

# Trailbuilding 101

From the builder point of view.





## Design trail work

- **Why Do We Need New Trail?**

Designing and building new trail from scratch with huge budget is rare. Almost always, projects are maintenance and rerouting of an existing trail to make it work better. These are as important as build mega trails from scratch.

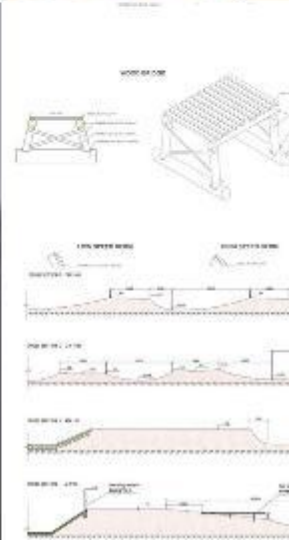
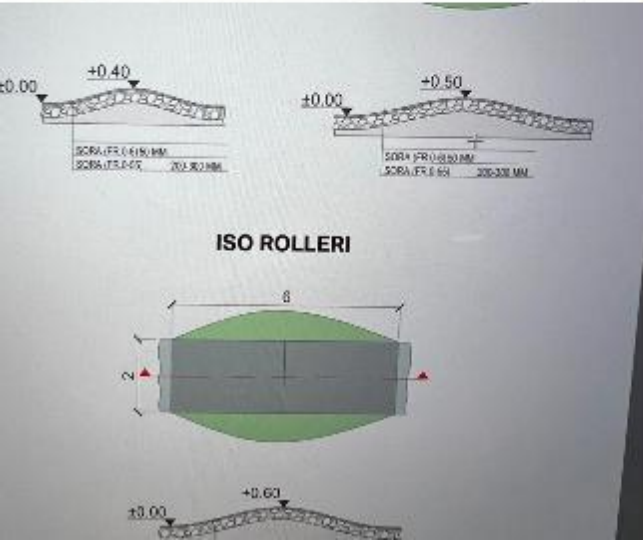
- **Who Will Use the Trail?.**

As a designer, you must know the types of visitors your trail will attract and support. The vast majority of trails are shared-use. Thus, you should consider what makes a quality trail from a number of different user-group perspectives.

- **What Kinds of Experiences Trail users want?**

Always design and work with landscape on your mind. No matter which group end users are, they appreciate nature /wilderness experiences, beautiful scenery and easy rolling trails.

So, backpack full of gear surveyor the area, notice all risks, mark all scenery spots, make final plans, flag the route and make sure trail build up goes as planned.







## Building the trails, but how?

Shared trails are most cost effective and also sustainable solution for environment. Shared-use trails take better advantage of the available space.

Shared trails require less trail miles and therefore have less impact. Building additional trails for individual user groups increases the ecosystem impacts including potential habitat fragmentation and water sedimentation.

Not everything for someone, but always something for everyone.

Landscape, materials and weather makes trail building tricky here up north and top challenges are:

- Topside drainage design
- Preventing Diffuse pollution into water courses
- Surface compaction
- Surface gradients and cross falls/cambers
- Surface water catchment - cross drains/water bars
- Severe weather events - more frequent, identify risks
- Slope stability.
- Trail surface and drainage maintenance.

And solutions for these are simple, just inconvenient.



## Trailbuilding 101

Ready to build trails? You have your plans, drawings, guidelines, machinery, tools, materials, fuel. So can we start already? Answer is yes!

Step by step it goes:

Trail is flagged accordance with the plan on the terrain. Following the design and drawings, build crew starts digging. No matter if trail is built by machine or by hand, first:

- ALL organic material needs to be removed from the trail area; peat, black soil, hummus, roots and twigs have to be removed. If living layer is possible remove as mattresses, they can be neatly removed to the side, so that they can be used for landscaping later.
- Excising material is already shaped as in plans. Compact. Trail features. These structures/ shapes ensure that water does not remain on the trail surface and drainage is as efficient as possible.
- Install drainage; water bars, stone pits, rollers, ditches, etc. Flat terrain is always an challenge. If a trail is not located on a slope, there is the potential for the trail to become a water storage. The trail tread must always be slightly higher than the ground on at least one side of it so that water can drain properly.
- Both ways, with materials produced on site or delivered materials, top layer is first shaped with rough materials: 0-55 or 0-32. Compact every 150-200 layers. Top surface with finer material 0-8 or samekind. Final shape and compact.
- In every section of trail, in flats or down- and uphill, builders should keep in mind; rolling contours, shapes, radiuses. Shapes, features and slanted trail top surfaces resist erosion. Contour trail is a path that gently traverses a hill or sideslope. These features minimize tread erosion by allowing water to drain in a gentle, non-erosive manner. When water drains widely, not in collected streams, fine materials won't start to erode with water.
- And as always, plans don't always work out. If build crew notices that something is off, they have to trust their experiences. All shaping should have a point, don't make shapes just for the sake of making them. If water drains effectively









### **Transporting the materials or produce them on site?**

Depending on the soil in the area, it is most cost-effective to produce the required soil on site. Using rock crushers and screening buckets on excavators is the most effective way to build trails in far far away locations.

“Screening” the materials: The top soil / surface layer is moved neatly to the side and the digging is started straight down with a screening bucket. The fine materials produced by the screening bucket is placed in a pile to the side/front/back of the excavated pit in the most suitable area.

The screened stones are piled next to the pit. When enough material has been produced, the screened stones are moved into the pit. The fine material is ready for construction of the top surface. Once the screening has been completed and the surface of the trail is ready, the stored mattresses can be used for landscaping (hiding the work area).

Crushed stone production. Crushed stone can also be used with large stones or screened stones, which allows the necessary crushed stone to be produced on site.

If production of materials is not possible. Crushed rocks and fine materials are delivered to the site either by ATV trailer combination, track or wheel dumper, front loader or skid steer loader. The materials can also be delivered in winter time by sled or snow groomer.

The base material of the route (0–55 or 0–32 crushed/gravel) is spread according to the route plan. The surface material (0–6 or equivalent crushed/rock ash) is spread on the route and compacted. This results in the most durable and maintenance-free tread surface.









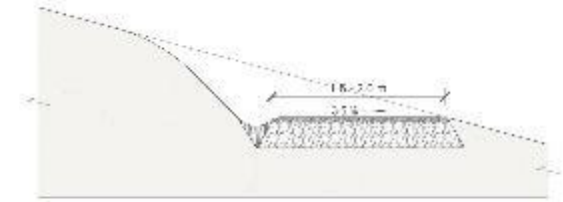
## Drainage

Water must always be taken into account during the trail building; trail shouldn't be flat at any point. There should be always some shapes, rollers, turns and on trail edges there should be always exit route for water.

The shapes / features help with efficient drainage. Trails top surfaces should always have downwards lean by approximately 3–5 degrees. This lean of course needs to be directed towards edge where there is a clearer path for water run away from the trail structures. If there's sections where water will most likely run over the trail in stronger stream during heavy rain or spring time floods, trail needs to be enforced with water bars or stone pits. What matter what location is, trail needs to be raised from surroundings



GRAVEL FILL 50 MM  
GRAVEL FILL 200-300 MM  
EXISTING SOIL AND STONES



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## Structure of bench cuts.

As the trail contours across a hillside, the downhill or outer edge of the tread should tilt slightly down and away from the high side. This tilt is called outslope, and it encourages water to sheet across and off the trail instead of funneling down its center.

Outslope is one reason why contour trails last for years and years. Trails top surface should have 5-percent outslope. Upper slope of the trail is built with a 1:1 slope. Sometimes upper slope needs to be shaped as drainage ditch. Then trail needs to have section where water will pass below. Either water needs to be drained by pipes or enforced section of trail.









### **Bridge over troubled water**

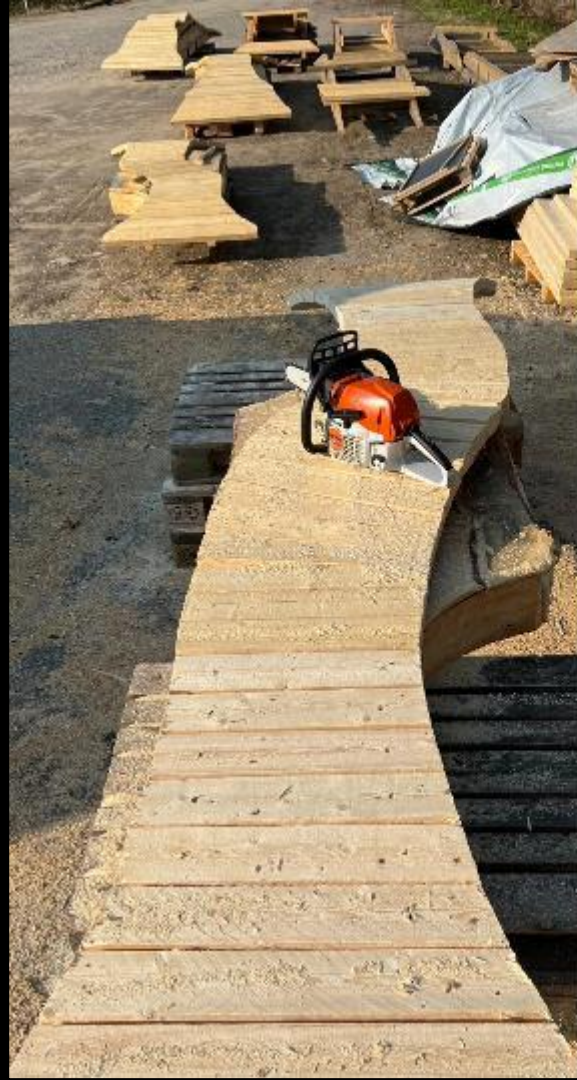
In some locations, conditions forces builders to use wooden structures. Larger water streams caused by meltwater or heavy rain are sometimes easier and more cost-effective to by pass with a wooden deck.

At the same time, wooden structures are impressive trail elements and are often the most photographed objects along trails. The frames of wooden bridges and elements: legs, uprights, pillars, etc. can be built from natural or treated wood materials. The deck is built from either untreated wood, impregnated or composite materials.



Stone structures. Stones are used in the reinforcement of structures, as a frame and surface material for water control areas, and as a bridge material. If the surface of the trail needs to be raised, larger stones can be used under the trail.







Thank you!  
Now let's go and build trails!



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