



GREATER MN PARKS AND TRAILS



PATHFINDER

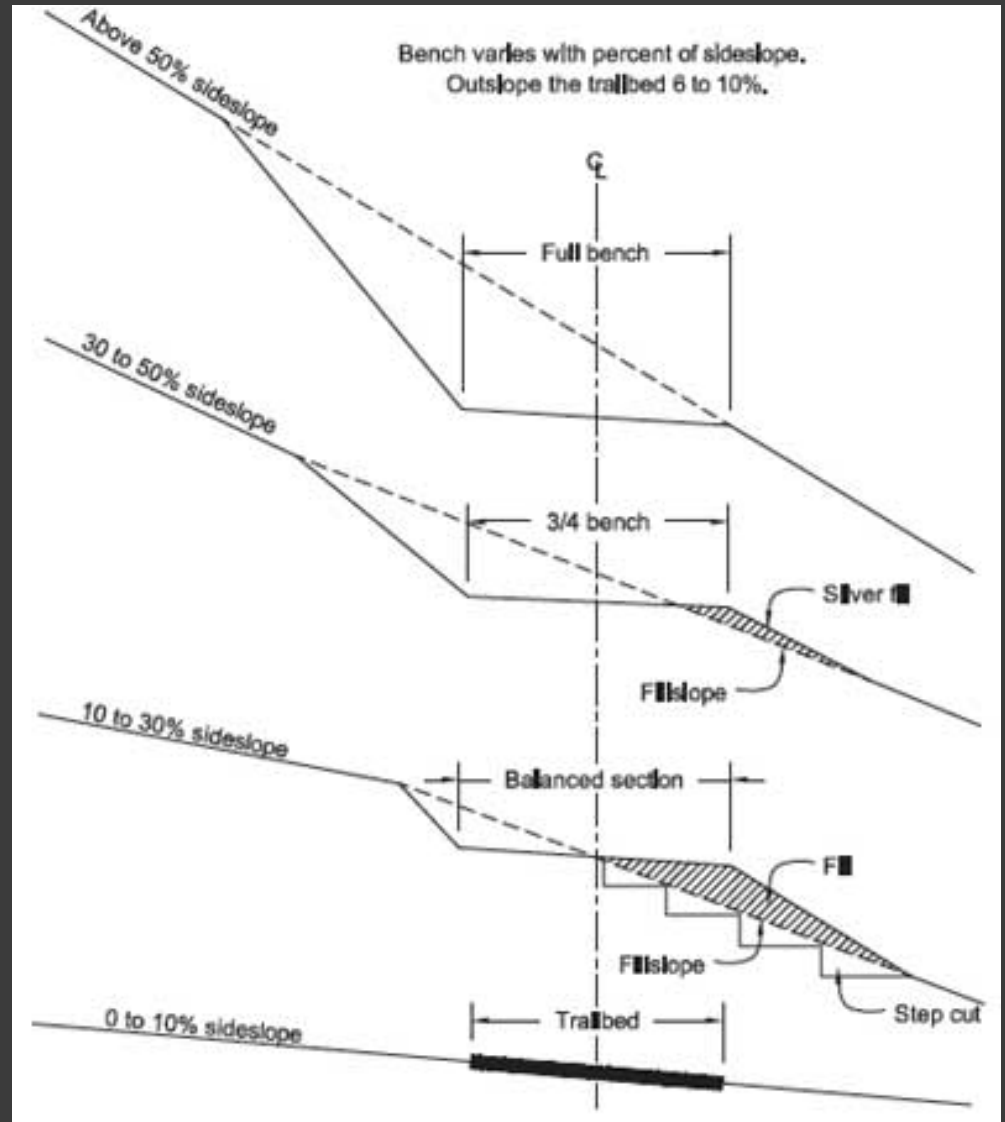
TRAIL BUILDING



11 Principles of Trail Design

1. Locate the trail on a side hill!

- Its much easier to drain water away from trail located on a slope than one on flat ground and it is easier to keep users on the trail.



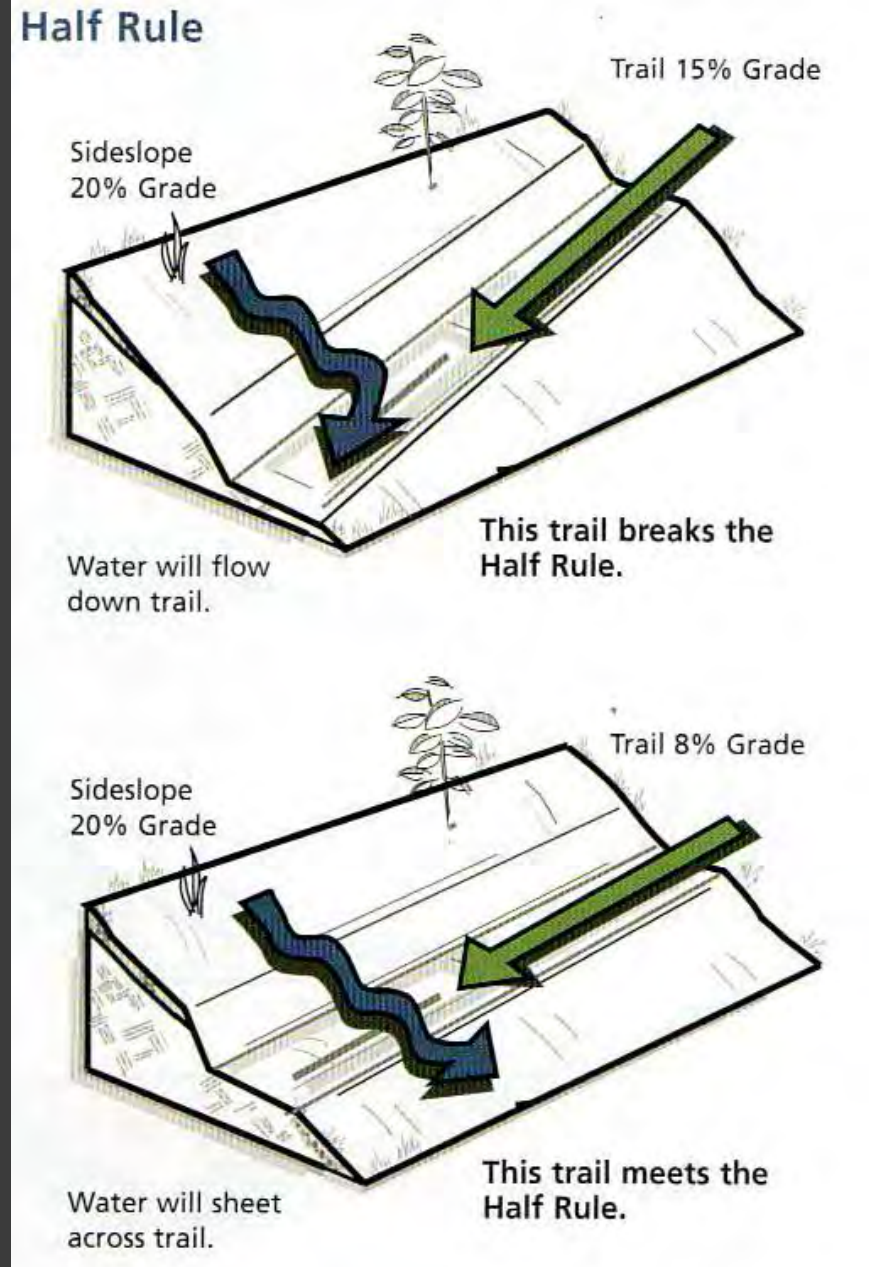
2. **Avoid fall line trails!**

- Tracks should always climb or descend a slope gradually, rather than directly up or down it. Tracks that travel directly up or down hills create a path for water that erodes soil and creates gullies. Riders may then widen tracks by riding around gullies



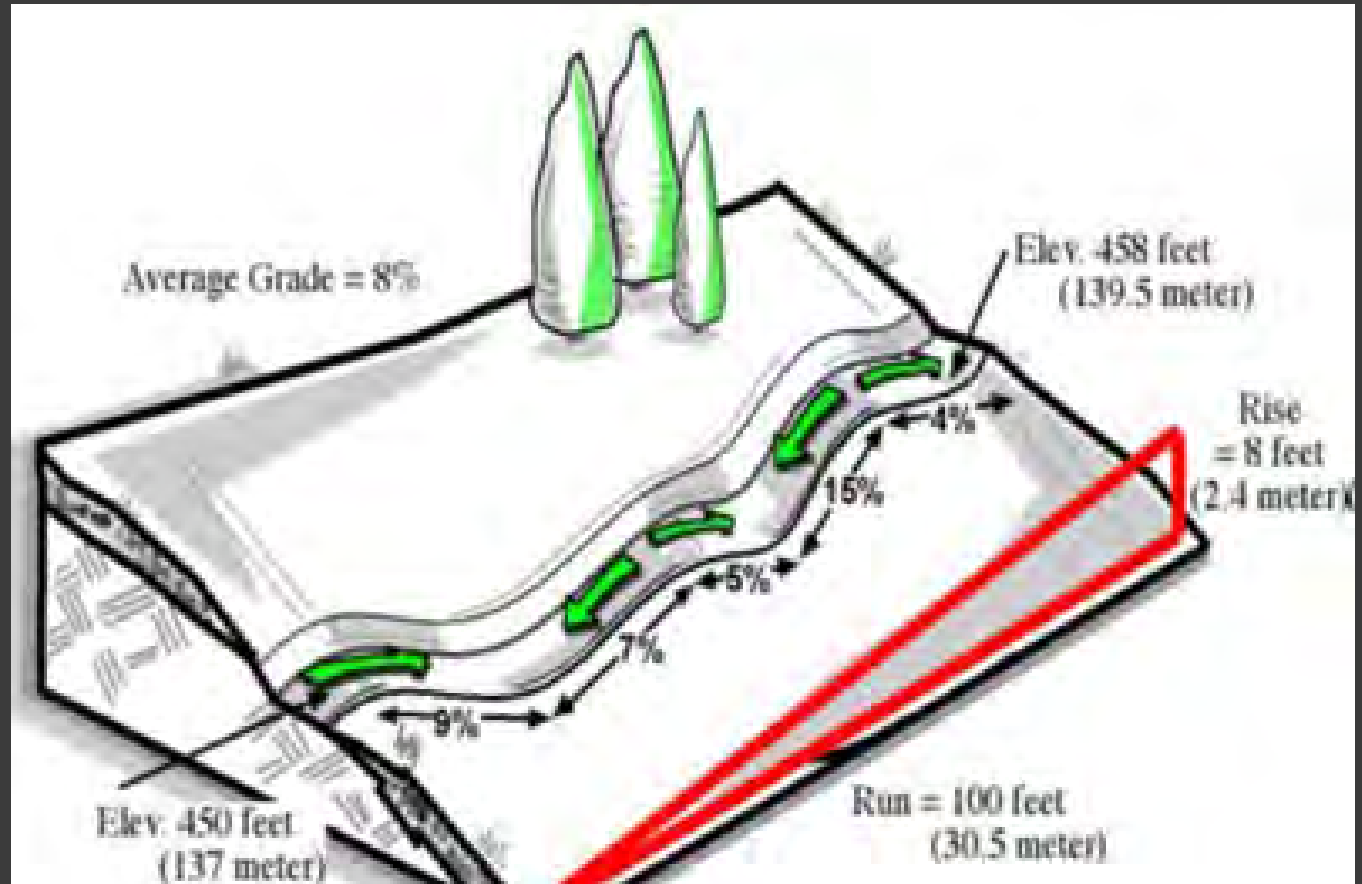
3. Use the 'half rule' to guide track alignment:

- A trail's grade should never exceed half the grade of the side hill it is located on. Grade is the elevation gained divided by the distance of the segment of the trail. Expressed as a percentage. A trail across the side slope of 20% should not exceed 10%

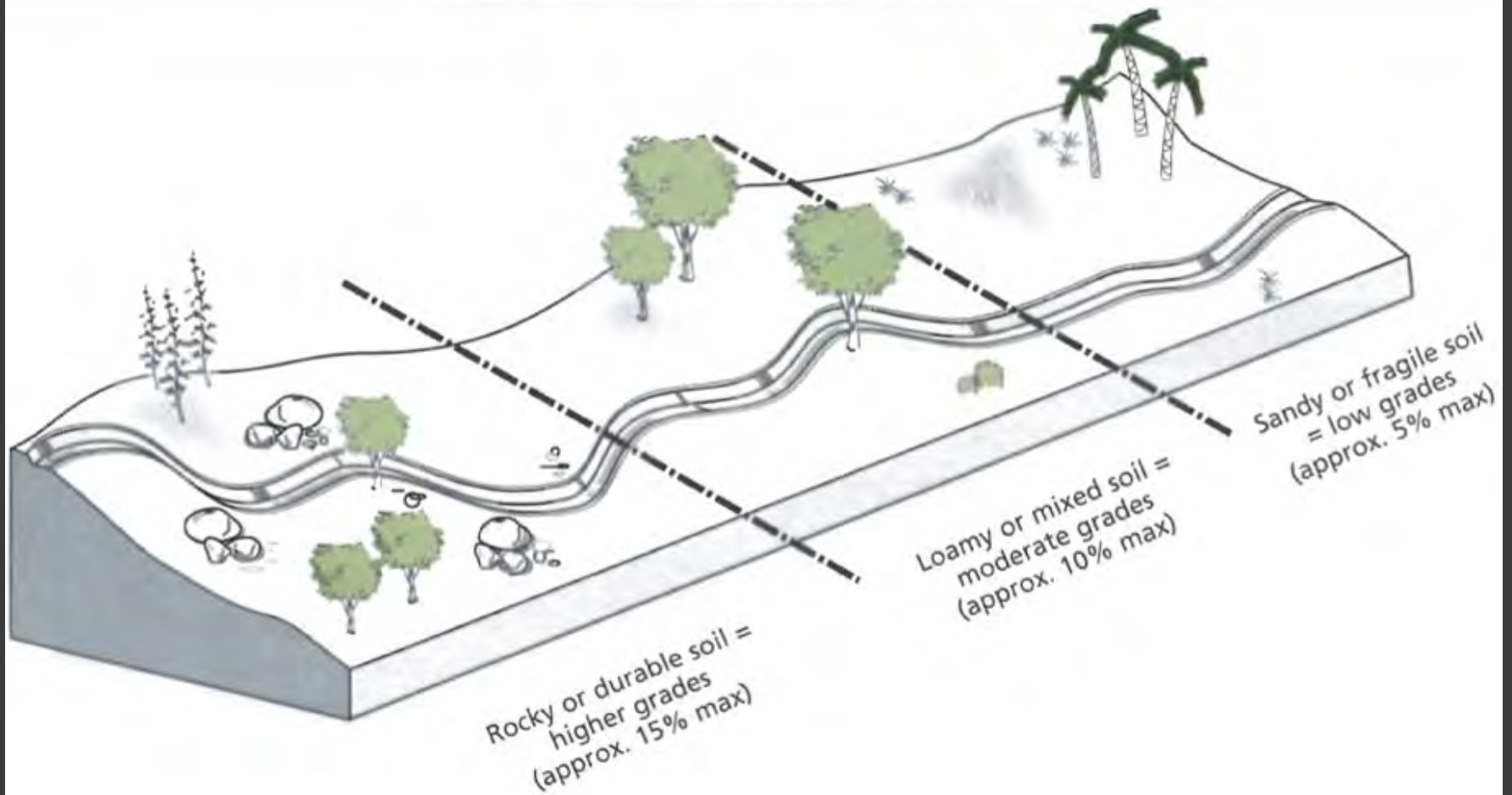


4. Follow the ten percent average guideline for sustainable grades:

- The average track grade is the slope of the track for uphill section generally an average grade of 5% or less is most sustainable.



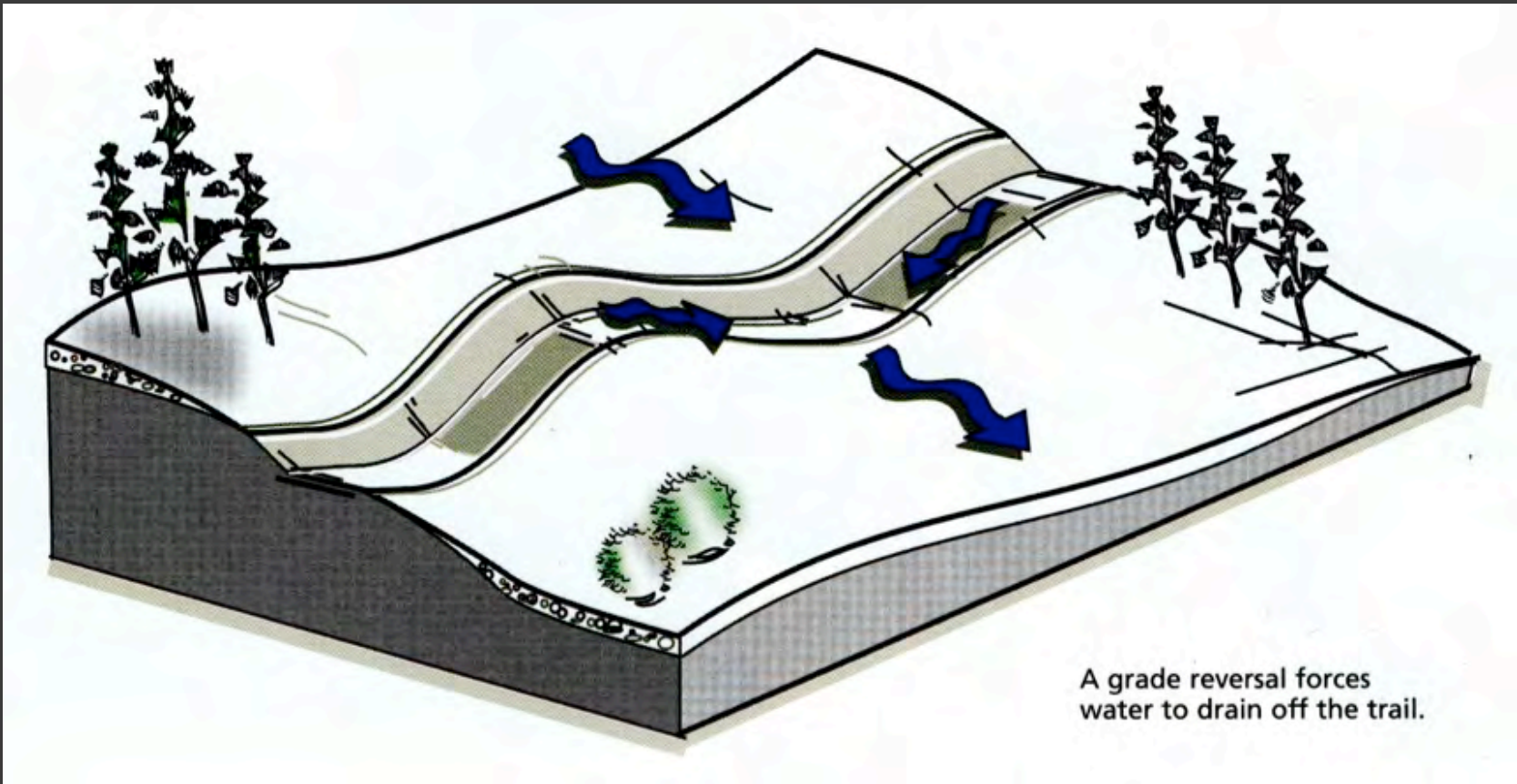
Maximum Sustainable Grade



5. **Maximum sustainable grade:** Typically, the maximum sustainable trail grade is about 15% for a short distance. But it is site-specific and varies with trail alignment, use of the half rule, soil type, annual rainfall, vegetation, use of grade reversals, type of users, number of users and level of difficulty

6. Grade reversals!

- Most trails benefit from grade reversals. A grade reversal is a spot where the trail drops subtly and rises again which forces water to drain off the track.



A grade reversal forces water to drain off the trail.

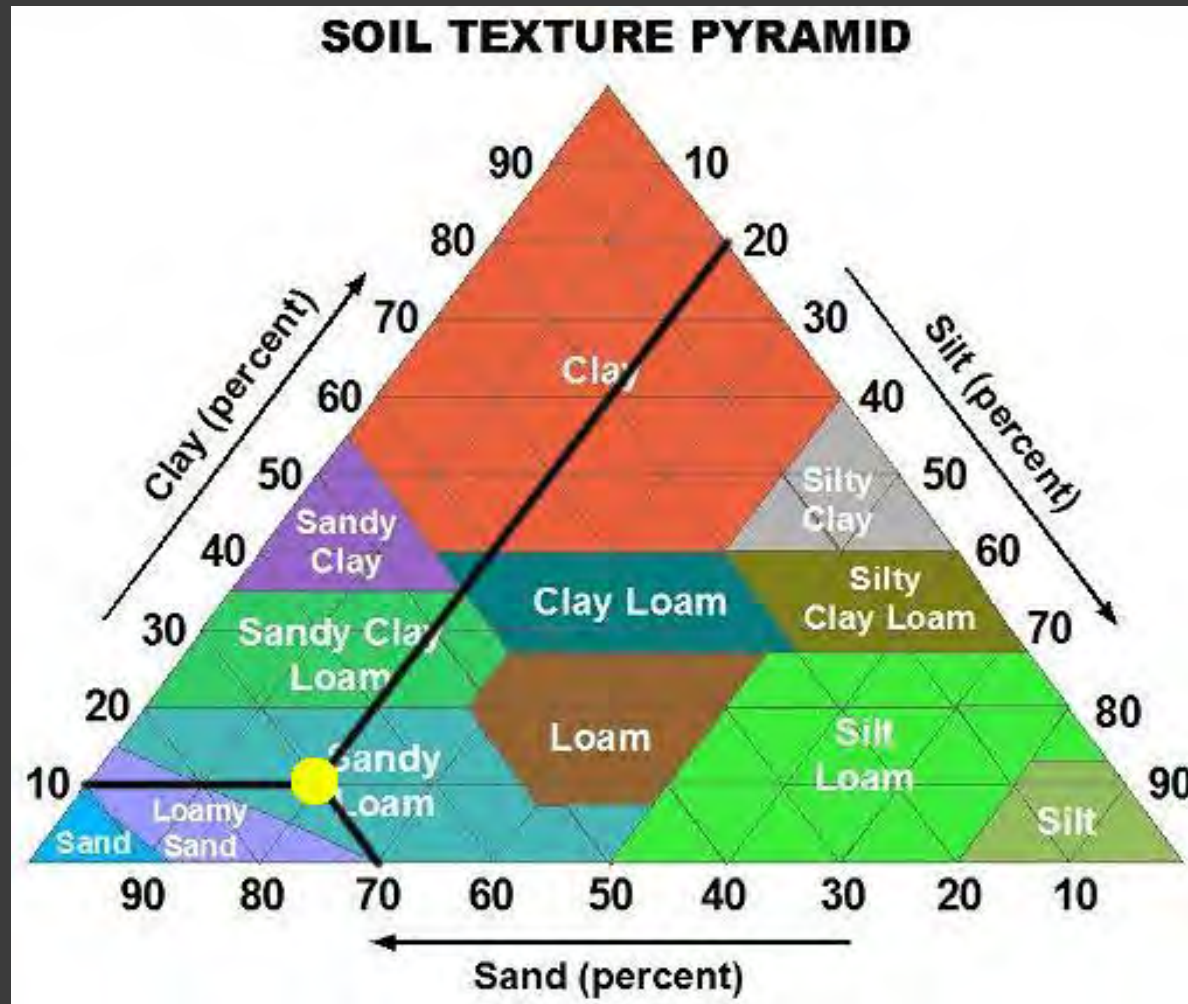
Caliente, NV



7. **Out slope:** most trails should be built with an out slope. An out slope is a tilt on the downhill or outer edge of the trail, which encourages water to sheet across and off the track in a gentle manner instead of funneling down the trail's center.



8. **Adapt trail design to soil texture:** Uniform soils dominated by one particle type such as a sand are most sensitive. A mix of different types of soil particles drains well and holds together. The presence of rock and gravel improve a soil's ability to withstand erosion.



Welch Village Ski Area, MN



Cody WY



Mission Creek Duluth MN

Lander WY

9. Minimise user caused soil displacement:

- Soil displacement by users can be reduced by three tactics: Consistent flow, insloped turns and armonring.



10. Prevent creation of unauthorized trails!

- Unauthorized trail creation can be reduced by having a stable and predictable surface and providing a high quality experience that meets riders' needs.



Lander, WY

11. Maintenance!

- Trails must be regularly maintained! Good track design should focus on allowing water to drain off and containing users to the trail.





Definitions!

Trail Difficulty!

EASIER



USE AT OWN RISK

Fairly flat, wide and paved. Suitable for all users

EASY



USE AT OWN RISK

Gentle climbs and easily avoidable obstacles such as rocks, roots and pot-holes.

MORE DIFFICULT



USE AT OWN RISK

Challenging riding with steep slopes, and/or obstacles, possibly on a narrow trail with poor traction. Requires riding experience

MOST DIFFICULT



USE AT OWN RISK

A mixture of long steep climbs, loose trail surfaces, numerous difficult obstacles to avoid or jump over, drop-offs and sharp corners. Some sections are definitely easier to walk.

EXPERT UNLIMITED



USE AT OWN RISK

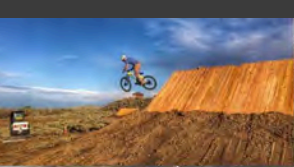
Exceptional bike control skills and balance essential to clear many challenging obstacles. High-risk level. Only a handful of riders will enjoy these rides.

HOW DO WE GET TO THOSE?

- The variables when looking at trail difficulty fall on:
 - The environment and topography.
 - Already existing local ratings.
 - The experience you are trying to create.
 - Width of trail.
 - Exposure of trail
 - Feature frequency
 - Type features

Trail Types!

DISCLAIMER! There are a ton of different trail types!



CLASSIC XC TRAIL

- Twisty, tight, and pinned in trail. Some built features but typically few and only when needed.
- Follows the contour of land.
- Varying width based on difficulty rating.
- Example: Old Theo Wirth Trails.



BACKCOUNTRY TRAIL

- Minimal tread modification
- Rougher trail. Raw, exposed roots, rocks, and other natural elements.
- Distinctly lacks built features such as rollers, berms, or manicured jumps.
- May use local material to access points of interest.
 - Views, rock features, etc.
- Typically narrowest type of trail.

FLOW TRAIL

- A series of rollers, berms, jumps, and features that are linked together like a sine wave, with one feature linking into the next.
- Usually wider to accommodate speed and size of features
- Highly shaped with local dirt or import.



GRAVITY TRAIL

- Trail built specifically for going down!
- Always one way!
- Utilizes elements from the other trails types
- Find your steepest acceptable grades with this trail type.
 - Armoring
 - Maintenance.



BIKE PARK

- Bicycle Playgrounds
- Skills building
- Pump Tracks



Q AND A!

- Is there too much bike trail already?
- Who is going to maintain it?
 - How much does maintenance cost?
- How many miles does it need to be?
- What difficulty do we build at?
- User conflict?
- Rogue trails?



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