TRAIL BUILDING 101

JULY 13, 2019 - West Bragg Creek

This 2-hour introductory session is for people new to trail work who want an overview. As an introduction to trail stewardship, we'll cover key principles of sustainable trail design and best practices for trail maintenance and repair.

The culture of trail stewardship starts within our community. If you like recreating on trails, chances are you'll really enjoy building and maintaining them too. Trail work is a little bit engineering; a little bit craft, ecology, user psychology, and a whole lot of labor, hopefully, labor of love. When in doubt, cut it out. Think Like Water!

Contents

1. Kananaskis Country History

Natural History

- The jagged peaks and u-shaped valleys in Kananaskis Country are 12,000 year-old reminders of the last ice age. They were revealed as kilometre-thick, million-year old glaciers melted to mere remnants.
- The actual mountains were formed over the course of 200 million years. Tectonic plates forced layers of rock to pile, break, and fold into mountains. The mountains which resulted from this pressure were originally much taller than today's post-glacier peaks.
- The rock itself is mainly limestone made from layers of fossilized sea creatures. These creatures lived hundreds of millions of years ago in the inland sea that covered southern Alberta. Evidence of this is seen in ancient coral reefs, oyster beds and shark teeth in Kananaskis Country.

Cultural History

- Archaeological evidence of humans in Kananaskis Country goes back over 8000 years. The Stoney-Nakoda, Siksika, Blood, and Kootenai First Nations all have deep connection to this land.
- Captain John Palliser chose the name Kananaskis 150 years ago on his expedition through the area.
- The name comes from the Cree "Kin-e-a-kis" - the name of a warrior who survived an axe blow to the head.

Kananaskis Country - An Experiment that Worked

- As early as 1902, parts of Kananaskis Country were included in the Rocky Mountain National Park (now Banff National Park). This land was removed in 1911. It was eventually turned over to the Government of Alberta in 1930.
- Bow Valley Provincial Park and Bragg Creek Provincial Park were created in 1959 and 1960.
- In 1972, the Alberta Wilderness Association proposed a wilderness area west of Calgary in the Elbow, Sheep and Kananaskis Valleys.
- That same year, the Environment Conservation Authority identified a need to set aside this area to protect watershed and to provide resource development, tourism and recreation opportunities.
- Banff-Cochrane MLA Clarence Copithorne, a rancher in the Jumpingpound area, recognized the growing pressure on the eastern slopes from Calgarians wishing to escape the city in the late 1960s and early 1970s. As Minister of Highways, Copithorne planned to upgrade the road into the Kananaskis Valley to divert people away from ranchlands.

- Calgary architect and environmentalist Bill Milne challenged the government to consult the public about the highway upgrade. Through Mr. Milne, the Government of Alberta received over 48,000 responses to a survey about the future of the eastern slopes. The majority supported creating a large protected area.
- Many say Mr. Milne and Minister Copithorne convinced former Premier Peter Lougheed to create Kananaskis Country with a single helicopter flight over the Kananaskis Lakes. It can easily be argued that simply seeing the magnificent ranges and valleys, the endless forests and rushing waters was all the convincing the Premier needed…
- In 1978, Premier Peter Lougheed officially dedicated Kananaskis Country and Kananaskis Provincial Park (now Peter Lougheed Provincial Park).
- Nearly two-thirds of the multi-use area envisioned by Peter Lougheed is now protected as a park, ecological reserve or recreation area.
- The needs of industry, ranching and tourism are still balanced with the mandate to preserve the animals, plants, and processes that keep the Kananaskis Country ecosystem healthy.

There are varying degrees of protection and permitted activities within the different categories of landscape, which include six provincial parks, four wildland provincial parks, an ecological reserve, and numerous provincial recreation areas.

Provincial Parks: Bragg Creek Provincial Park, Bow Valley Provincial Park, Canmore Nordic Centre Provincial Park, Peter Lougheed Provincial Park, Sheep River Provincial Park, Spray Valley Provincial Park

Wildland Provincial Parks: Bluerock Wildland Provincial Park, Bow Valley Wildland Provincial Park, Don Getty Wildland Provincial Park, Elbow-Sheep Wildland Provincial Park.

Ecological Reserve: Plateau Mountain

2. Where Do Trails Come From And How Are They Managed

The very first trails arose long ago by wildlife migrating from place to place seeking food and shelter. With the settlement of people most of these earliest trails followed natural features such as creeks, rivers, and ridges. In the latter half or the 20th century, the art and science of trail design and management developed rapidly to provide quality recreation opportunities for hikers and horse riders, and later nordic skiers, and mountain bikers. The techniques of trail design, construction, and maintenance have been improved steadily by a growing force of agency, private, and volunteer trail experts.

Maintenance of designated/sanctioned/formal/recognized/official trails in Kananaskis Country are the responsibly of Alberta Environmental and Parks (AEP, Alberta Parks and Public Land). Due to funding and resource constraints, AEP relies on partner associations to assist with trail

building and maintenance, and help sustain the growing recreational trends on foot, on wheels or on a horse.

?Do you know which trail associations are in your area?

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Multi use trails are most common as they cater to the biggest audience and get the most support to get built and maintained. For example, the trails in WBC are considered All-Seasons Non-Motorized Trails. They accommodate numerous activities including mountain biking, hiking, equestrian users, trail runners, skiers, snowshoers, orienteering, and dog walkers. Single or limited use trails include specific features that make it impractical for certain groups.

Example 1: Mount Assiniboine single track for hikers and wider track for horseback riders and no bikers due to high traffic area and dangerous encounter between horse back riders and bikers.

Example 2: Star War trail in Banff is meant for bikers with wooden features that are not for horses or hikers.

? What is a trail fairy?

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3. Trail Day - What to expect

- Varying details: the length of a trail day will vary depending on the project and organizers, and the level of physical fitness will vary depending on the project and its tasks.
- A trained Crew Leader will meet you at the parking lot (assigned meeting location).
- The session will begin with a 15 minute safety talk followed by departure for the worksite.
- Volunteers will hike and carry tools to worksites up to 4 kilometers from the parking lot.
- Most worksites are located throughout Kananaskis where there is limited or no cell phone reception.
- Washrooms are located at the trail heads only.
- Weather changes unexpectedly so check the forecast and dress accordingly. See clothing suggestions below.
- Volunteers are to provide their own lunch and snacks.
- There will be a first aid kit on site and Crew Leaders are trained in first aid.
- A suitable communication device will be on site for use in the event of an emergency.

- Pets are discouraged on volunteer trail days, unless the Crew Leader is agreeable. Pet owners are fully responsible and liable for their pets.
- We will be using hand tools such as a pulaski, axe, shovel, rake and shears which may cause injury if used inappropriately. Training on proper use will be conducted at the trailhead.
- The work may consist of building new trails or reroutes, maintaining trails such as repairing ruts, brushing/cutting shrubs, cutting roots, and fine-tuning trail tread. This will include digging, rake duff and earth, lifting and clearing rocks and deadfall, and prune roots and shrubs.

4. Trail Day - What To Bring

Adequate clothing and safety gear for trail days which should include but is not limited to:

- Eye protection (clear lenses will be best)
- Long sleeve shirt (sun and snag protection)
- Long pants (breathable quick drying are best)
- Socks (consider wearing 2 pairs; a liner & a thicker outer pair to prevent blisters and improve comfort)
- Boots (to prevent sprained ankles and provide support for the day)
- Jacket (for rain / cooler temperatures and not your favourite jacket. Remember all the snags and dirt etc.)
- Gloves (we can provide some it you forget yours)
- Lunch / snack (there are no restaurants or stores nearby)
- Water (it is important to stay hydrated)
- Bug spray
- Sunscreen
- Toilet paper
- Back pack (for all your stuff)
- Also a good practice to let someone (family/friend) know that you are going into the backcountry, that you will be out of cell range, that you expect to be back by a certain time, and will let them know when you are out of the backcountry.

5. Health and Safety

The Alberta Occupational Health and Safety (OH&S) Legislation outlines the general responsibilities to support workers in achieving a Health and Safe work environment. Everyone working as part of the organization; all employees, volunteers, and contractors (collectively, “workers”) is responsible and accountable for health and safety. All workers are expected to understand roles and responsibilities and must comply with the group’s Health and Safety program. All workers have the following fundamental rights.

The Right to Know

All workers have the right to know what hazards may be present at a work site, how these hazards may affect them, and what will be done to control or mitigate the risks associated with these hazards.

The Right and Responsibility to Refuse

All workers have the right to refuse work that they believe on reasonable grounds to be unsafe for themselves or others at the worksite.

The Right and Responsibility to Participate

All workers have the right to participate in health and safety management activities.

The Right and Responsibility to Report

All workers have the right to report safety events (i.e. near miss, incident), unsafe practices, and unsafe conditions without fear of reprisal.

Organizations engaged in volunteer trail work can never guarantee safety, but the risks of injury can be minimized. Volunteers must be apprised of the risks as best they can be anticipated. Acceptance of these risks should be acknowledged by each volunteer before an event in the form of a signed waiver of liability.

6. Right Tool for the Right Job

- Spade shovel
- Pulaski
- Clay pick
- MacLeod
- Hoe
- Rake
- Tamper
- Rock bar
- Handsaw
- Loppers
- Come along
- Buckets, bags, blue barrel, wheelbarrow, gorilla cart

*Motorized equipment (ex. Chainsaw) – only used by certified operators and required special approval by the land manager.

The tools you will need will depend on what terrain you are on and what you plan on doing.

7. Tool Safety (demonstration)

What is the circle of death?

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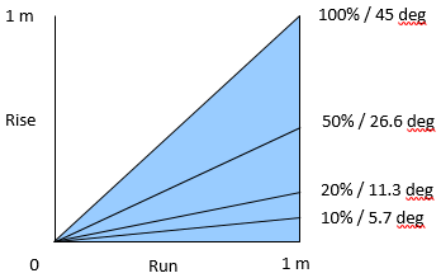
8. Trail Terminology

Tread: The tread is the surface of the trail on which users walk or ride.

Trail corridor: The area of passage of the trail, including all cleared and managed parts above, below and adjacent to the tread. The trail corridor is wider than the tread surface itself and is as high as necessary for the trail users.

Grade: The trail grade is the amount of change in elevation of the trail from one point to another.

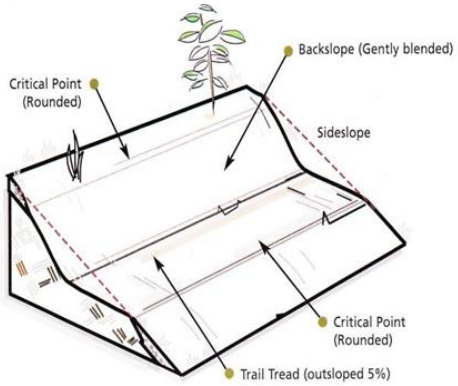
- Easy (green circle): average grade = 5-8% and maximum climbing grade = 15%
- Challenging (blue square): average grade = 10% and maximum climbing grade = 15-25%
- Difficult (black diamond): average grade = 15% and maximum climbing grade = 30-35%



Generally, an average overall trail grade of less than 10% is considered more likely to be sustainable.

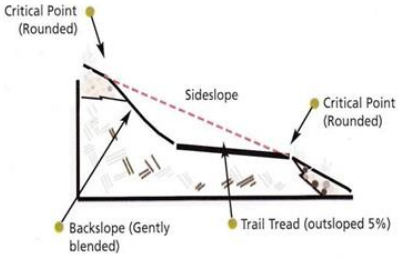
Outslope: Like the hillside, the tread slopes downward. Outsloping a trail is one technique to get water to flow across the tread rather than down it.

- An average 5% is considered ideal
- Too little *Outslope* creates pooling
- Too much creates widening on the outer edge



Bench Trail: A bench is a section of tread cut across the side, or contour, of a hill. A full bench trail is constructed by cutting the full width for the tread into the hill. This design creates a consistent and stable tread.

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.



Grade Reversals: Grade reversals reduce erosion by breaking up the trails watersheds and forcing water to run across the trail down the hill instead of down the trail tread.

- Periodically spaced reversals prevent water from accelerating down the tread
- Place them before and after any drainage problem areas
- Use the topography

Soil composition

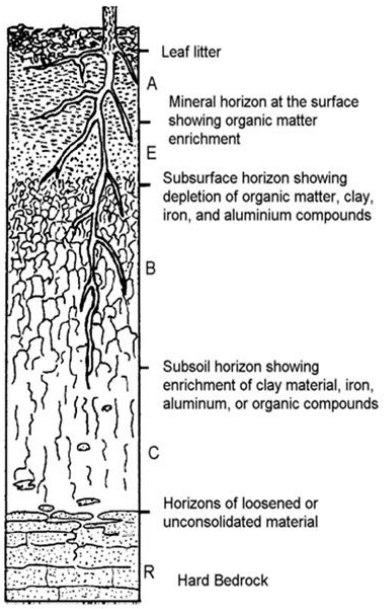
-Loam

-Clay

-Gravel (Lake Minewanka example)

-Glacial till

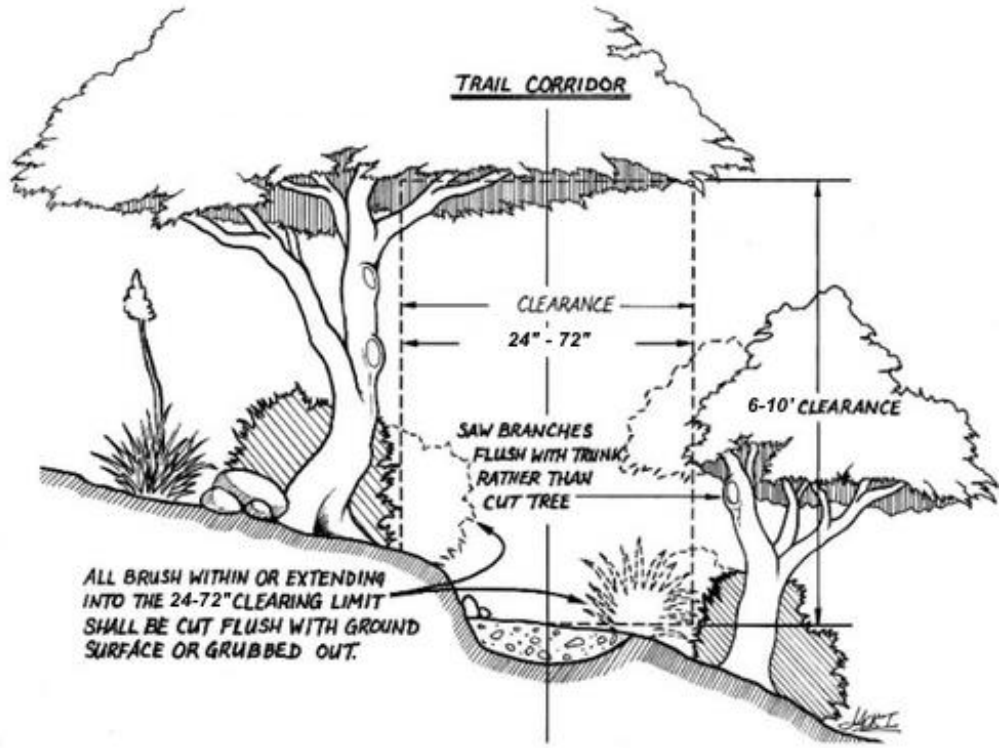
-Mineral sol (Brown Gold!)



9. Trail Corridor

To ensure the trail corridor offers good line of sight, it should be cleared 3 feet wide from ground level to 24” (about knee height); 8 feet wide from 24” to 10 feet overhead. Part of brushing includes removing tree saplings in the trail corridor, ideally before they grow above 24”. All sapling stumps must be cut as flush as practical with the ground to prevent unsightly tripping hazards and to reduce the chance of multiple new saplings sprouting from the stump.

Always keep hand saws out of the dirt so they remain sharp and your work easier. Brush work can be done with loppers for stems smaller than one-inch diameter or use a hand saw for larger stems. the ground. Cut tree limbs growing into the trail corridor with a hand saw. Cut the limb as flush with the trunk as possible to speed healing of the wound and prevent disease and rot.



10. Trail Construction

Always keep in mind:

1-Safety, safety, safety

2-Most of the work usually is to manage water issues (erosion, diversion, crossing)

3-Always look to minimize your efforts and maximize your results (work smart not hard)

4-Leverage is a beautiful thing when dealing with heavy objects!

After planning where the trail will go, follow these steps in carrying out the construction:

Trail Clearing

- Establish your centerline
- Remove Trees, overhanging branches and shrubs
- Leave tree stumps within trail tread about waist high
- Flush cut all others outside of tread (see Trail Maintenance section on the *3-Cut Method*)
- Drag all debris 10metres off trail
- Remove stumps from tread

Trail Tread Construction

- Work from established centerline
- Establish a clean inside line on the corners
- After the inside line is established, cut outside line to desired tread width
- Dig out all organic material down to mineral soil inside the lines
- Keep excavated material on the tread that is being developed & refrain from disturbing plants beyond the trail corridor.
- When required, rocks and roots should be removed
- Cut roots 6 inches back from trail edge and bury cut end

Hard Surfacing of Treads

- Dig out all material at least 3inches down
- Define edges
- Leave small roots and rocks in tread
- In some areas, landscape cloth may be used
- Rake gravel into a crown
- In wet areas, use coarse pit run under gravel

Scattering Debris

- Wheelbarrow, rake, carry or drag debris into the woods and scatter to blend in.
- On flat ground, wheel debris at least 5m into surrounding woods
- Spread dirt out to allow growth from underneath
- Topsoil and plant materials can also be used to repair damaged trail edges and encourage re-vegetation.

When should you keep roots or remove them?

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11. Trail Maintenance

All trails need maintenance and repair as vegetation encroaches, erosion occurs, vandalism happens, and safety concerns arise. Maintenance involves returning an existing trail its original state or bringing it in line with current trail standards as set out by the Alberta provincial government.

Priorities for Trail Maintenance

1. *Correct unsafe conditions*: This could mean repairing impassable washouts along a cliff or removing blow-down from a steep section of an equestrian trail.

2. *Correct natural damage*: Deal with erosion, sedimentation and off-site trampling, for instance.

3. *Restore the trail to the planned design standard*. This means the ease of finding and travelling the trail matches the construction standard for the recreational setting and anticipated user group.

Corridor Maintenance

To keep the trail clear and obvious to users, in order to keep them from straying off the trail:

Tread Maintenance

Tread maintenance involves removing roots, stumps, slough, and berms, filling ruts and low spots, repairing landslide damage, washouts or boggy conditions, and improve backslope.

Drainage 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. As the water gains volume and speed on steep grades, it erodes a trail into a deep gully filled with rocks and roots left behind after the soil has been carried away. Proper maintenance of trails includes correcting drainage problems.

In a more typical trail world, diverse circumstances cause tread erosion in varying amounts. Trails in soft soils, and especially on steep grades, are at most risk of erosion. In such conditions, trail users loosen tread soil as they walk along. When water comes along, the loosened soil is carried away leaving a concave or cupped tread. Simple compaction of soft soils exacerbates cupping. Some of the loosened soil is displaced to the downhill side of the tread, where

combined with leaves and needles, it forms a berm. Berm by itself, or combined with cupped tread, disrupts the outslope of ideal tread and prevents water from leaving the trail. The same process that forms berm happens on the uphill side of the tread, often exacerbated by additional material falling onto the trail from the backslope, creating what is called slough. To protect a trail from erosion three things need to happen:

1) reduce the amount of water running down a trail;
2) reduce the speed of the water moving down a trail; and
3) reduce the erosive force of users' feet loosening the soil.

The best way to achieve these objectives is by good trail design and construction, whereby a new trail is built with modest grades (less than 15%), passing only through durable soils, and includes grade reversals at regular intervals that naturally shed water.

In addition, the natural aging process of trails requires vigilant maintenance. If neglected, the problems will only grow worse and require major reconstruction or abandonment. In some cases, poor design, construction and maintenance have exacerbated such problems. This all adds up to trail workers facing much work to do to improve tread and prevent further erosion.

12. Trail Reclamation

If you have rerouted an existing trail, you will need to reclaim the old trail in order to prevent further use and to enhance regeneration of vegetation and natural contours.

- Break up old tread
- Control erosion
- Camouflage the corridor
- Transplant vegetation
- Apply natural barriers if applicable (such as placing a fallen tree across the tread)
- Relocate signage