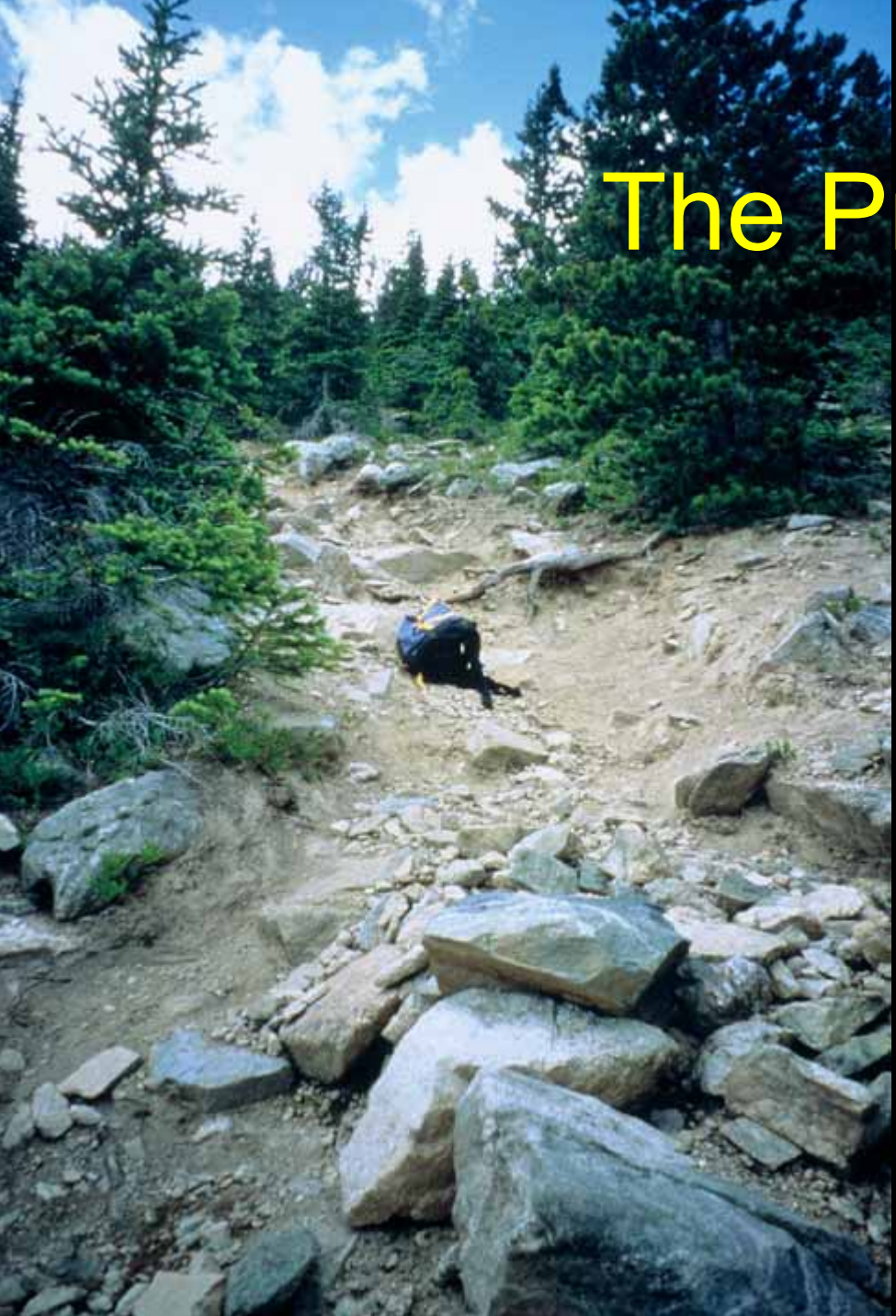
IMBA's Mission:

To Create, Enhance, and Preserve
Opportunities for Mountain Bikers Worldwide

A Sustainable Trail...

- Protects the environment.
- Meets the needs of its users.
- Requires little maintenance.
- Minimizes conflict between different user groups.



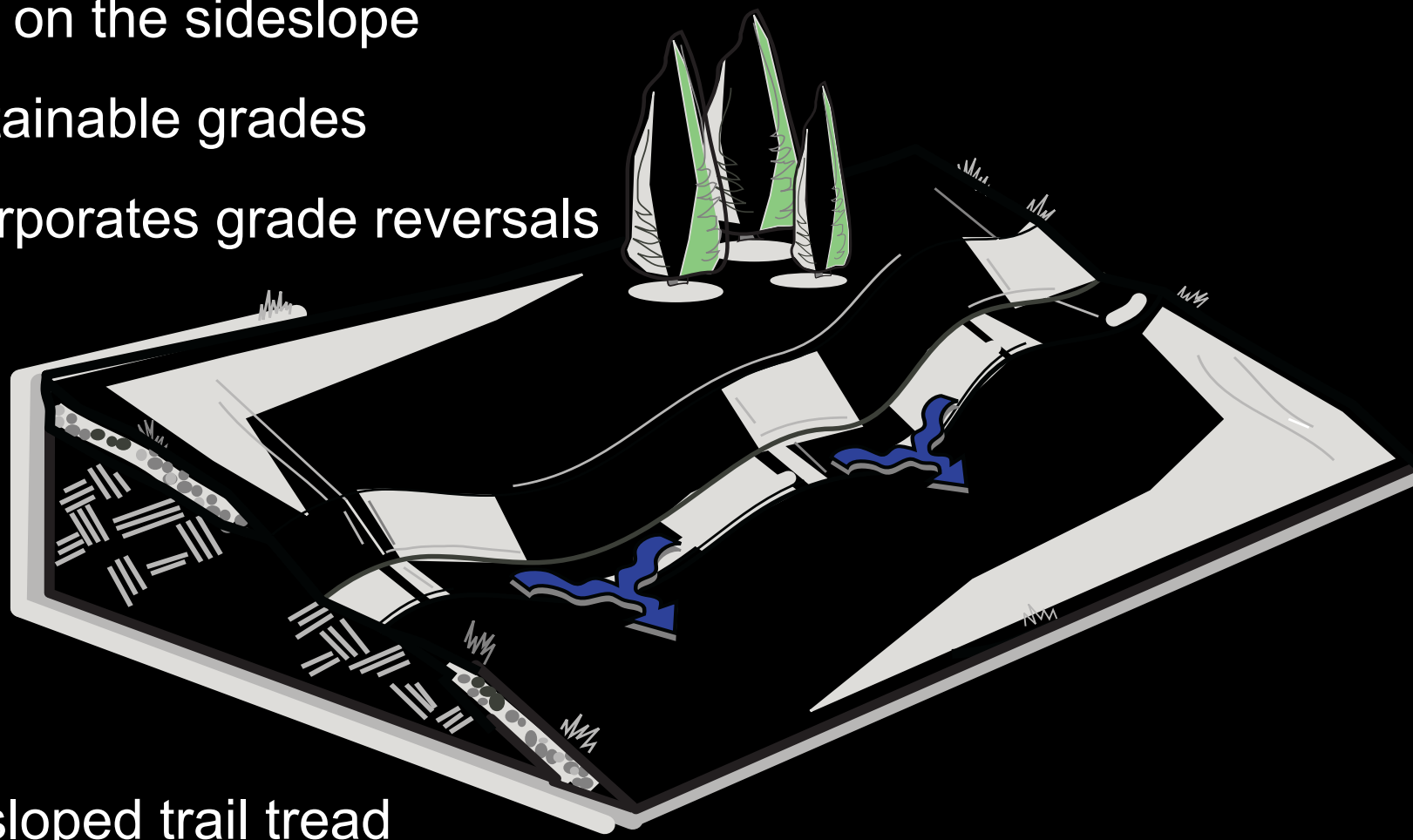
The Problem: Erosion

Erosion is a natural process caused by water and wind.

The Solution: Rolling Contour Trails

Rolling Contour Trail

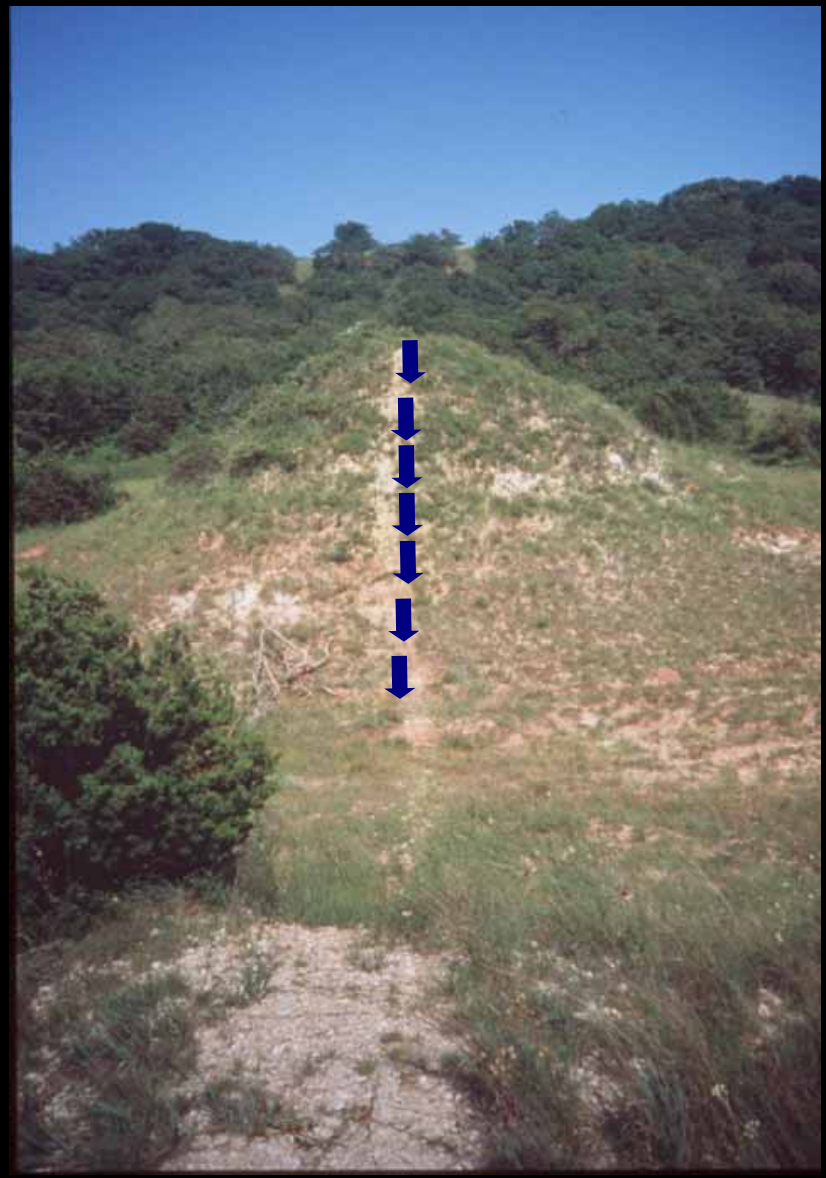
- Built on the sideslope
- Sustainable grades
- Incorporates grade reversals



- Outsloped trail tread
- Facilitates sheet flow

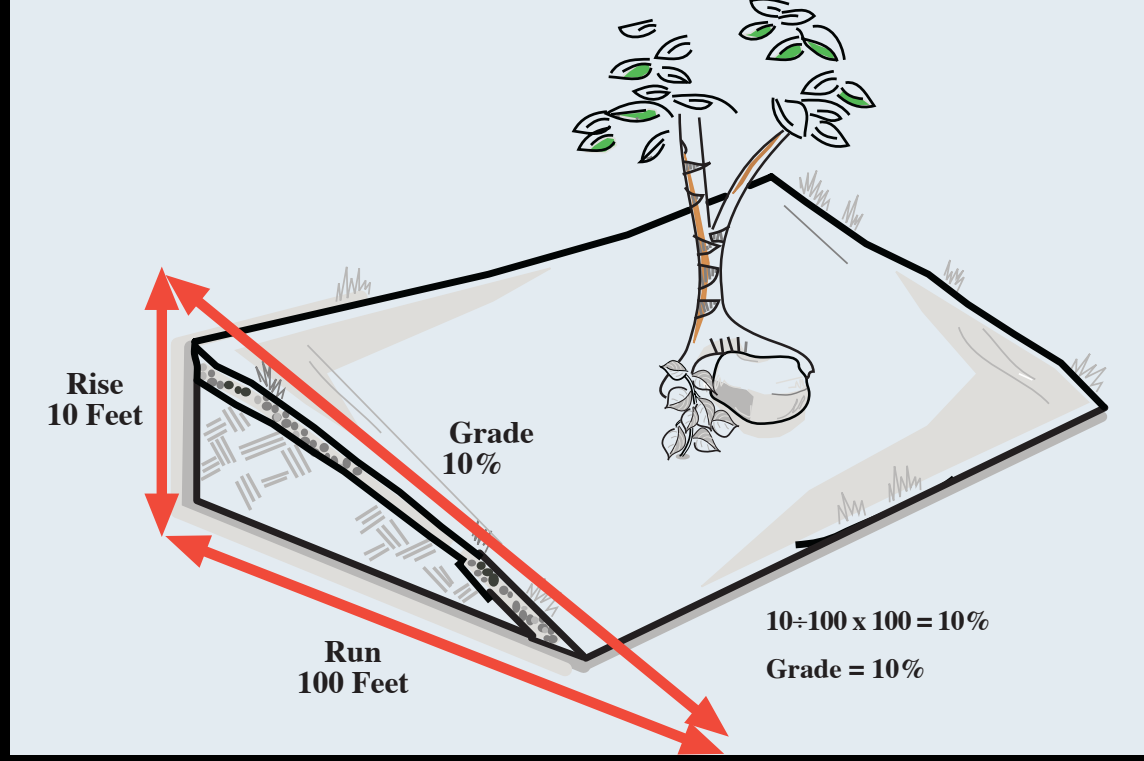
Built on the Sideslope

Avoids the Fall Line



Avoids Flat Areas

What is Grade?

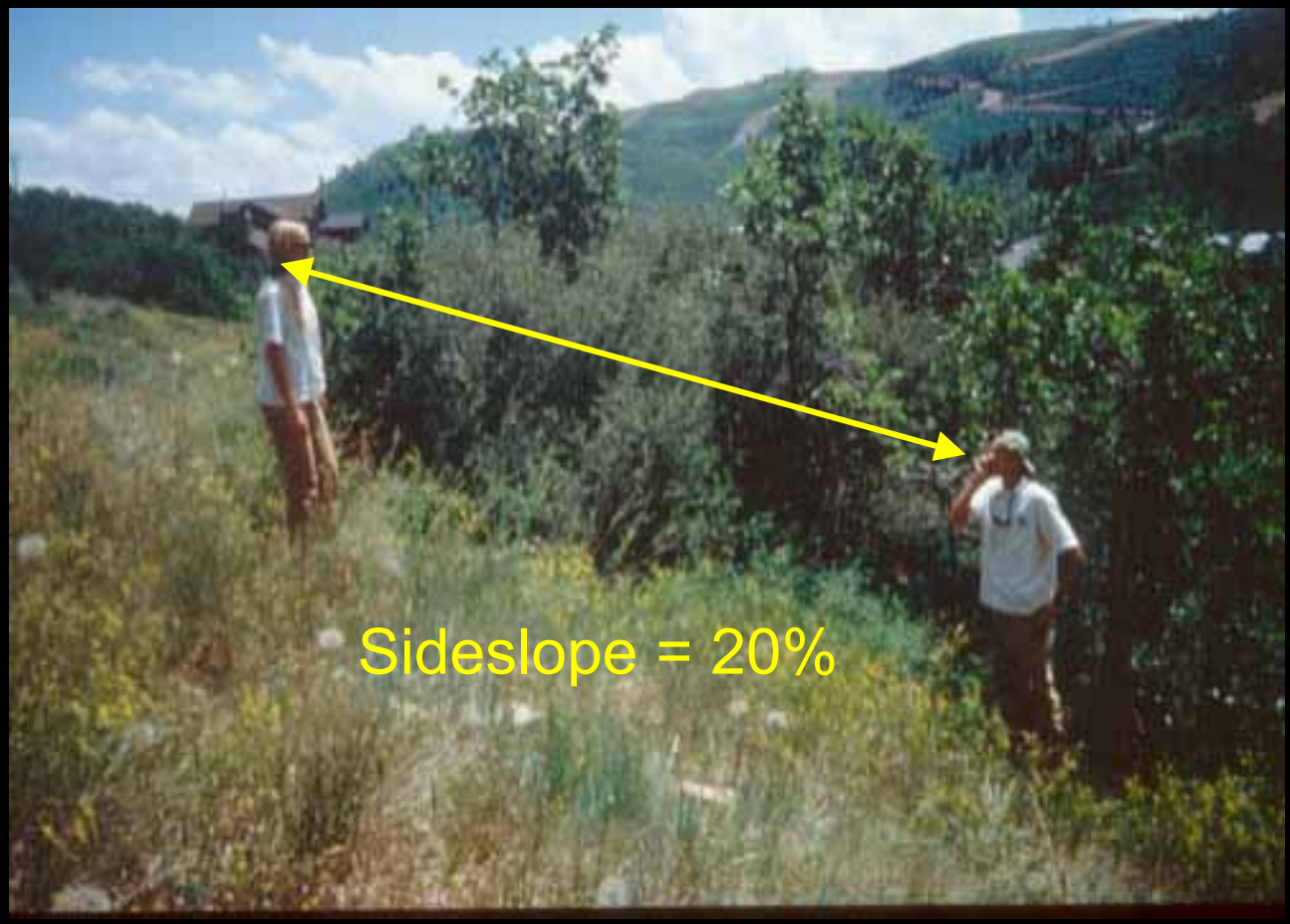


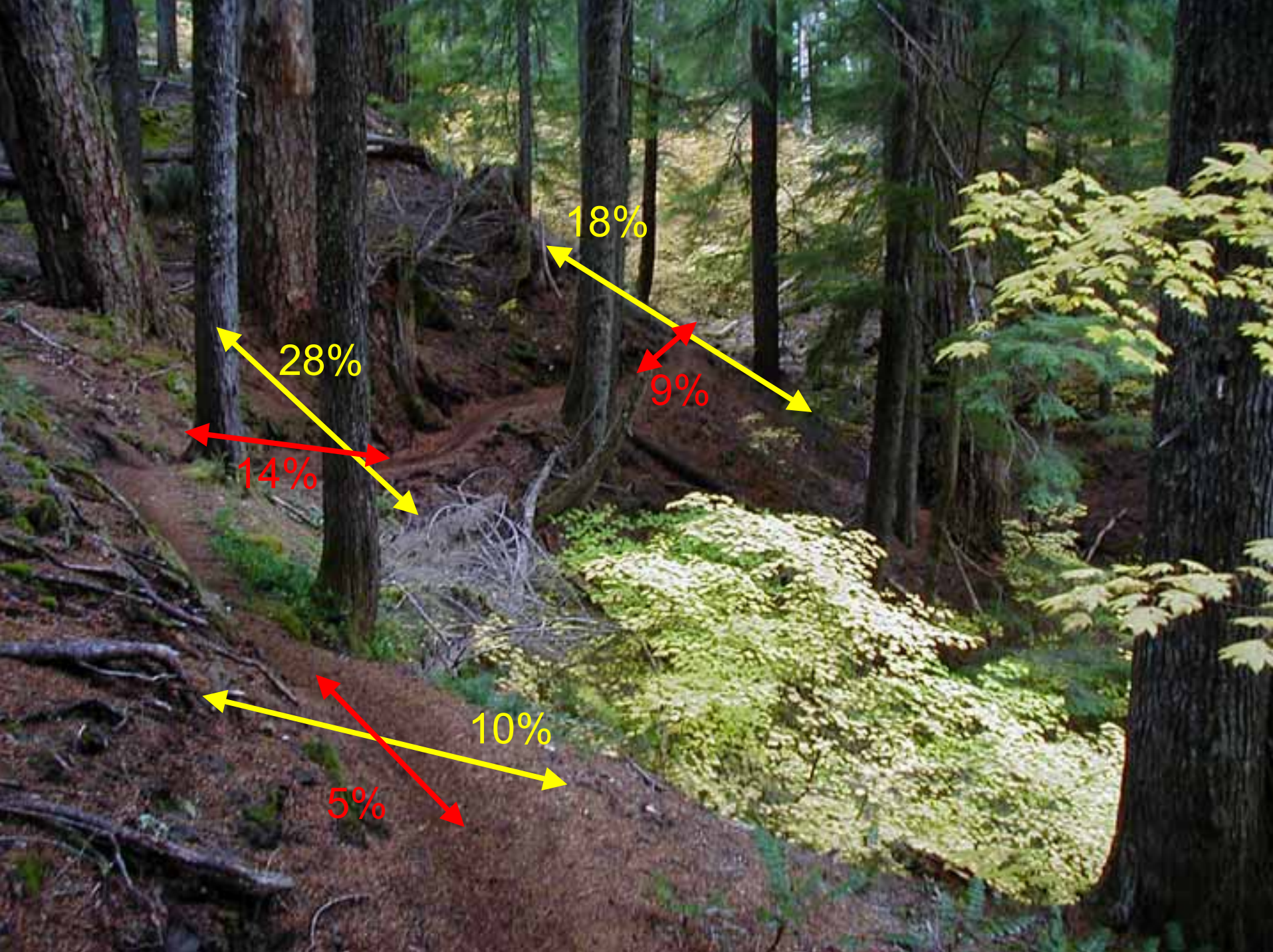
Five Elements of Sustainable Grade

- The Half Rule
- The Ten Percent Average Guideline
- Maximum Sustainable Grade
- Grade Reversals
- Outslope

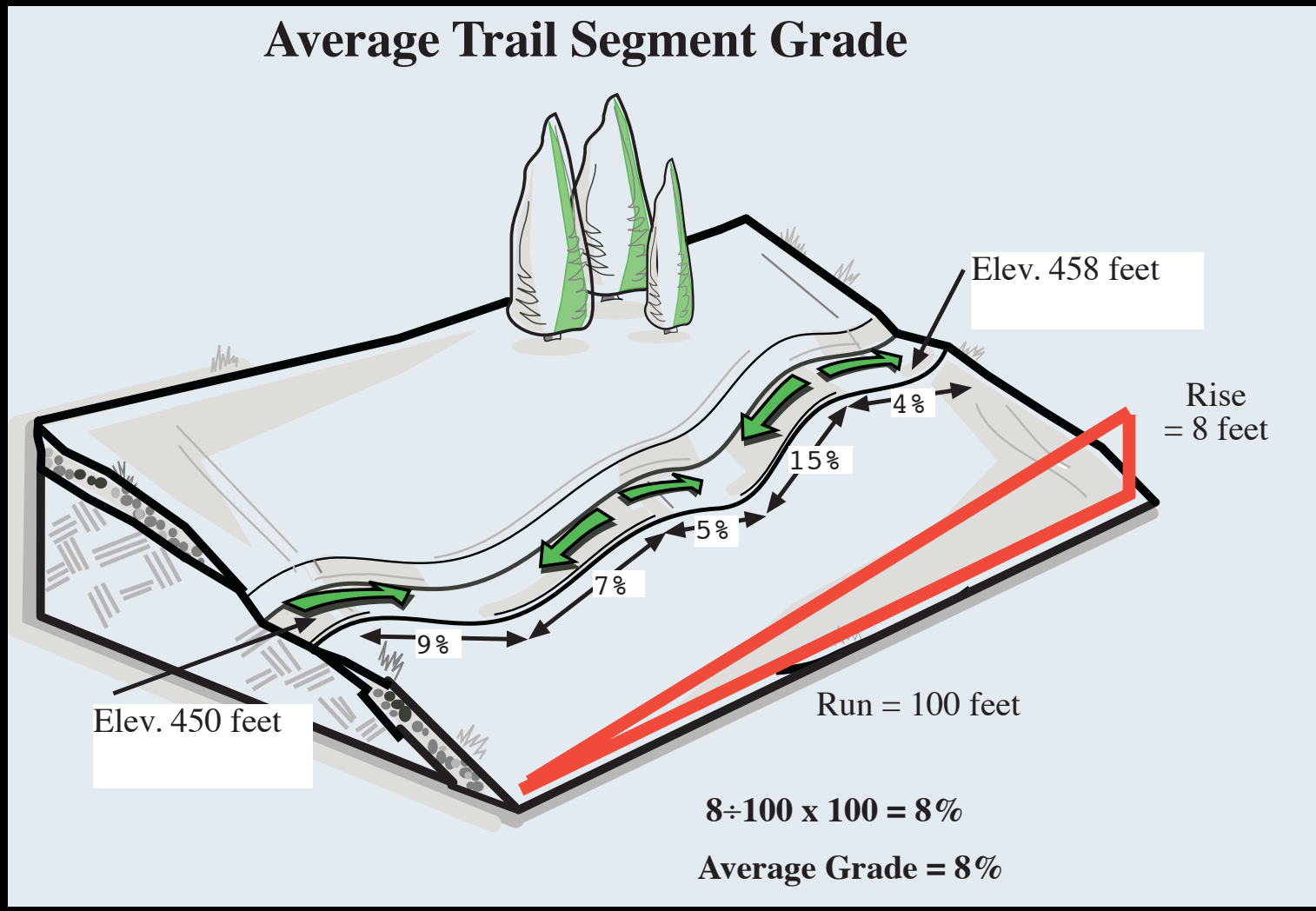
The Half Rule:

Keep the grade of the trail less than half the grade of the sideslope, to keep water from diverting down the tread.




18%
9%
28%
14%
10%
5%

The 10% Average Guideline



Maximum Sustainable Trail Grades

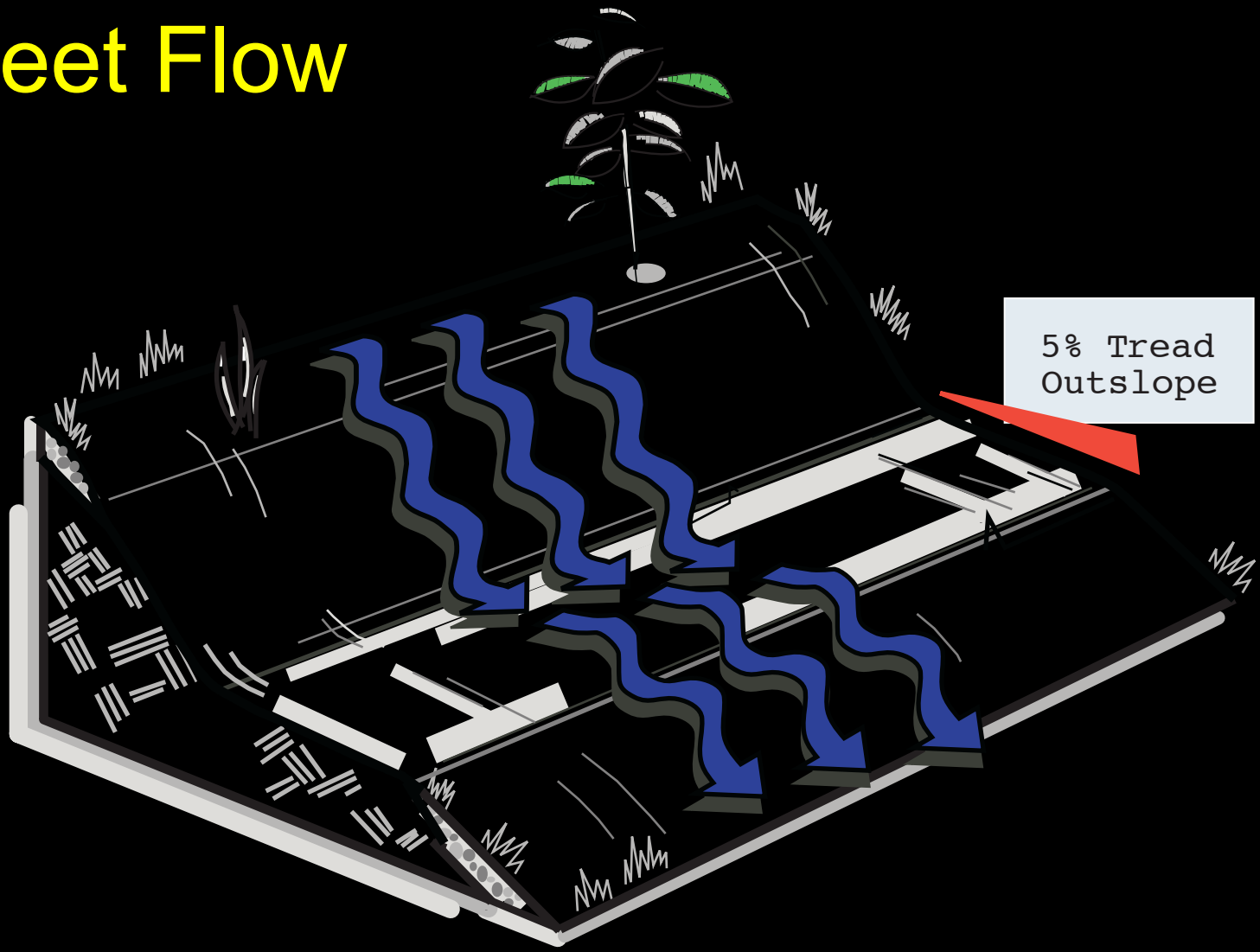
- Half Rule
- Soil Type
- Rock
- Annual Rainfall Amount
- Grade Reversals
- Type of Users
- Number of Users
- Difficulty Level

When in doubt, design trails with conservative grades.

Grade Reversals

Grade Reversals

Sheet Flow



Sheet Flow

Using a Clinometer


°
(DEGREES)
%
(PERCENT)
10
0
10
SUUNTO

Trail Difficulty Rating System

	Easiest White Circle	Easy Green Circle	More Difficult Blue Square	Very Difficult Black Diamond	Extremely Difficult Dbl. Black Diamond
Trail Width	72" or more	36" or more	24" or more	12" or more	6" or more
Tread Surface	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
Average Trail Grade	Less than 5%	5% or less	10% or less	15% or less	20% or more
Maximum Trail Grade	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
Natural Obstacles and Technical Trail Features (TTF)	None	Unavoidable obstacles 2" tall or less Avoidable obstacles may be present Unavoidable bridges 36" or wider	Unavoidable obstacles 8" tall or less Avoidable obstacles may be present Unavoidable bridges 24" or wider TTF's 2' high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or wider TTF's 4' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or greater Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or narrower TTF's 4' high or greater, width of deck is unpredictable Many sections may exceed criteria

Trail Difficulty Rating System

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Effective Signage

Sign Types

Trailhead Kiosks

Directional Signage

Warning Signs

Difficulty-Level Signs

Regulatory Signs

Educational Signs

Kiosk Signage

- Let users know the local rules.
- Provide explanations for regulations.
- Provide information on how to volunteer.
- List emergency contact information.
- Be positive rather than negative.

Regulatory and Difficulty Level Sign at Intersection

Interpretive and Educational Signage

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DirectionalSignage

Maps

TELEGRAPH TRAIL SYSTEM

CITY OF DURANGO

SIGN # 39 FOR EMERGENCY

Fort Lewis College

RIM TRAIL

COLLEGE Dr

HORSE GULCH ROAD

Raider Ridge

DOWN N OUT

EXTENDED RIDGE

ROCKY ROAD

CUCHILLO

MIKE'S TRAIL

SIDEWINDER

STACY'S LOOP

MEADOW LOOP

TELEGRAPH TRAIL

ANASAZI DESCENT

TELEGRAPH

PALITSKY POINT

CRITES CONNECT

GRANDVIEW RIDGE

COWBOY TRAIL

BIG CANYON

CARBON JUNCTION TRAIL

SOUTH RIM TRAIL

BIG SANYON TRAIL

WEST ROAD

SALE BARN TRAIL

Dominguez Drive

HIGHWAY 550/160

HIGHWAY 3

SAWMILL Rd

ANIMAS RIVER TRAIL

Animas River

HWY 160

HWY 550

10th St

8th Ave

MAIN Ave

COLLEGE Dr

3rd St

TH

YOU are HERE

W — N — E

S

trail

paved trail

trailhead

dirt road
(closed to most vehicles)

SCALE
1 inch = 1/2 mile

- USE OF ALL TRAILS SHOWN ON THIS MAP IS AT YOUR OWN RISK!
- None of the entities listed on this map, nor any of the landowners, take any responsibility for the condition of the trails shown or the activities that you may encounter thereon.
- STAY ON TRAILS AND EXPECT ONCOMING TRAFFIC!
- Some of the trails in this area are on private land and permission to use them may be withdrawn at any time.

TRAIL INTERSECTION

MEADOW LOOP

TELEGRAPH

TELEGRAPH

U.S DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

LA PLATA COUNTY

- Fort Lewis College & FLC Foundation
- Colorado State Board of Agriculture
- First Presbyterian Church of Durango

DOT
DEPARTMENT OF TRANSPORTATION

CITY of DURANGO

IMBA INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION

Managing Visitors Through Trail Design

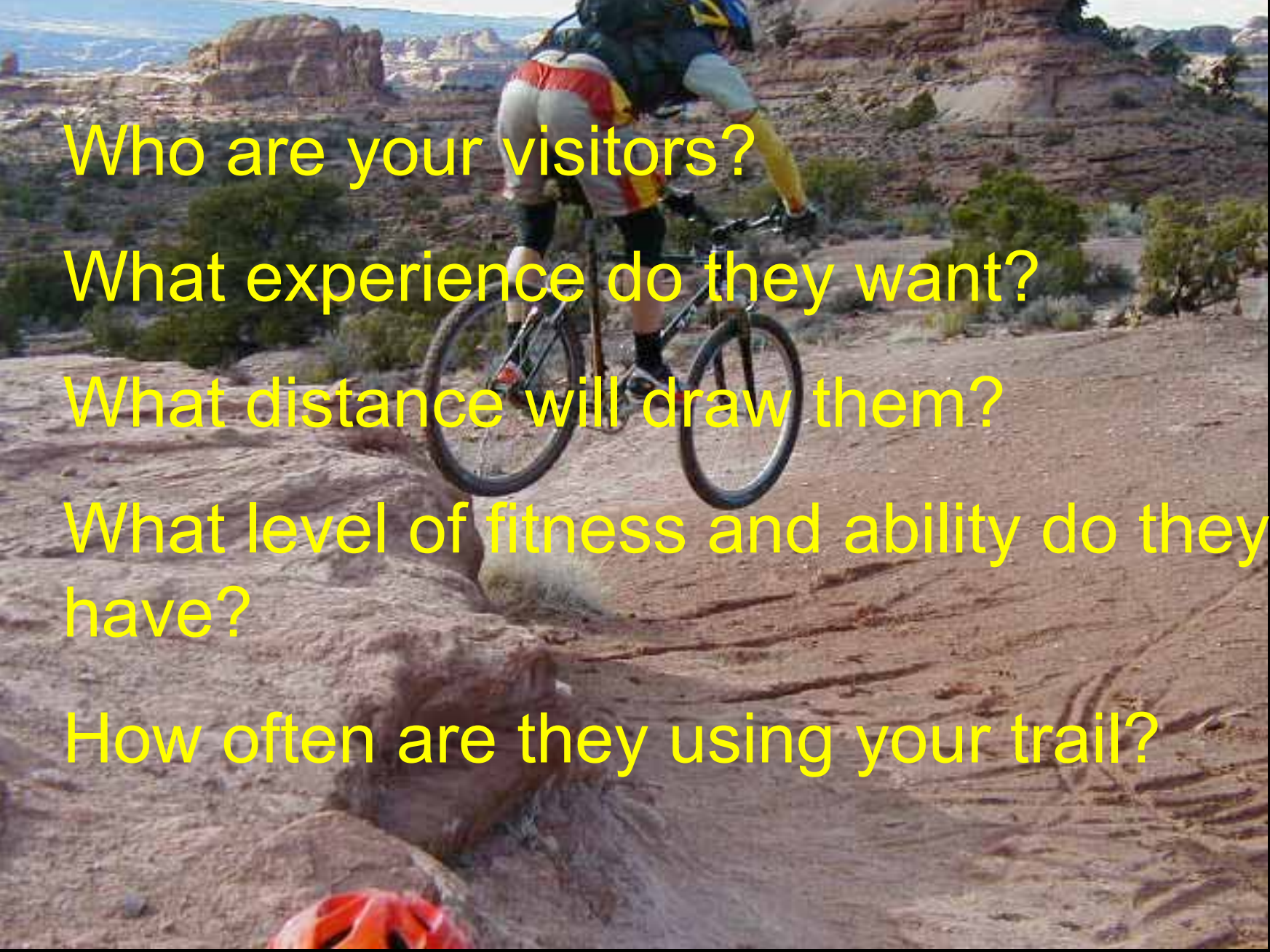
IMBA INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION

Eleven Steps to Better Trail Design

Step 1: Get Permission and Build a Partnership

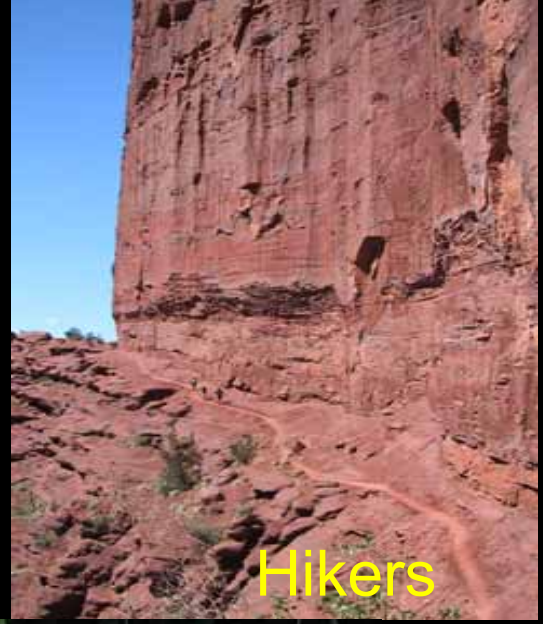
Step 2: Identify Property Boundaries

Step 3: Determine Visitors


Who are your visitors?
What experience do they want?
What distance will draw them?
What level of fitness and ability do they have?
How often are they using your trail?

Pedestrians


Walkers


Hikers


Trail runners


Backpackers

Equestrians

Mountain Bicyclists

Mobility Challenged

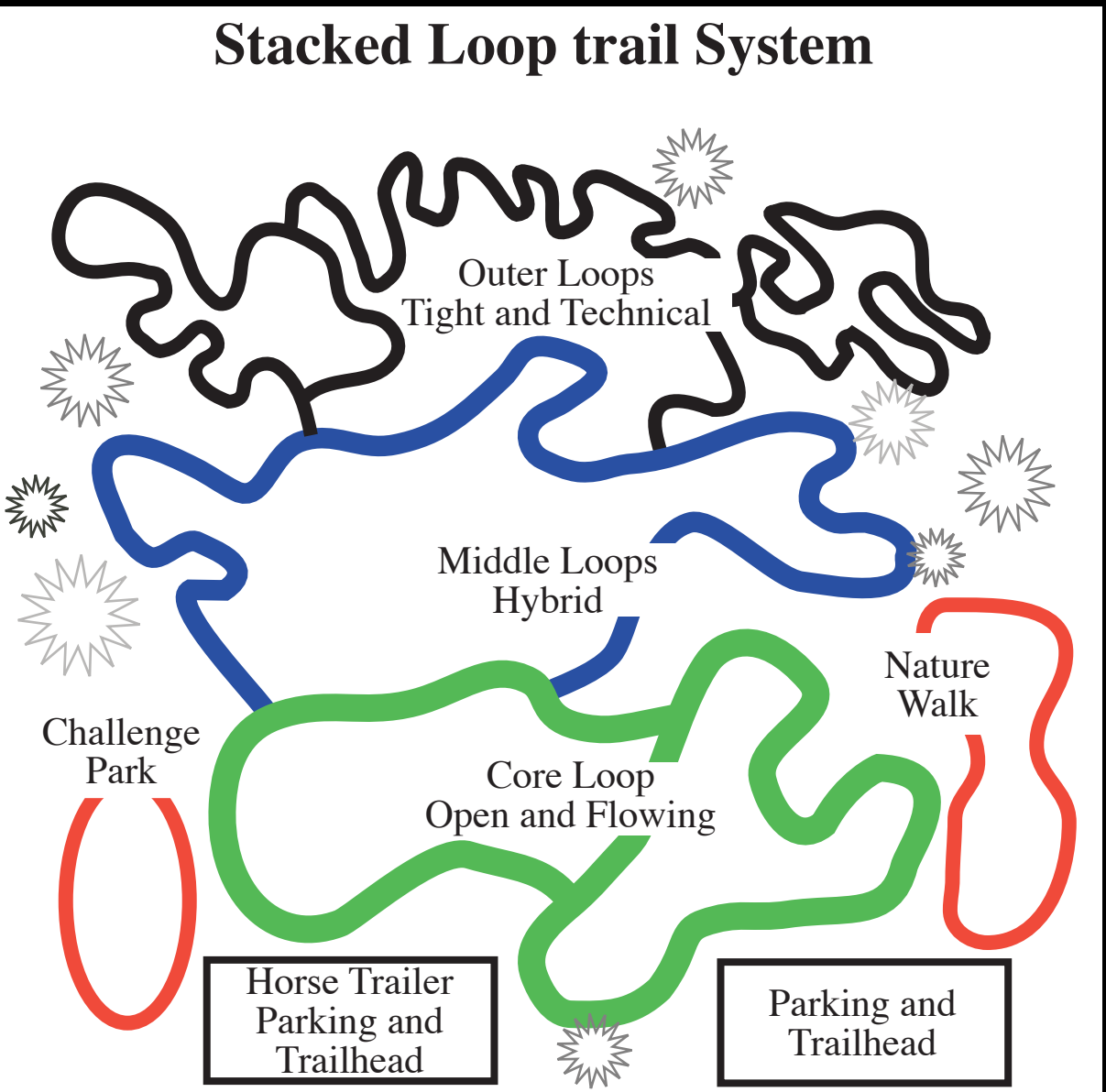
Step 4: Identify Control Points

Positive Control Points:

- Trailheads
- Scenic overlooks
- Unique vegetation
- Rock outcroppings
- Water features
- Turning platforms
- Bridge placement

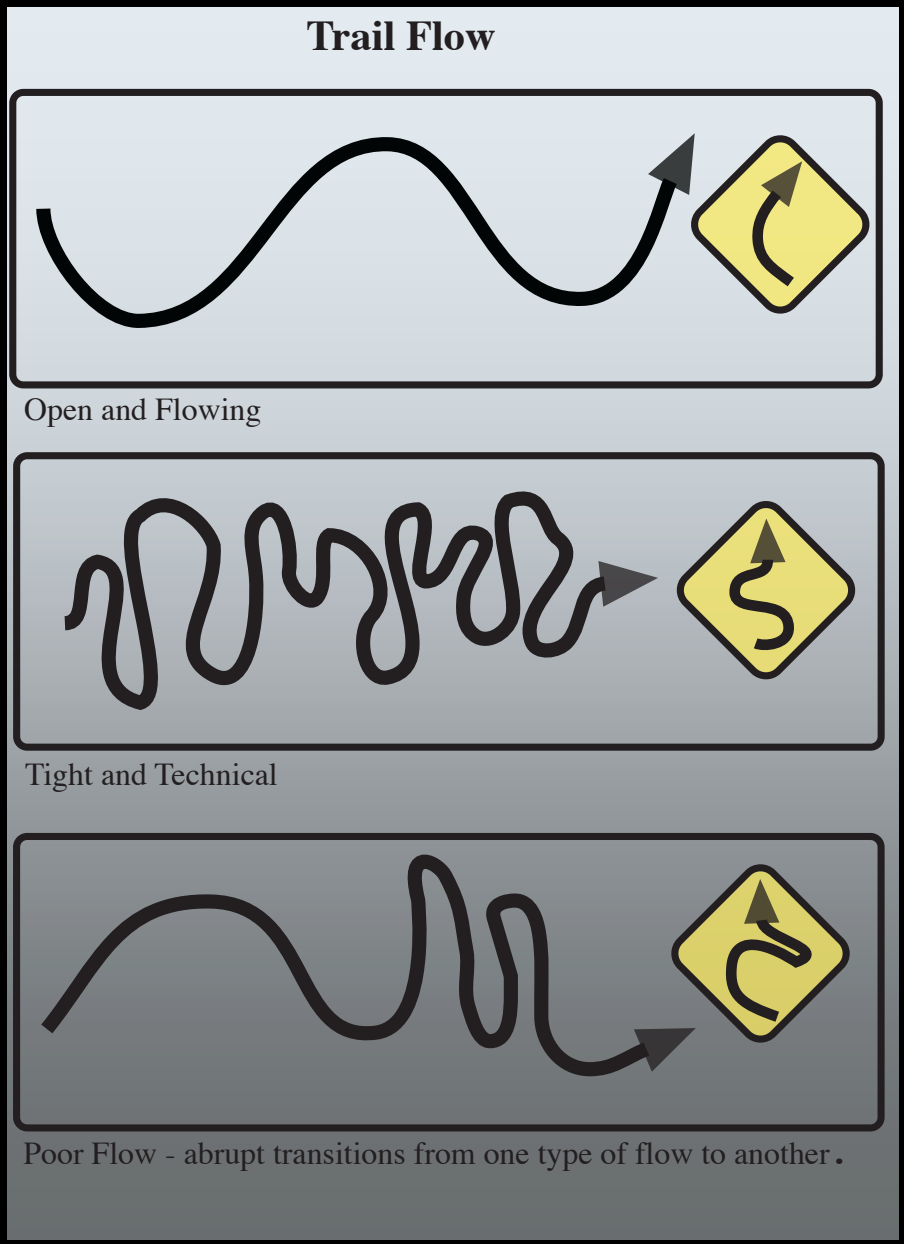
Negative Control Points:

- Low-lying wet areas
- Flat Areas
- Endangered Species/ Sensitive habitat
- Other trails
- Private property
- Unpleasant Views



Step 5: Configure Loops

Step 6: Plan a Contour Route



Step 7: Determine Type of Trail Flow

Open and Flowing

Tight and Technical

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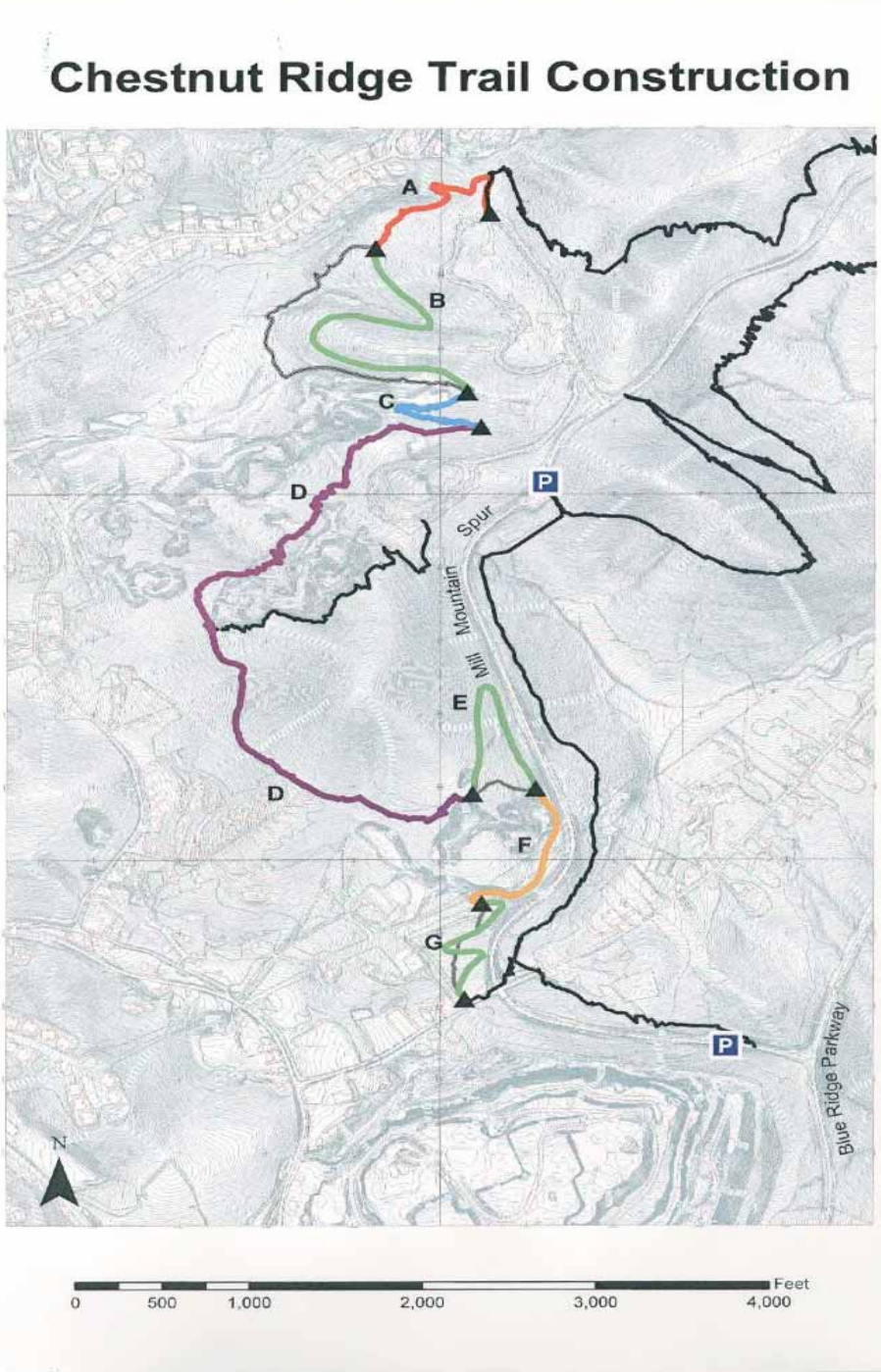
Step 8: Walk and Flag the Corridor

Step 9: Develop a Construction Plan

Determine:

- Trail dimensions
- Construction technique
- Time and cost
- Labor pool



Step 10: Conduct an Assessment Study

- Biological
- Cultural
- Archaeological

Work with land manager to determine the process

Step 11: Flag the Final Alignment and Confirm Permission

Tool Safety

Safety

- Safety begins with a good grip
- Check before swinging
- Be alert for hazardous footing
- Right tool, right job
- A sharp tool is a safe tool
- Carry the tool properly
- Travel safely
- Stay alert!

Mechanized Tools

Pros:

- Consistency (with a trained operator)
- Construction speed

Cons:

- Expense
- Environmental impact
- Noise
- Loss of volunteer connection

Trail Construction

"Build it right, build it once."

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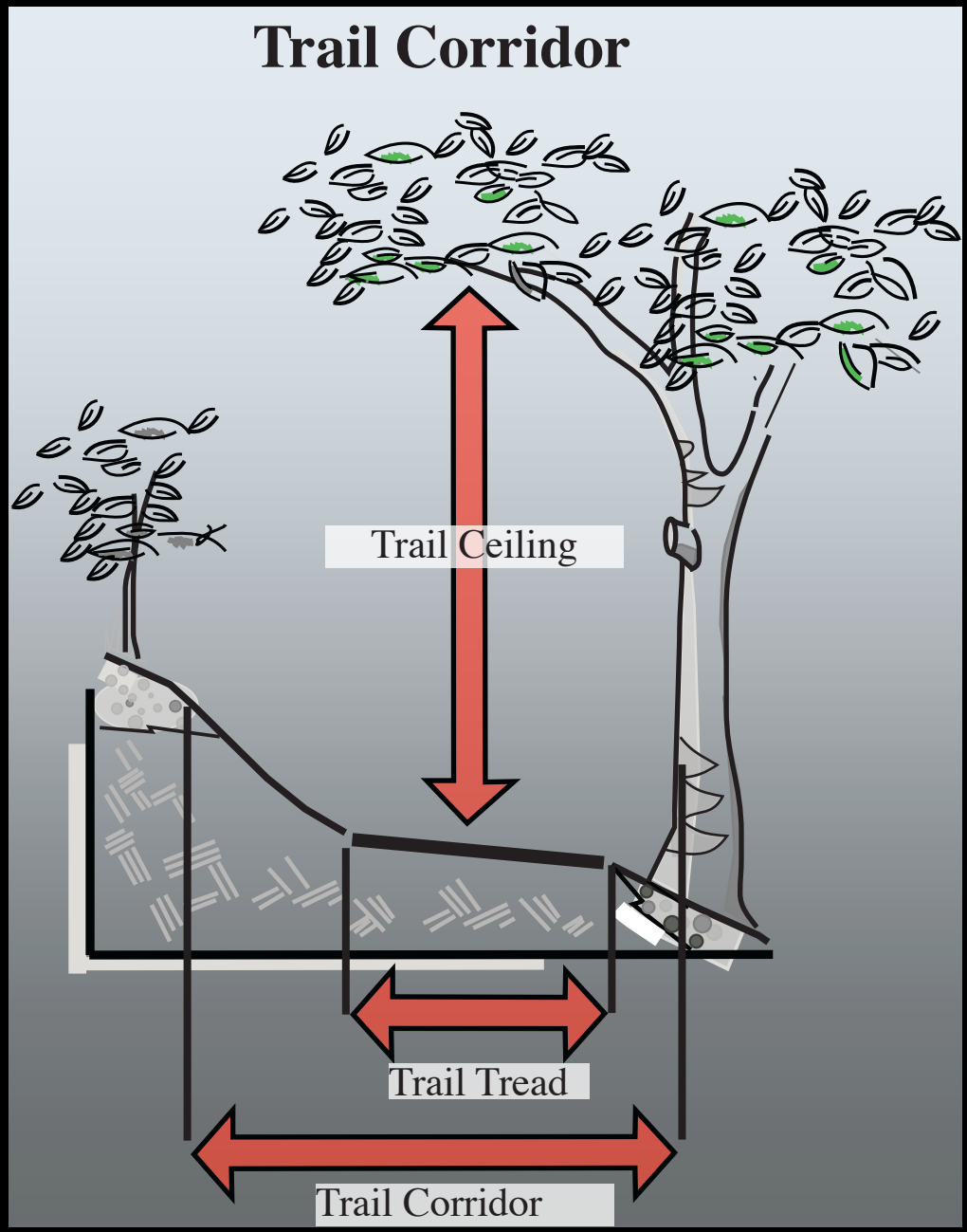
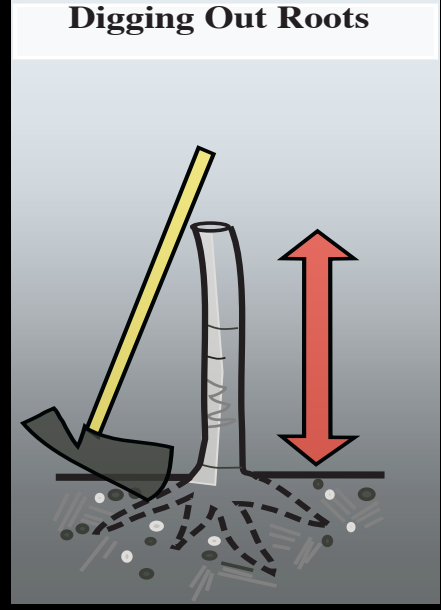


Clearing the Trail Corridor

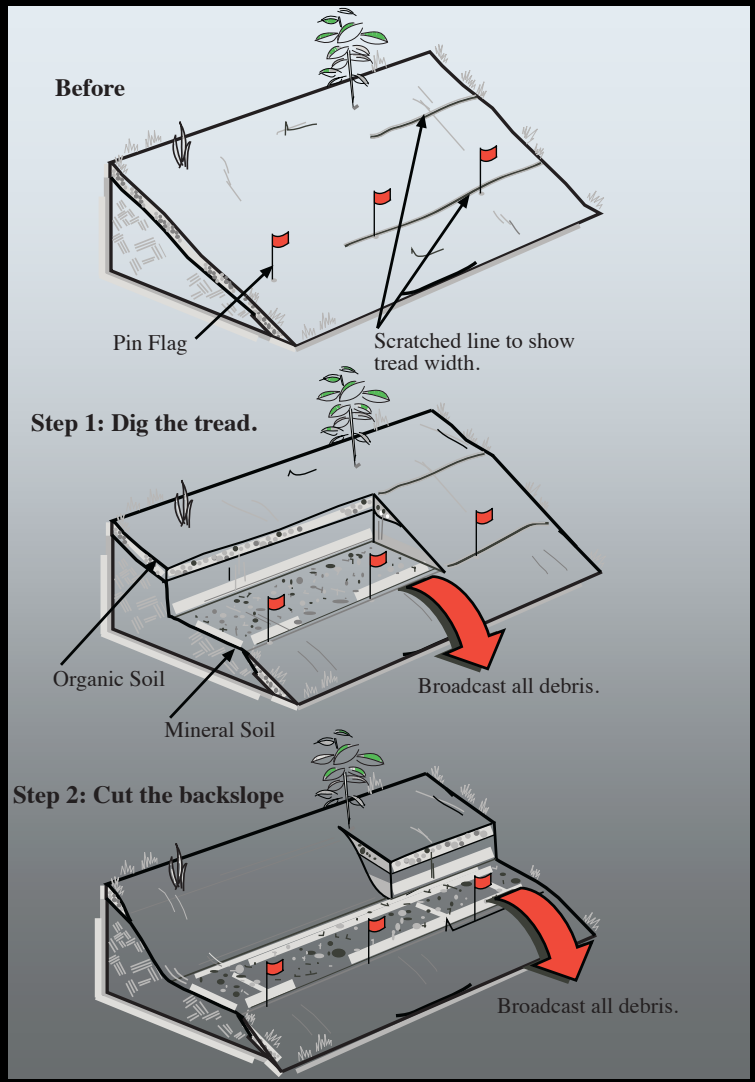
How
Wide?
How
High?

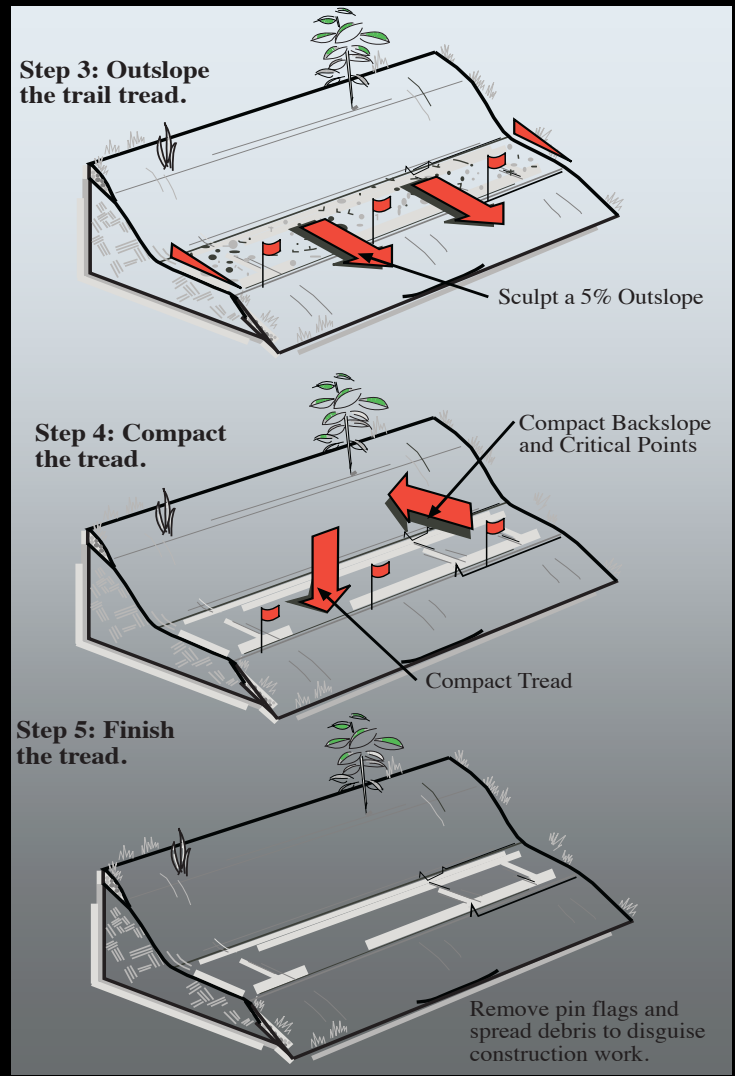
Clear Corridor



Removing Trees and Brush

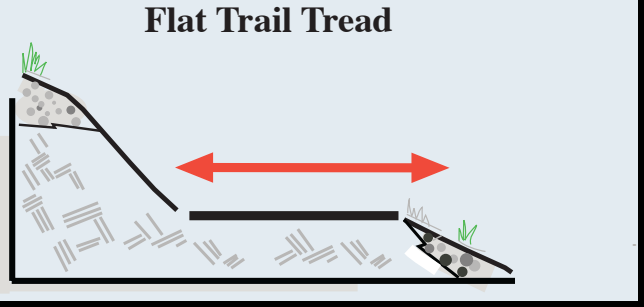
Building Bench Cut Trails

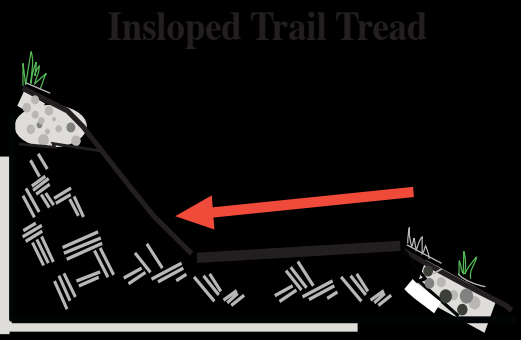


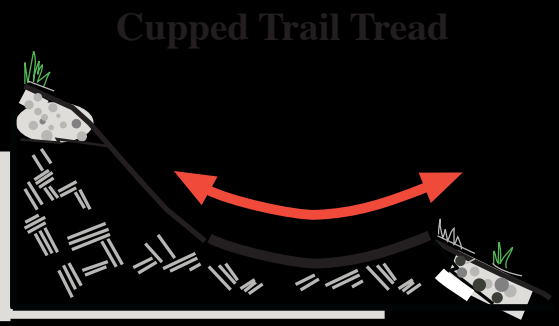


Step 1:
Dig the Tread

Step 2: Cut the Backslope, Broadcast Spoils







Step 3: Outslope the Trail Tread

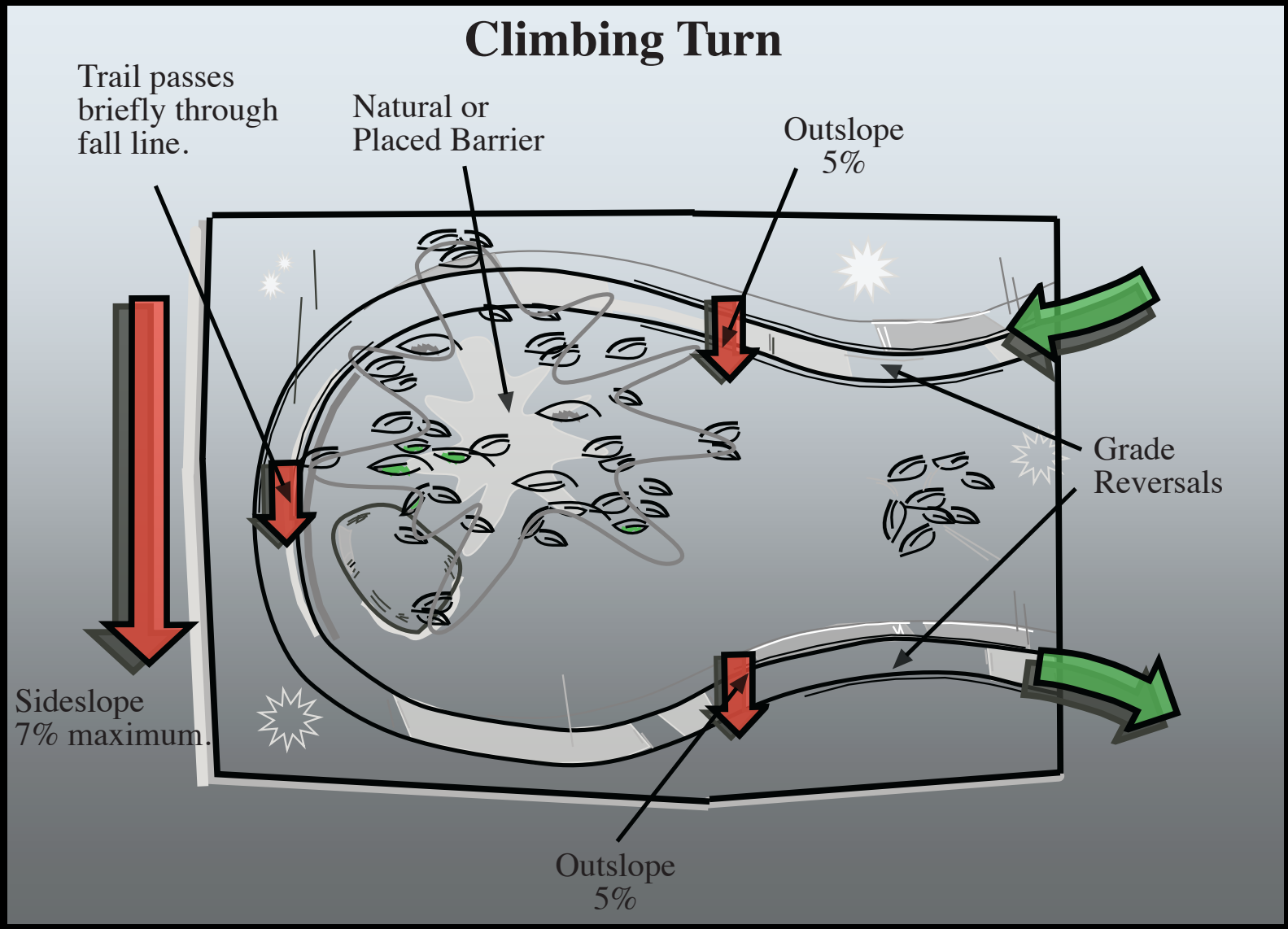
Step 3: Outslope the Trail Tread

Step 4: Compact the tread

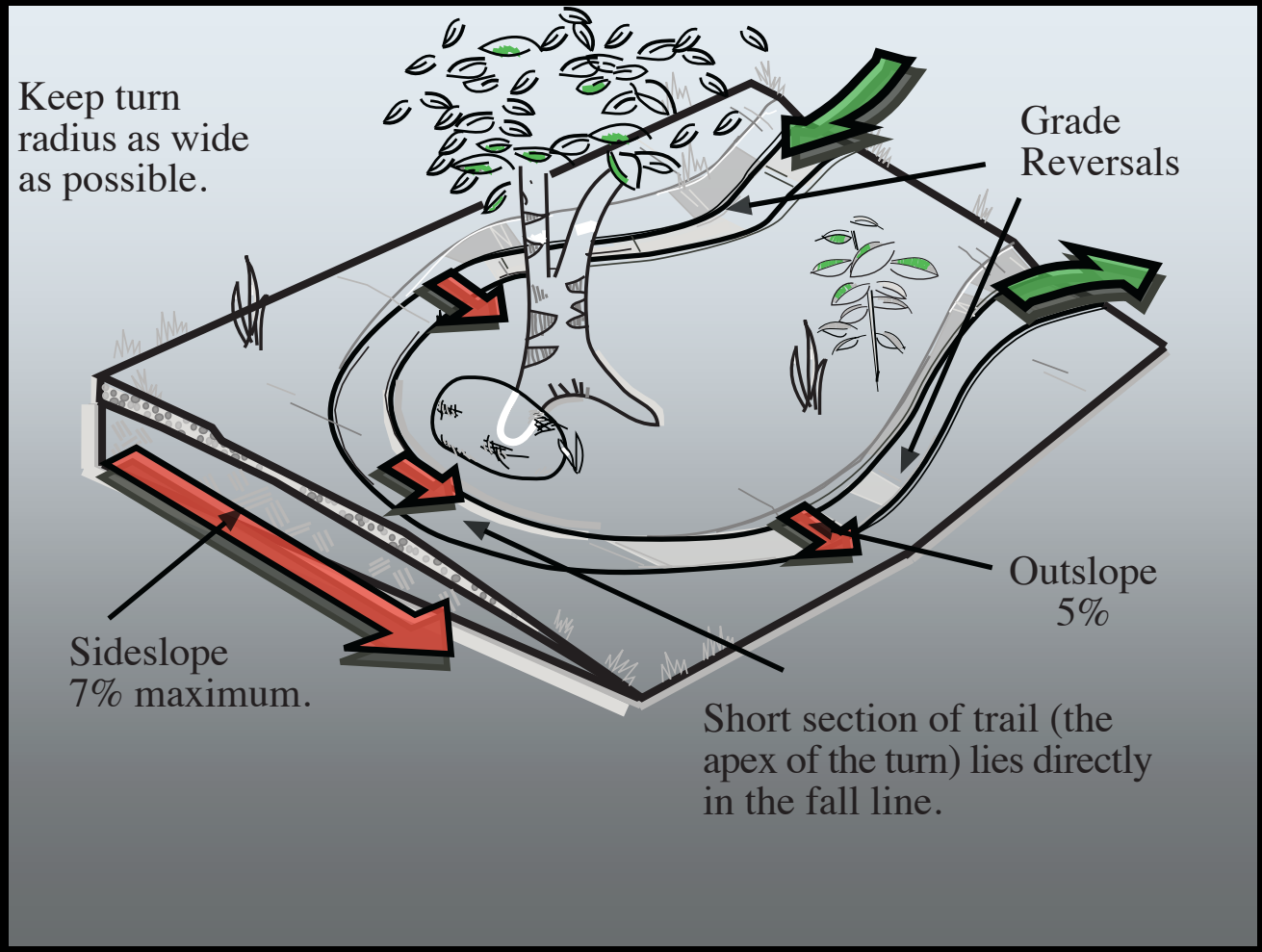
Step 5: Finish the tread and mask the construction area

Gaining Elevation

Climbing Turns

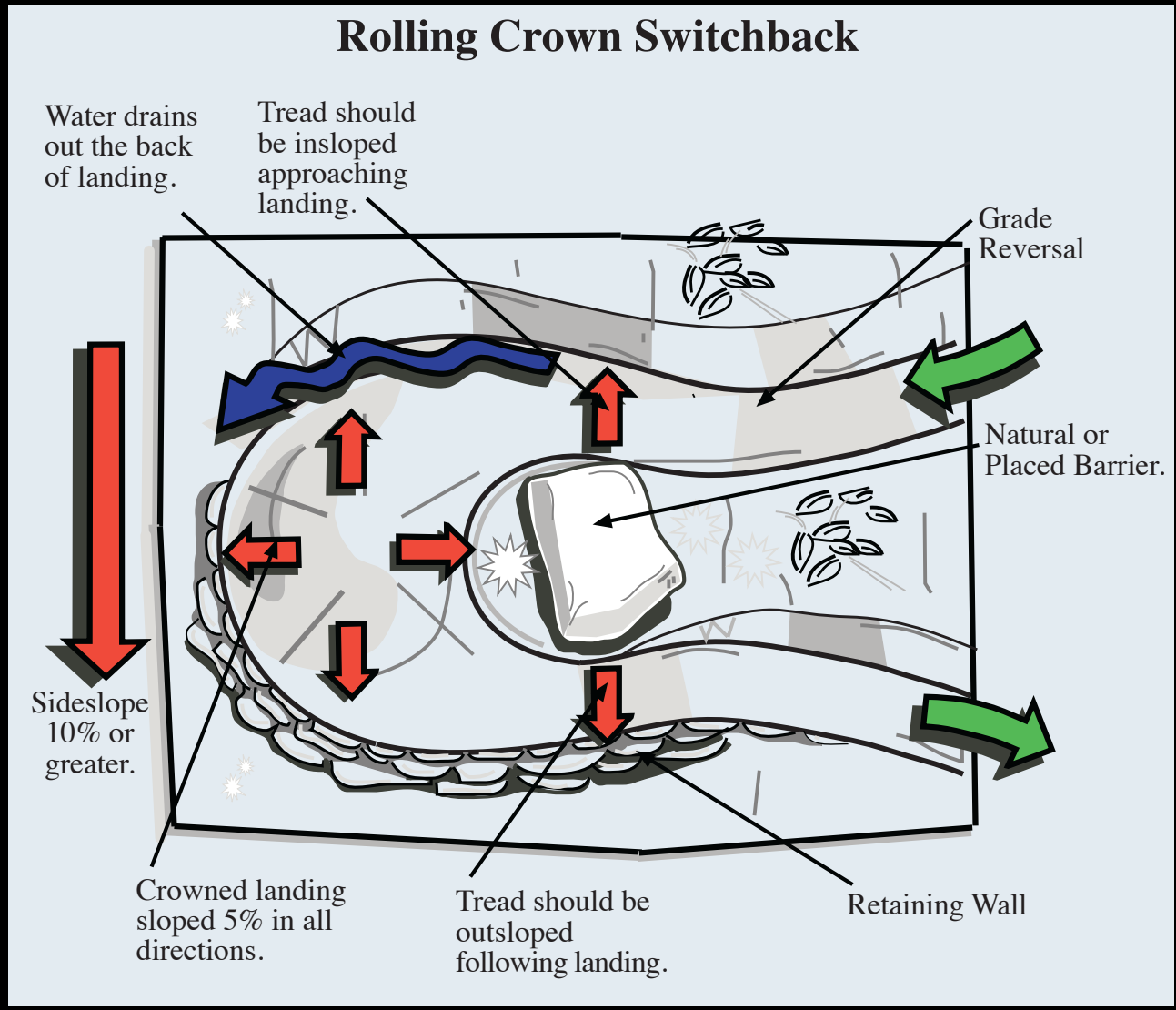


Climbing Turns

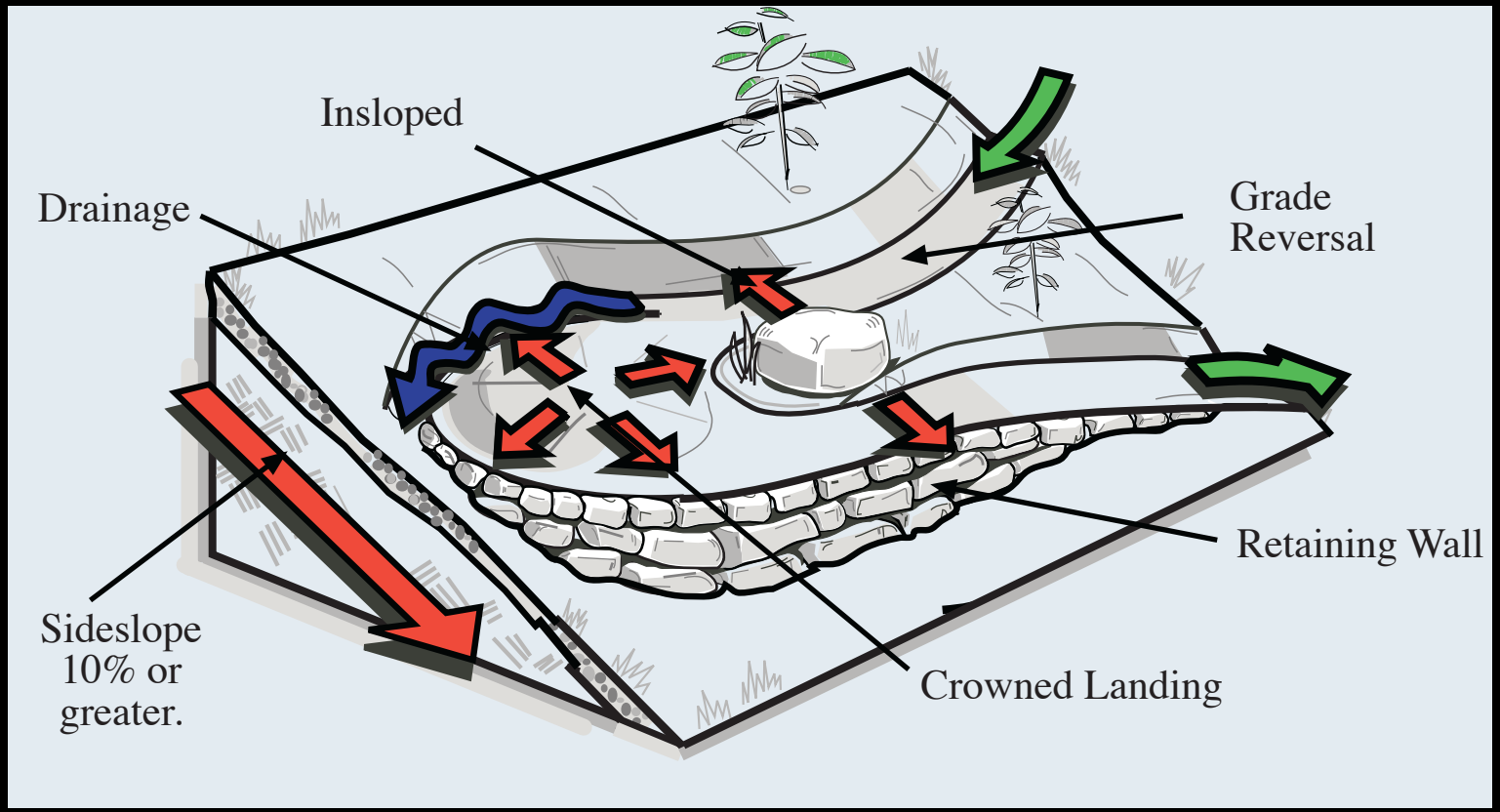


Rolling Crown Switchback

Rolling Crown Switchback



Rolling Crown Switchback



Choose the location

Build the Turning Platform and Retaining Wall

Toe-in and Lock Base Together

Fill Pore Space With Cobble

Assure A Tight Fit

Back-Fill With Soil

Construct Layer 2 Assure Batter on Wall

Assume 1’ of wall/10% sideslope

...And Layer Number Three

Repeat Cobble & Back-Fill

Keep Tamping

Deck Radius as wide as largest trail user

Completed Approach

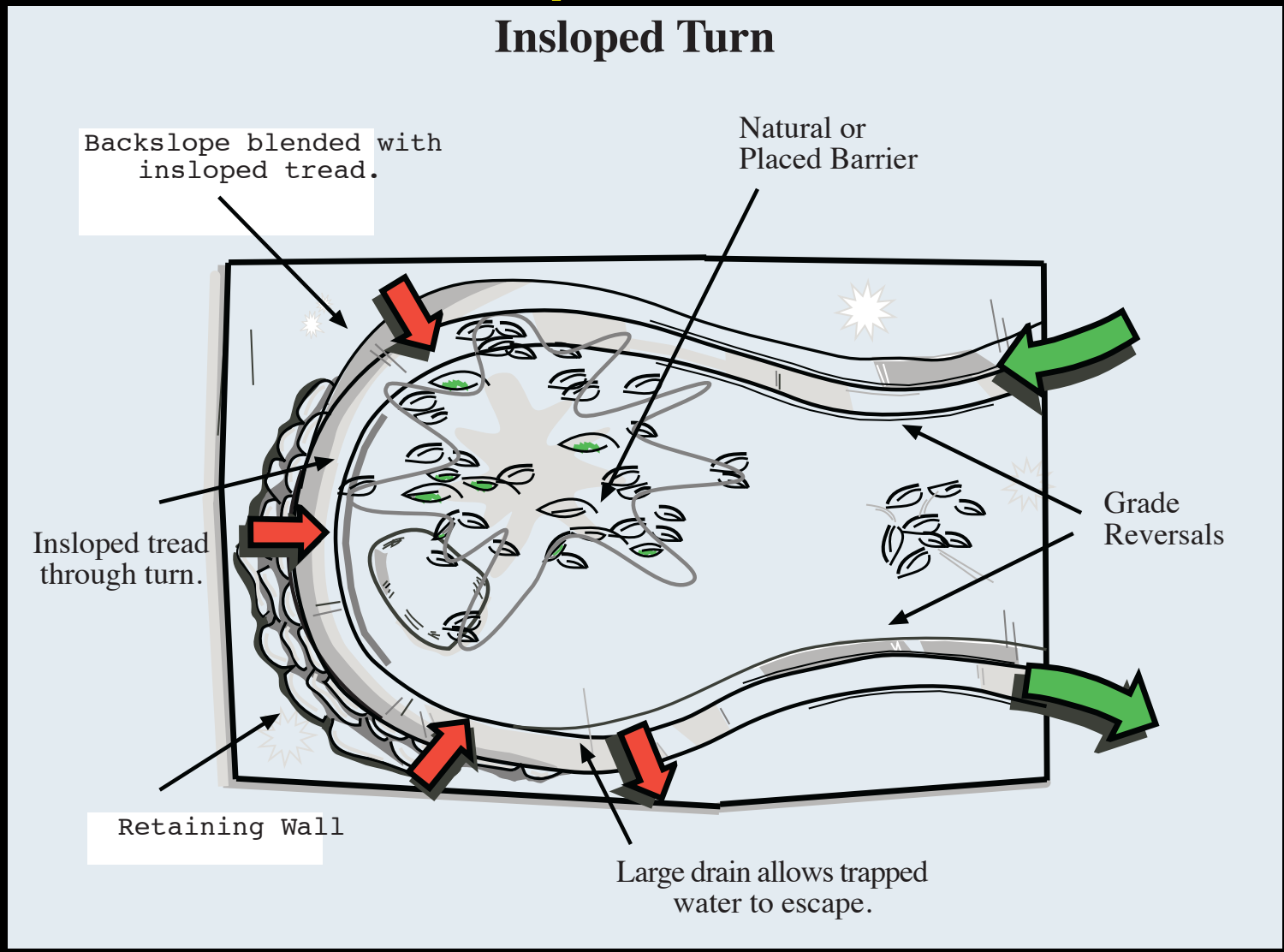
Completed, Insloped Exit

The Final Product

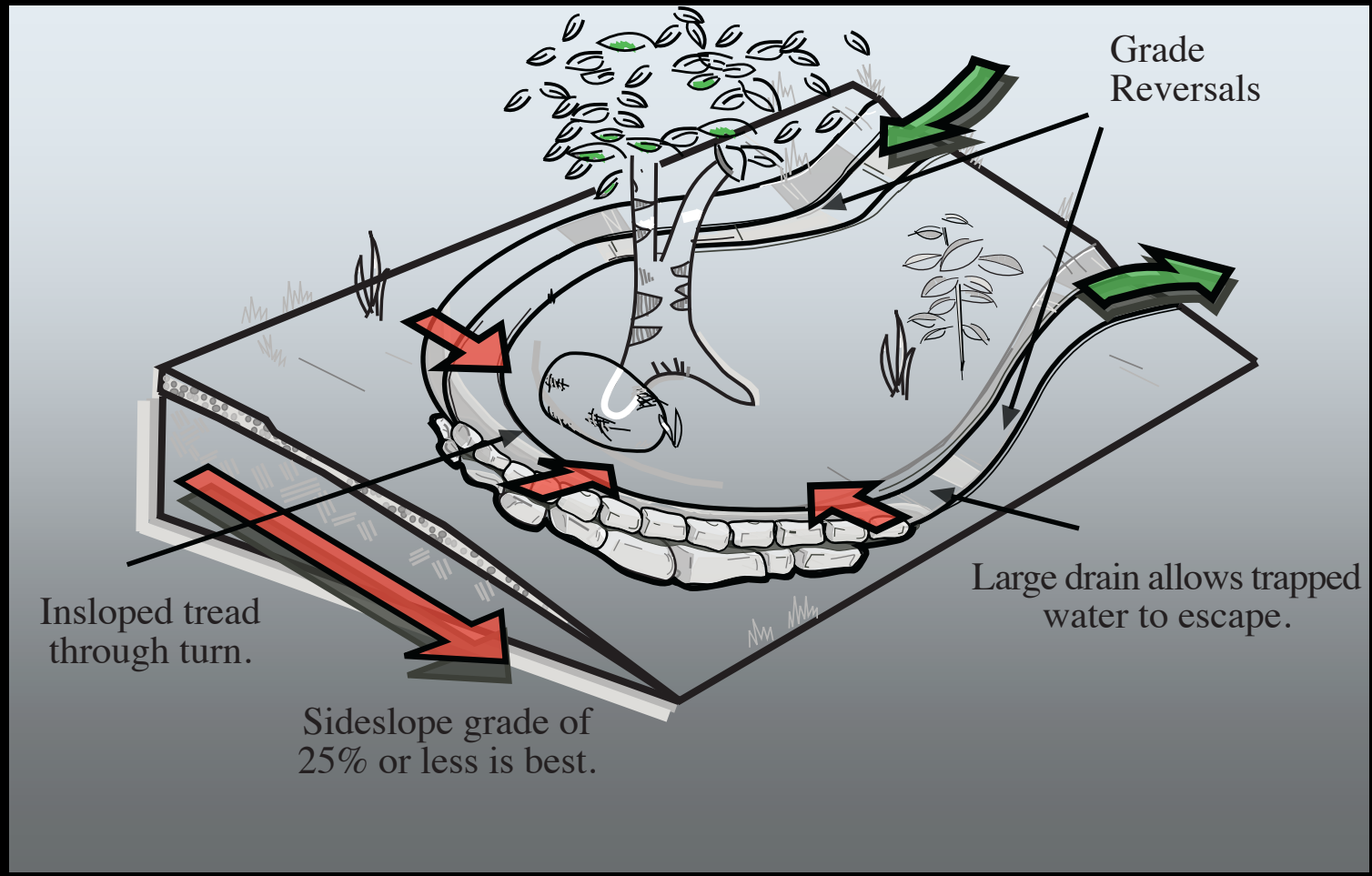
Satisfied Crew

200 volunteer hours

Insloped Turns



Insloped Turns



Insloped Turns

Step 1: Choose the Location.

Step 2: Build a Turning Platform and Retaining Walls.

Step 3: Build the Insloped Turning Area.

Step 4: Fine-Tune the Turn.

Wetlands and Water Crossings

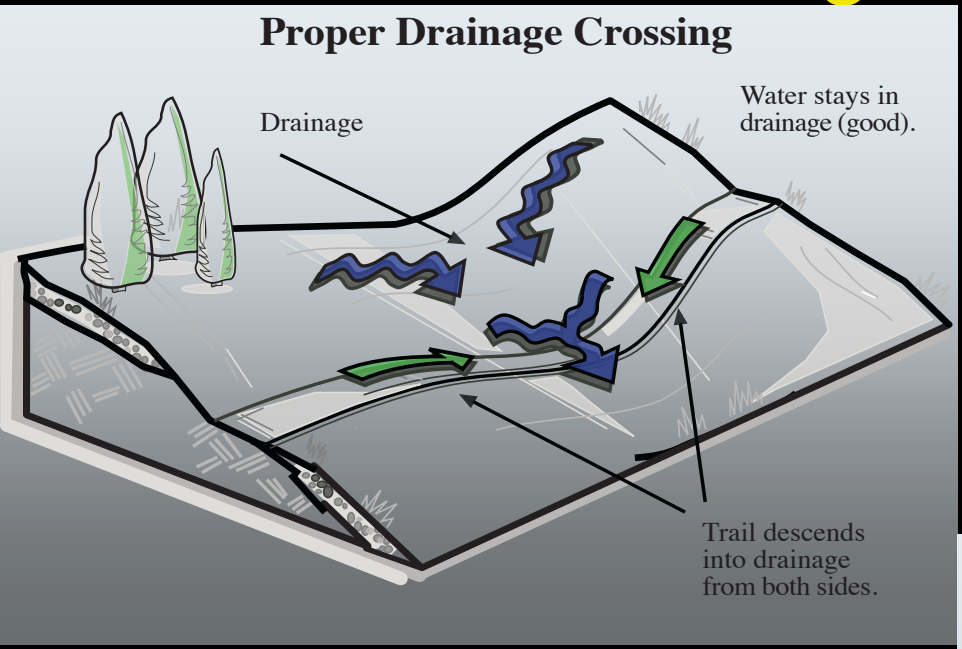
Water crossings should be avoided whenever possible.

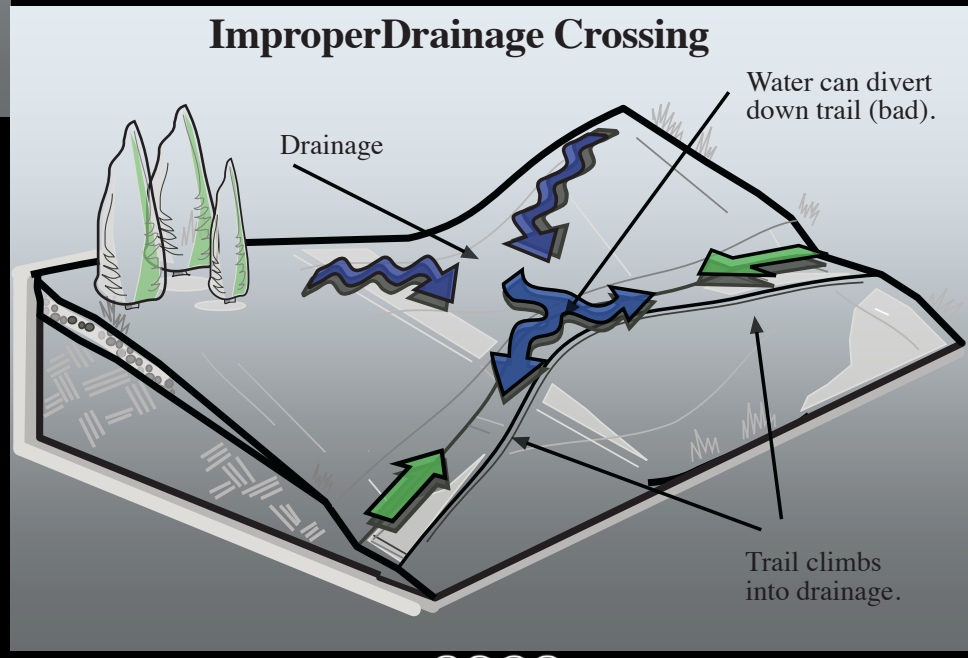
1. Minimize the impacts to the stream channel.
2. Minimize the impacts to the streamside environment.
3. Create a safe and sustainable passage for all trail users.
4. Minimize the number of crossings.

General Guidelines for Water Crossings

1. Consult with Land Managers.
2. Identify Water Crossings as Key Control Points.
3. Carefully Design Crossing Approaches.
4. Include Grade Reversals.
5. Mimic the Stream.

Drainage Crossings





Armored Crossings

- Construct at grade
- Fit should be tight
- Extend armoring beyond perceived wet area

Stone Culverts

Prefabricated Culverts

Lack of Engineering or Maintenance

Reinforced Dry Crossings

Tips for Successful Bridge Building

- Make the bridge high enough.
- Extend approach ramps well onto the trail.
- Bridges and their approaches should not have sharp turns.
- Design the bridge so that travelers on either end can see each other.
- Design bridges with the users in mind.
- For wooden bridges, use screws and bolts instead of nails.
- Avoid letting stringers touch the ground.
- Use rot resistant wood if using unfinished wood.
- Bark must be stripped off the lots you use.
- Consult an experienced bridge builder.

Wetlands

Raised Tread,Turnpike Construction

Boardwalk Construction

Trail Maintenance

Trail Assessment

1. Create an Assessment and Repair Sheet
2. Walk or Ride the Trail
3. Confer with Land Manager
4. Assign Work Crews

Corridor Clearing

Identifying Trail Problems:

User-Caused Erosion

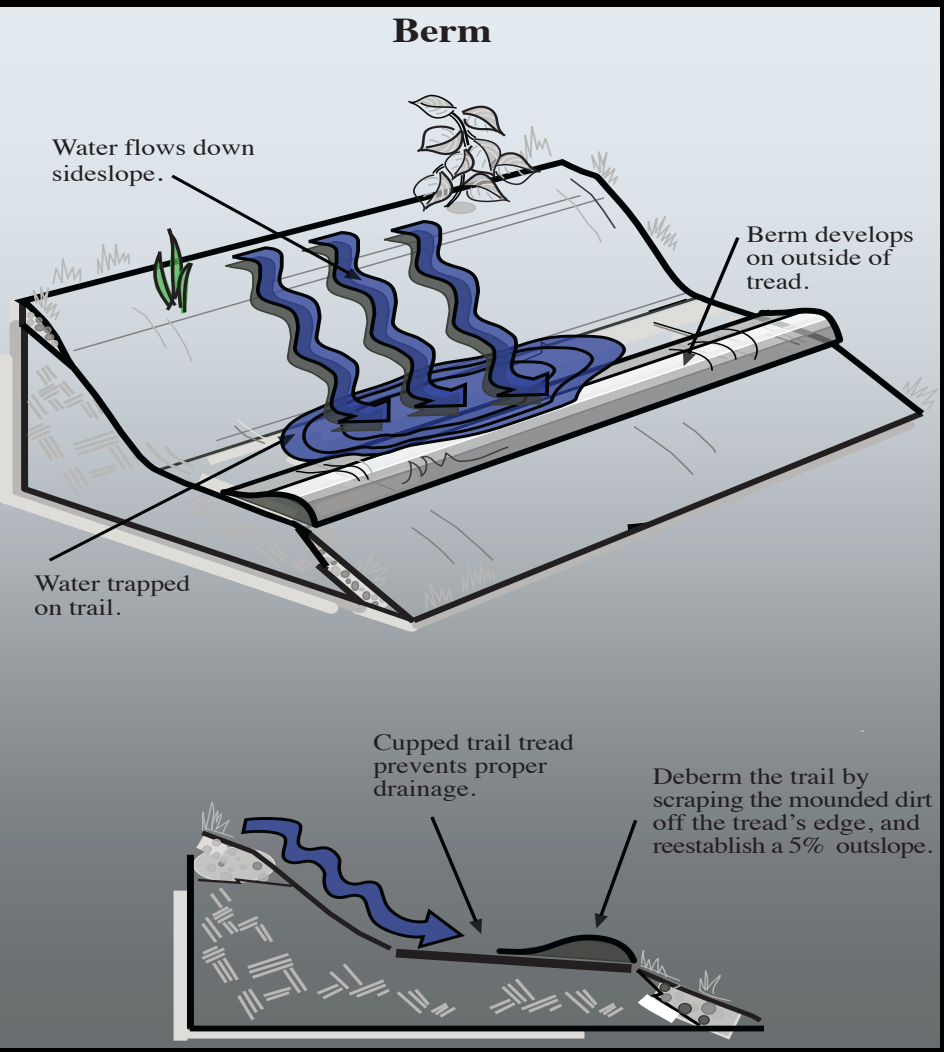
- Steep trails
- Wet trail
- Social trails
- Trail braiding, widening, and tread creep
- Brake bumps

Identifying Trail Problems:

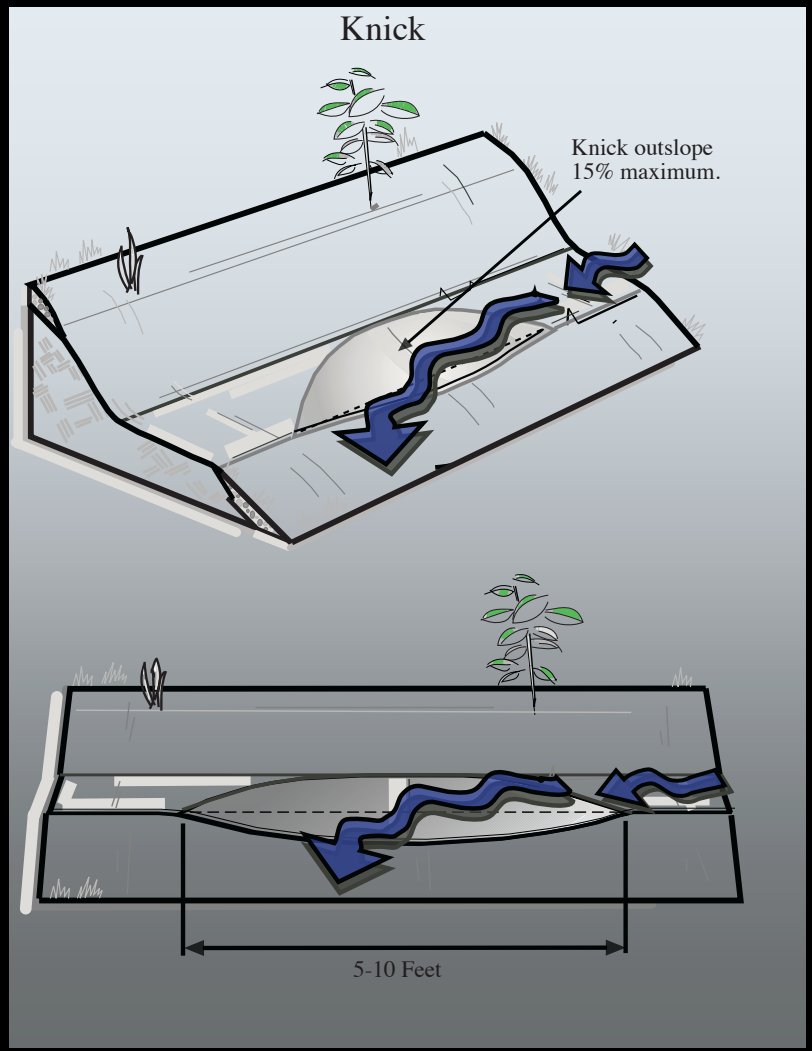
Water-Caused Erosion

- Fall line trail
- Trail lacks outslope
- Trail lacks grade reversals

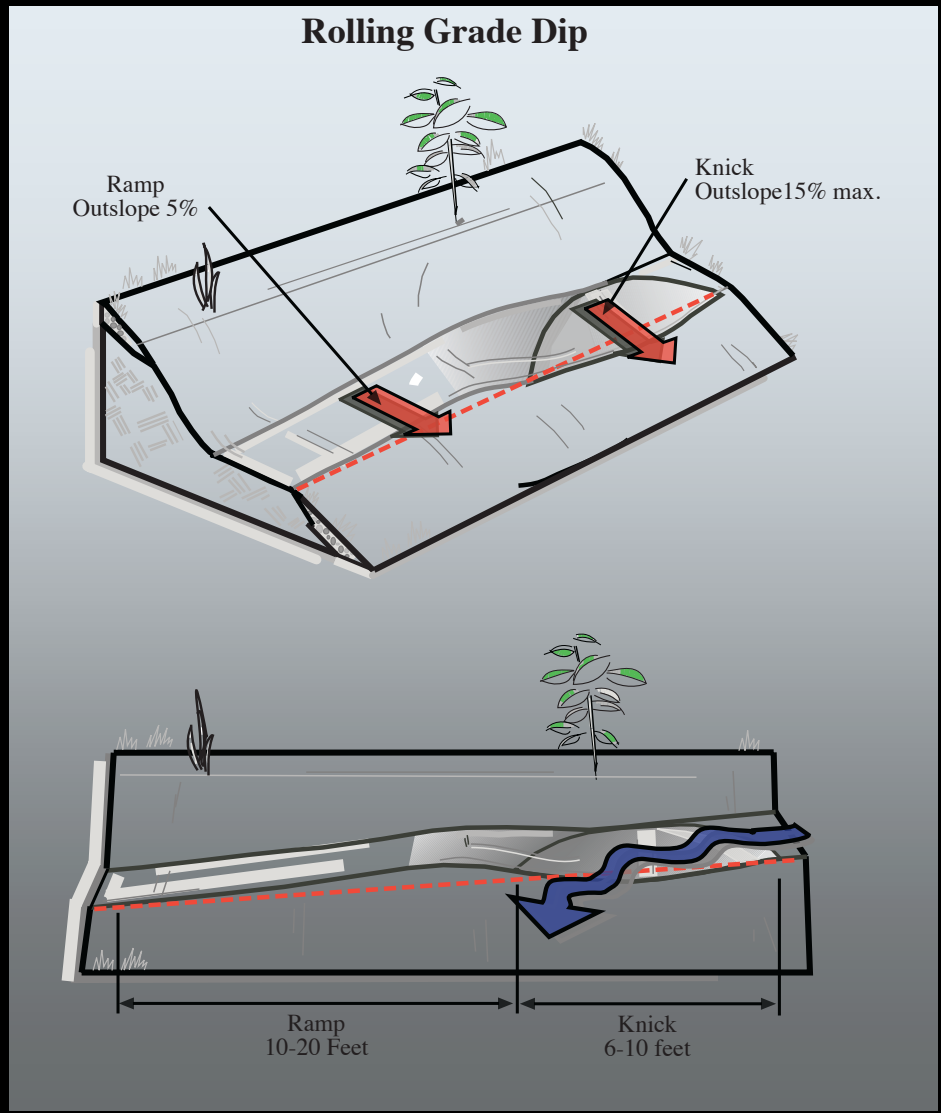
Drainage Solutions



Knicks

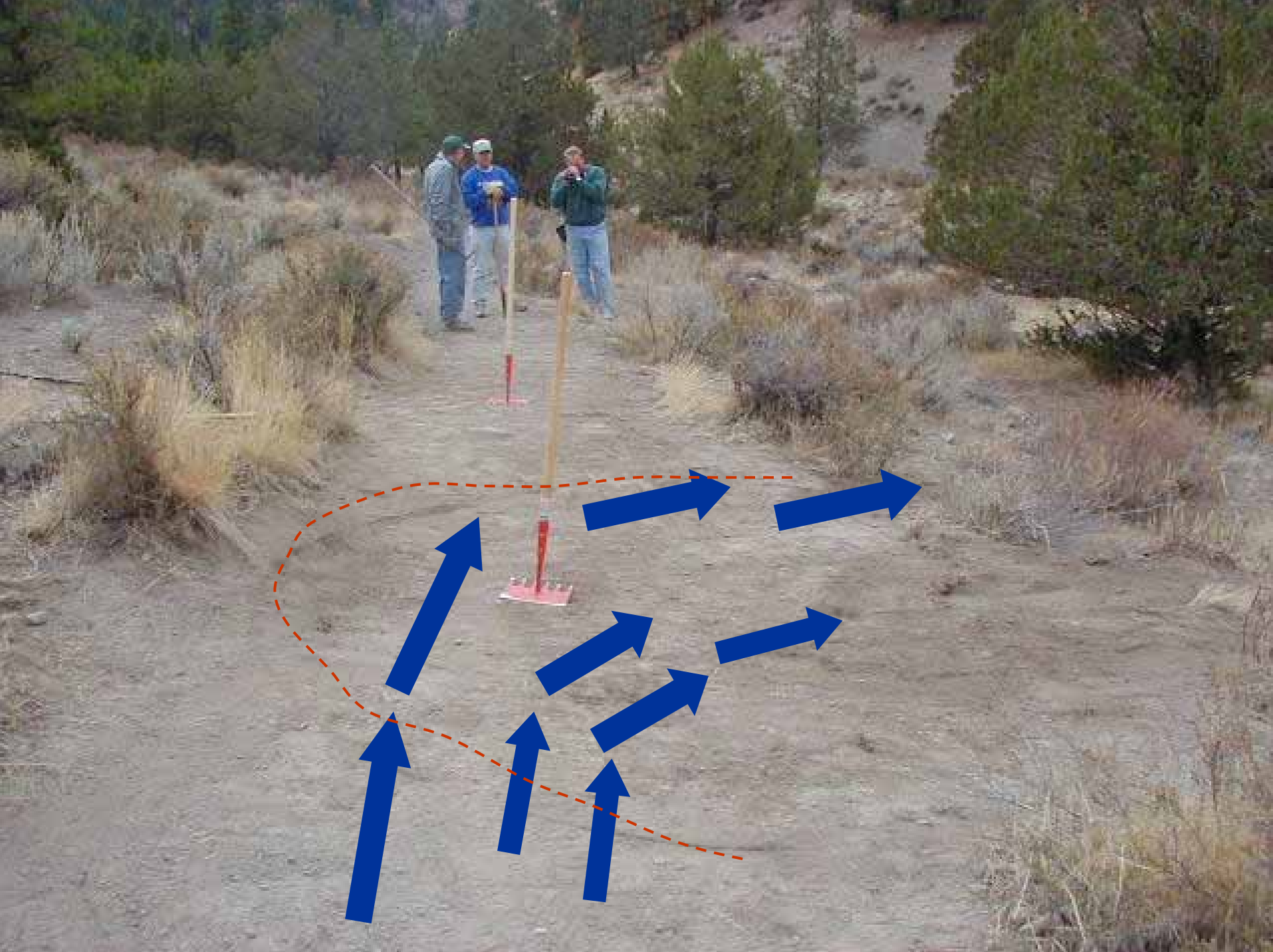


Rolling Grade Dip



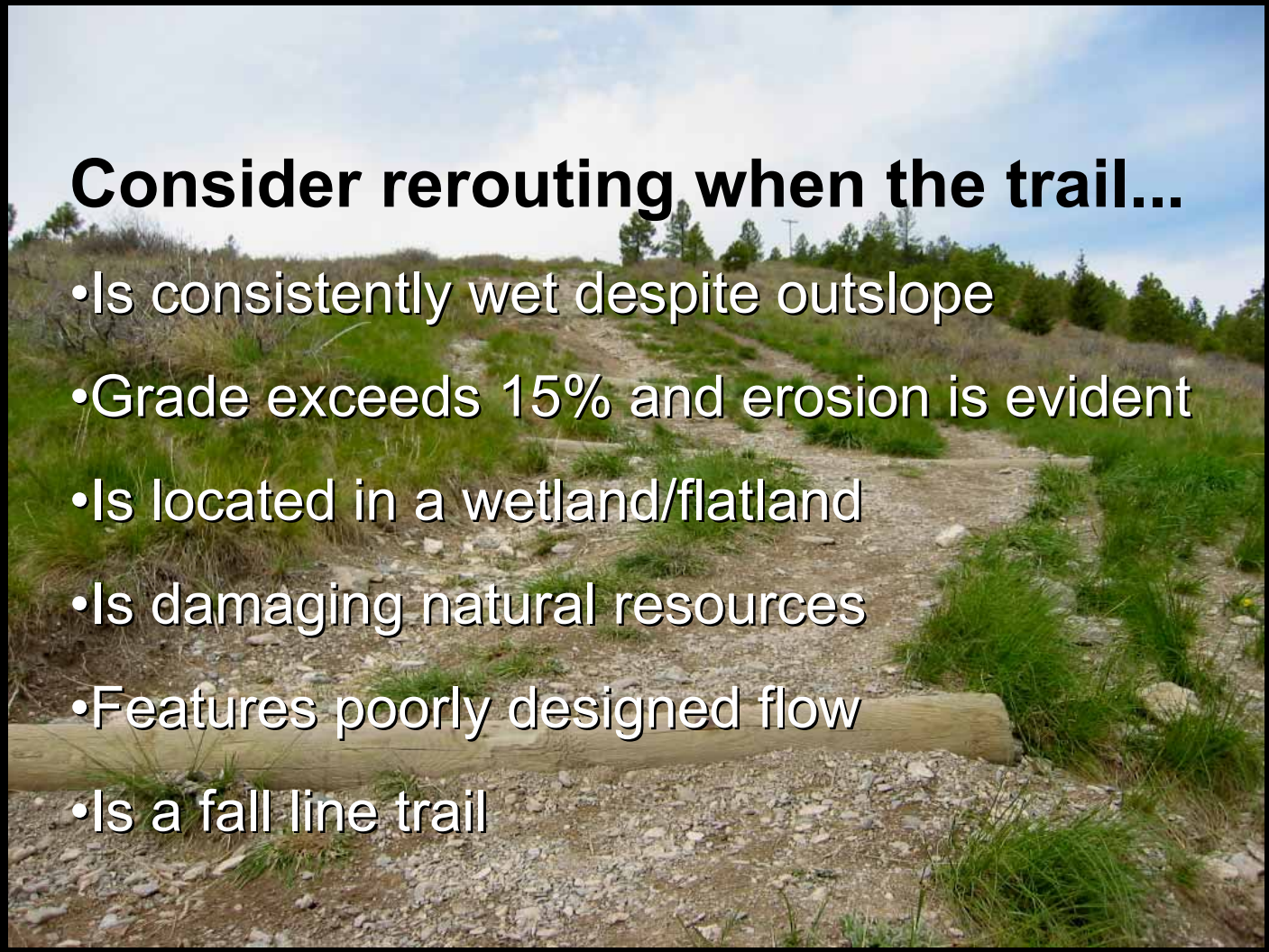
Create and Excavate the Knick

Broadcast Soil
for gentle ramp



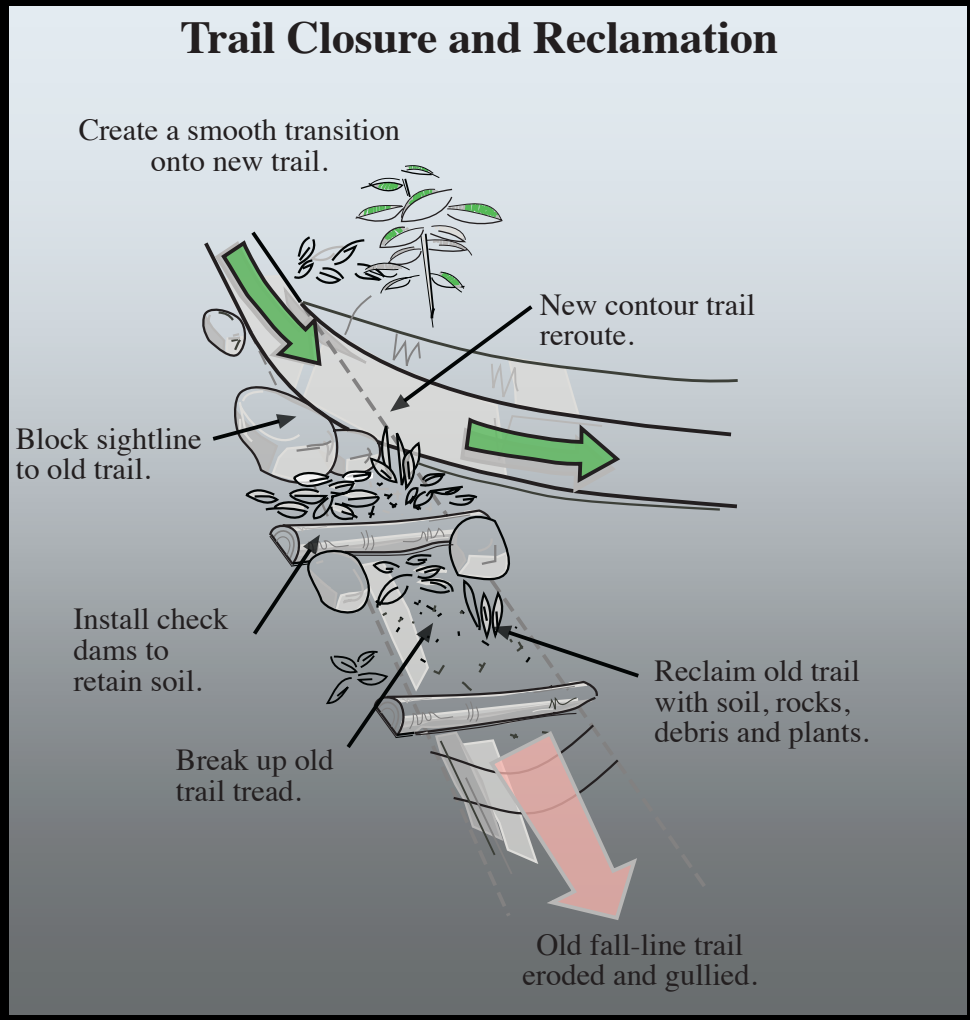
Waterbars: Good Intentions, Bad Results

Rerouting and Reclaiming Damaged Trails



Design a fun and sustainable reroute

Trail Closure and Reclamation



Educate trail users when the experience has been substantially altered


LONG
LIVE
LONG
RIDES
LONG
LIVE
LONG
RIDES