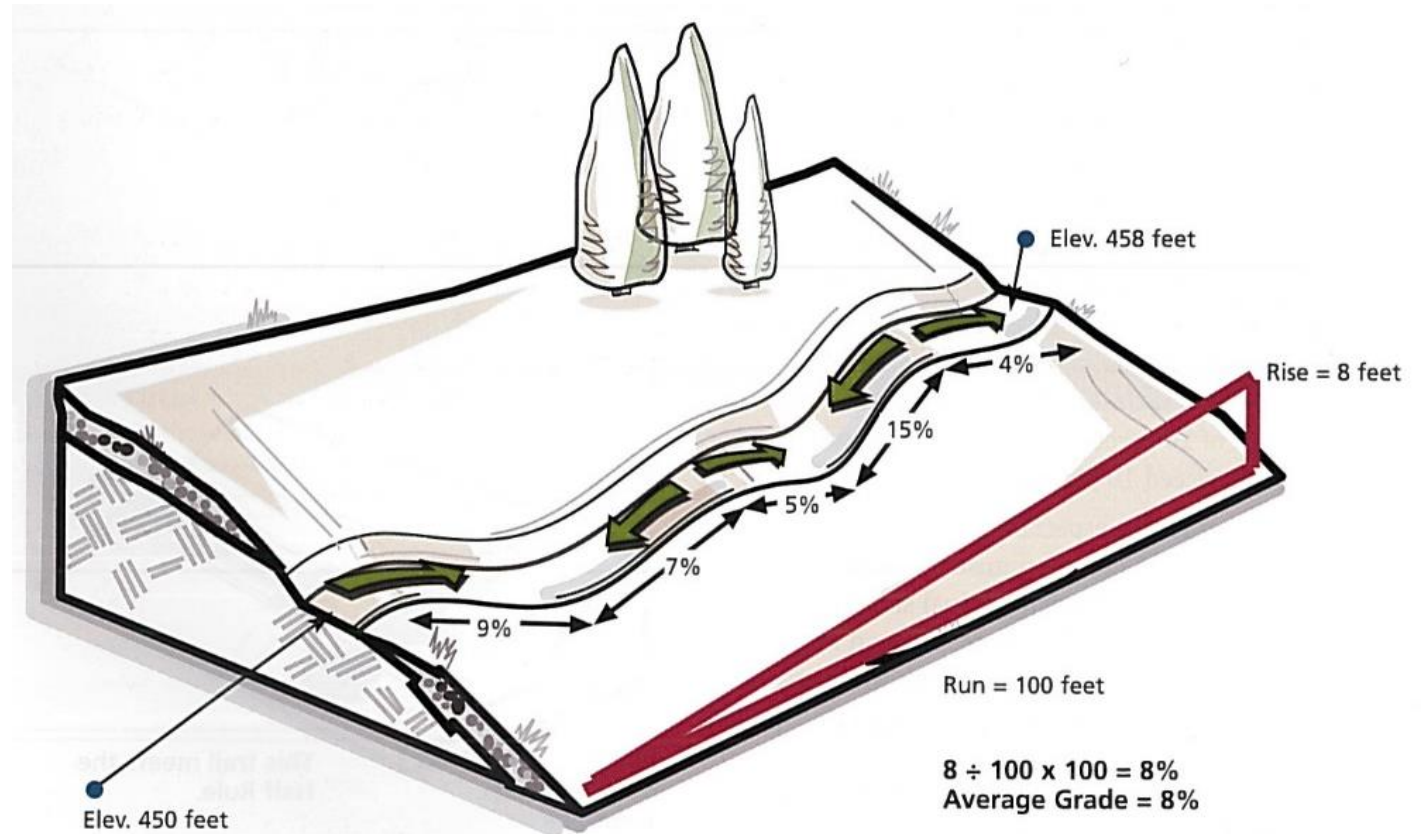
# Drainage

Cleaning drainage is the most important maintenance task and needs to be done on time.

- Not maintaining the drainage on the trail results in minor erosion to catastrophic failure
- Once the soil is gone its very hard to replace
- Maintaining drainage protects the trail as well as surrounding environment

## Types of Drainage Features

- Out slope
- Water Bars
  - Earthen
  - Timber Reinforced
  - Rock Reinforced
- Culverts and Ditches
- Drain Dips or Grade Dips
- Knicks
- Grade Reversals



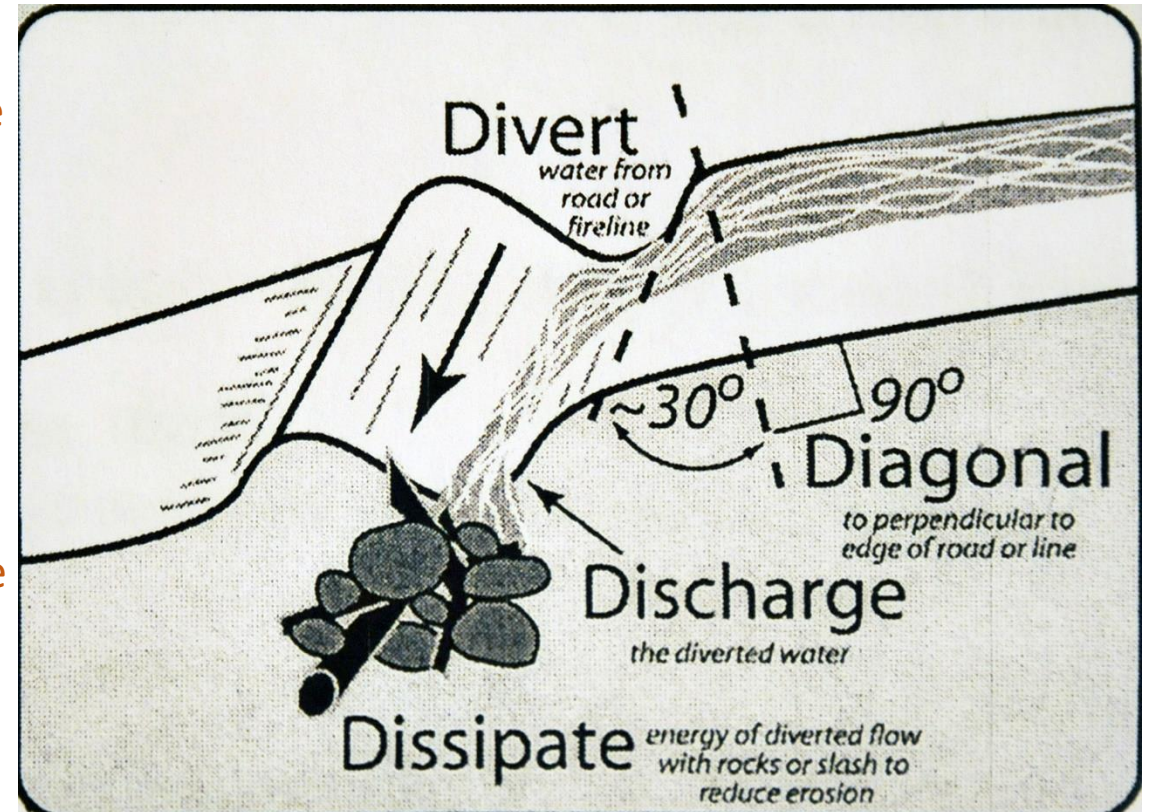
# Drainage – Water Bars

**Water Bars indicate a trail was not properly laid out or constructed.**

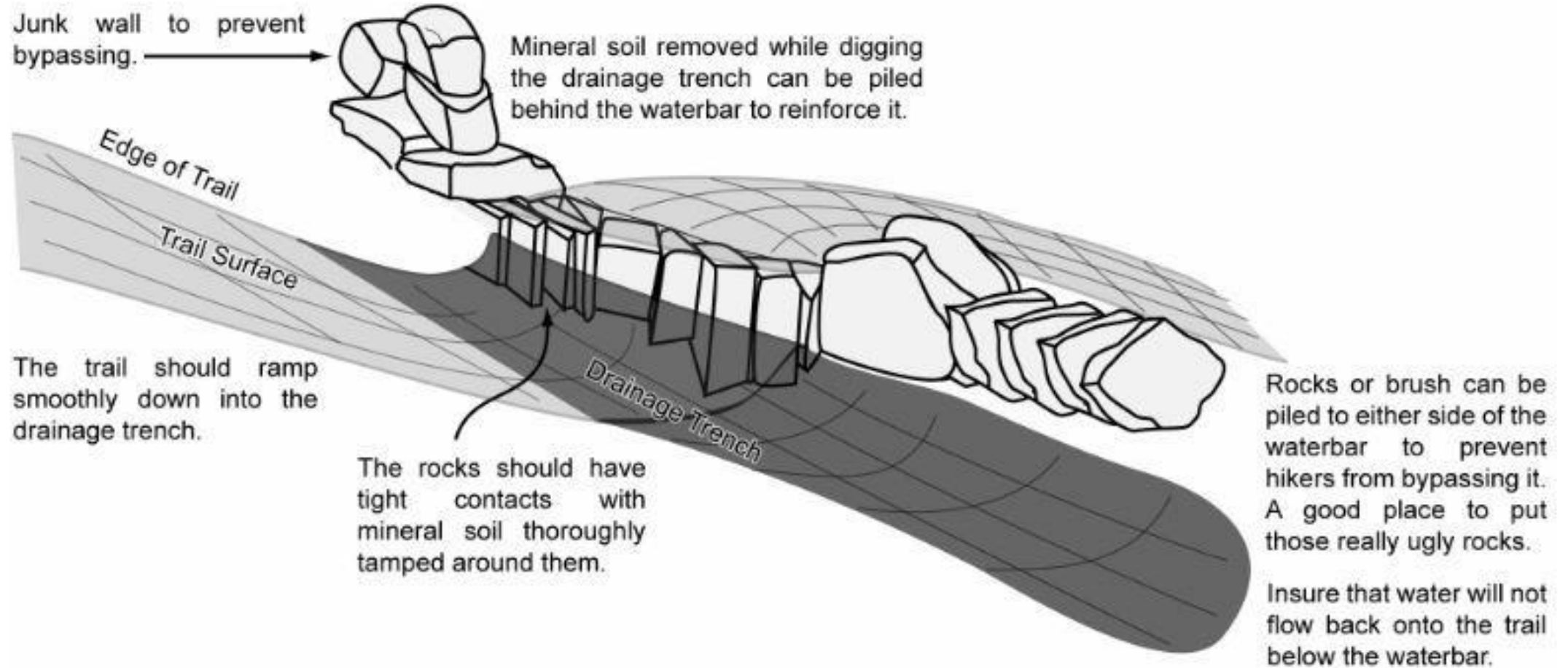
- Rock Reinforced > Wood Reinforced > Earthen
- Belted water bars allow tires to easily roll over structure
  - Used on Mt. bike and OHV trails, but typically wouldn't recommend

**What makes a good water bar?**

- It actually works! – Put it in the right place
- 30-60° to perpendicular - 45° is good start
- Big
- Wide
- Subtle
- Not easy to go around
- Rock reinforced is best
- Turn the water before the water bar
- Discharge the water without causing more erosion

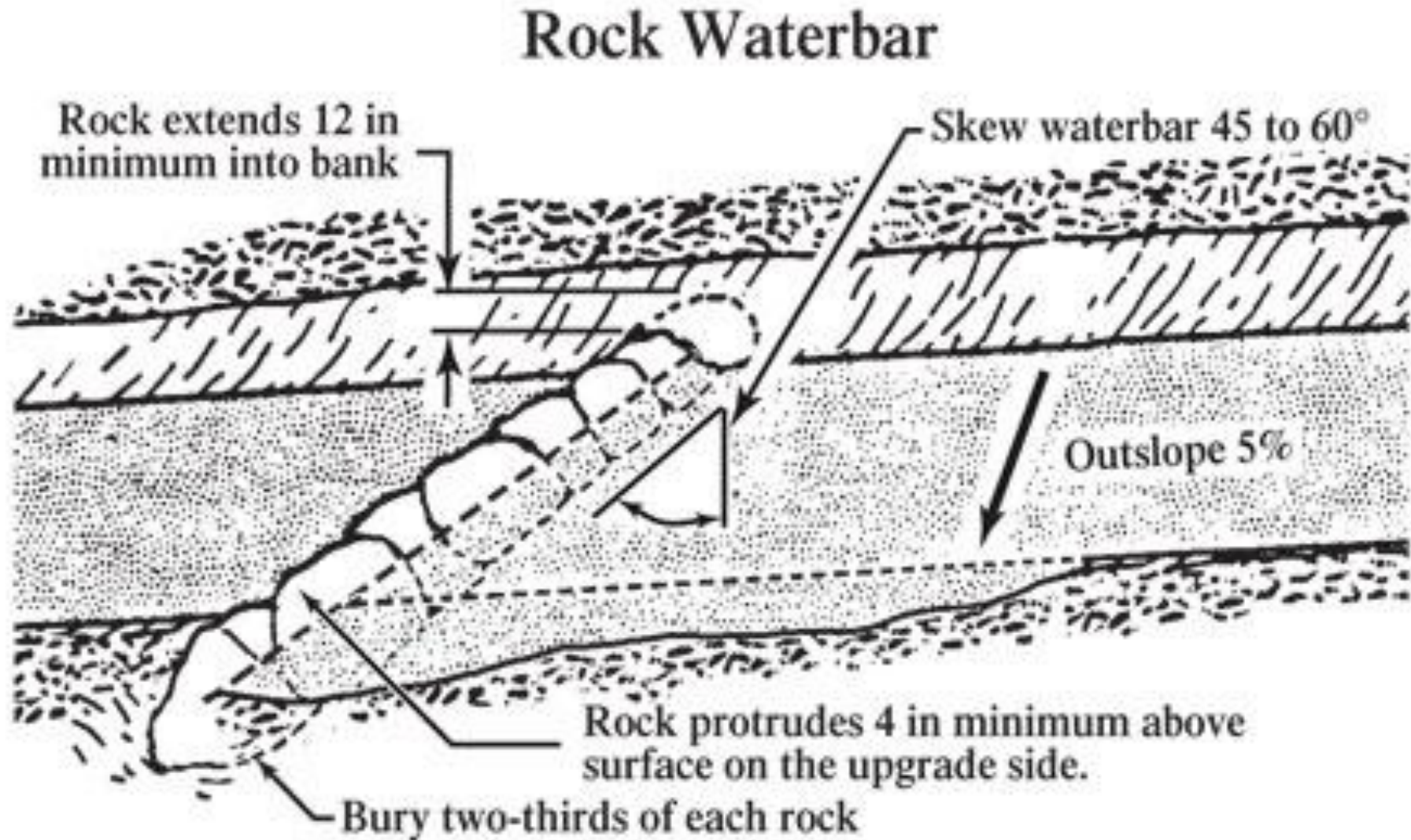


# Drainage – Water Bars



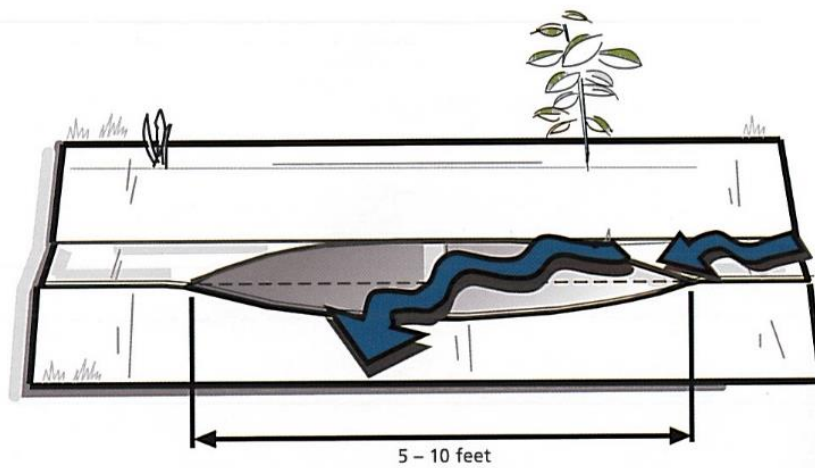
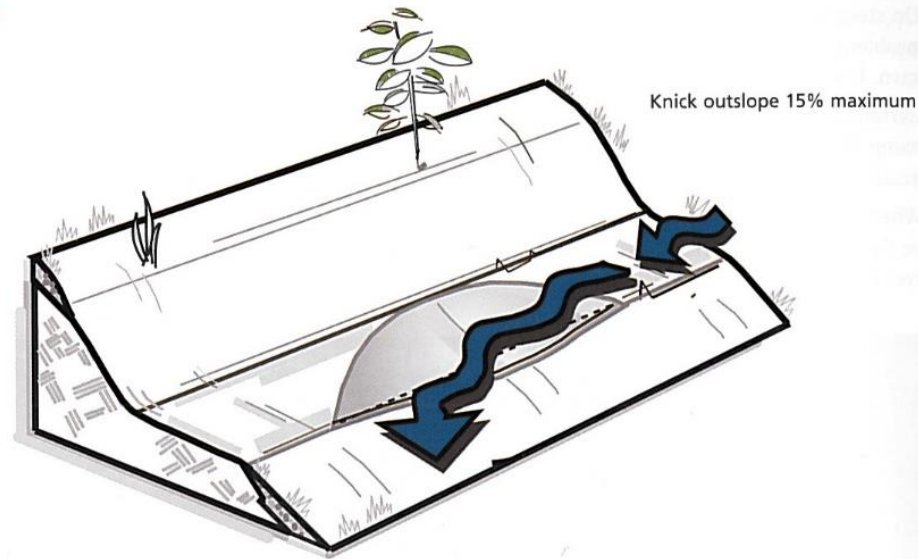


# Drainage – Water Bars



# Drainage – Knicks

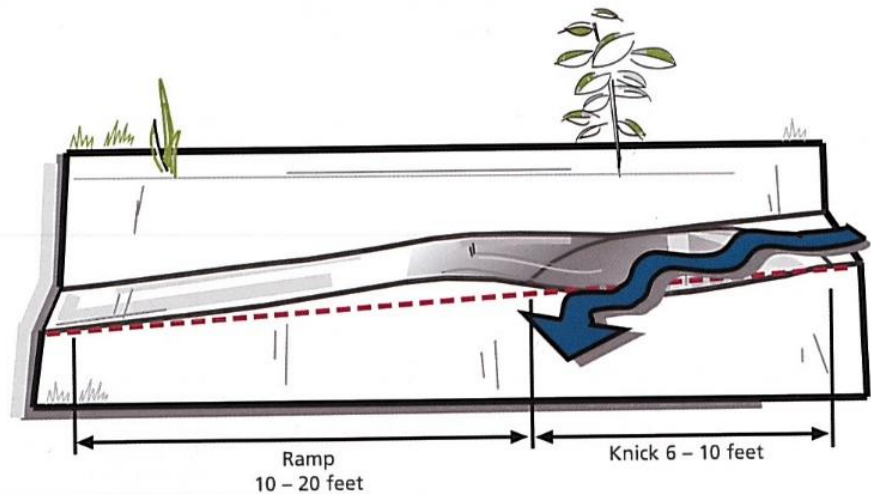
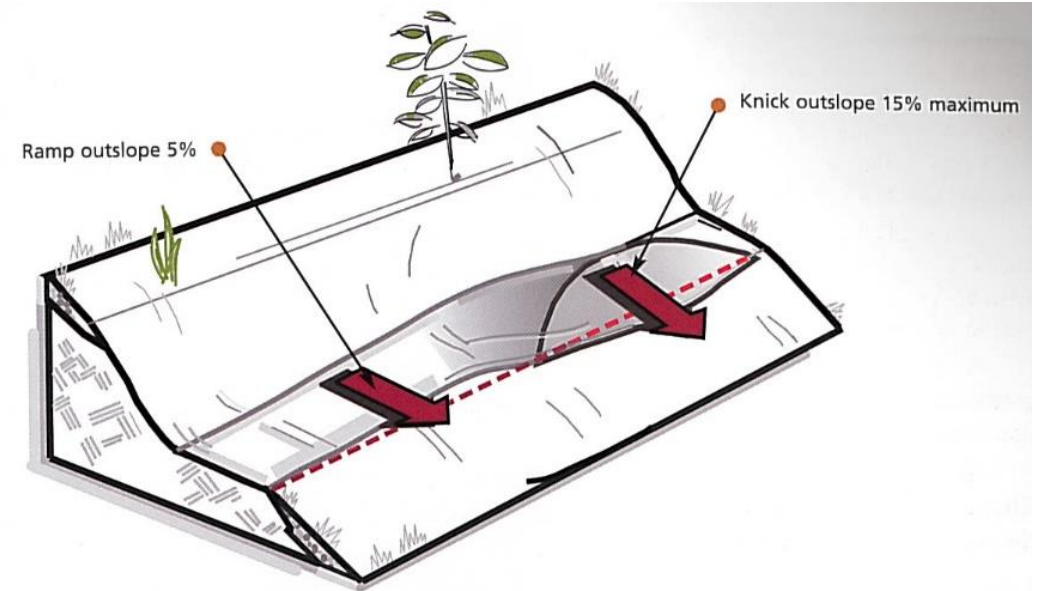
| Knick



# Drainage – Rolling Grade Dip

## A built grade reversal.

- Superior to water bars
- Lower maintenance
- Most users don't even notice
- Withstands multiple types of use



# Logout

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## Removal of downed trees that cross or impact the trail.

- Most easily understood and one of the most appreciated trail maintenance tasks
- Makes travel on the trail easier
- Protects resources because people don't have to go around
- Reduces common trail user complaints

## Things to think about.

- Can use downed trees to define trail or narrow trail sections
- Does the tree have to be removed? It depends...
- Is it safe to remove the tree?
- What about a leaner or widow maker?
- Pay attention to binds
- Make your cuts count
- Leave the trail safe to pass – No sharp angles protruding into the trail
- Put all debris on the downhill side – Don't block drainage
- Tool of choice or tool for the job?



# Questions and Discussion



# References

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**Trail Construction and Maintenance Notebook, 2007 Edition. USDA Forest Service, Missoula Technology and Development Center.**

**AMC's Complete Guide to Trail Building and Maintenance, Fourth Edition. Staff of AMC's Trails Department; Appalachian Mountain Club Books.**

**Lightly on the Land, The SCA Trail Building and Maintenance Manual, Second Edition. Robert C. Birkby**

**Trail Solutions, IMBA's Guide to Building Sweet Singletrack. Vernon Felton**

**Trailism.com. Trail: building, science, art, journeys, and gear.**

