Best Practices for
The Development of Snowmobile Trails

The Vermont Association of Snow Travelers, Inc
Revised 7/2017

Overview

Construction and maintenance of snowmobile trails is ongoing. Trails must be constructed and improved during the dry months of the year and regularly groomed during the winter months. There are no substitutes for good planning, improvement, and maintenance.

This document provides a general guideline for the design and construction of snowmobile trails. These best practices are not intended to be substitutes for site-specific designs that respond to local conditions, landowner or public land manager requirements, and safety concerns. In all cases use your best judgment.

Contact

For questions about trails or funding grants, contact:

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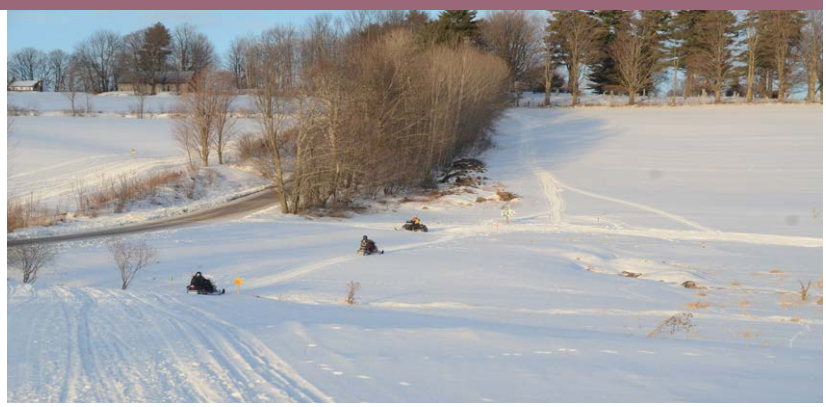
or visit www.vtvast.org

Planning a New Trail or Reroute



Your initial planning must include decisions about what type of trail you need or plan to build. Landowner or manager permission, costs, environmental effects, and quality of the recreation experience are all affected by this first decision, so it is an important one. When considering a new trail, ask yourself:

- Why this trail?
- What purpose will this trail serve (spur to food, gas, reroute, etc...)?
- What type of trail (corridor, secondary)?
- Will this trail hold snow?
- Will the landowner or manager be happy with what you are proposing to build?
- Can you afford to build AND maintain this trail?
- Should you build this trail (security/longevity of the trail, other considerations)?

Corridor Trails

Corridor trails are a network of primary snowmobile routes that provide access to significant areas or services. The traveled portion must be capable of handling two-lane traffic and must be wider on corners. While the minimum width is eight feet, twelve feet is ideal. Where possible, add an additional two feet of width to improve safety in high use are as.

Secondary Trails

Secondary trails usually connect local attractions or neighborhoods to main corridor trails. They have variable trail widths and grooming conditions and can provide a more primitive recreational experience.

Mapping

Mapping your ideal route will help you to refine your trail plan and convey your ideas to others.

When in the field, you can use a recreational GPS or smart phone app to take tracks and waypoints that can be uploaded to a mapping program. As you refine your route, you can also use plastic flagging to mark your path so you can easily show others on the ground. A few other tools that will be helpful are:

Becoming familiar with various types of bridges, water bars, and other construction details in this manual will help you plot and refine your initial route.

Tax Maps

- Helps determine who owns which parcel of land
- Available through your local Town Clerk
- Make sure that all boundaries are agreed upon

Topographical Maps

- The contour lines on the map show elevation changes
- Shows which slopes are suitable and which will be too steep
- VAST's interactive trail map has a topo feature!

Interactive Maps

- The VAST interactive map is a good starting point
- The ANR Natural Resources Atlas has many great data layers that can help you evaluate **landcape considerations**
- Google Earth is a free program that allows you to upload your GPS data

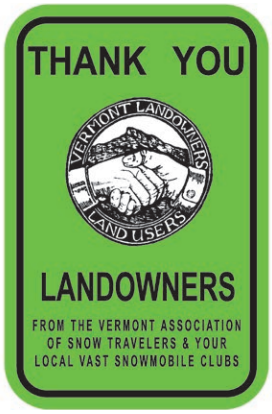
Planning the Ideal Route

When designing a new trail from scratch, first identify where your trail will begin and end. When creating an ideal route between these points, there are many things to consider.

An ideal route is one that:

- Works well with compatible **Landowners & Managers**
- Minimizes **Water Crossings**
- Capitalizes on **Control Points**
- Addresses and incorporates **Landscape Considerations**
- Has safe but minimal numbers of **Road and Rail Crossings**

Landowners & Managers



Landowner relationships are the most important consideration in planning a trail system. Most trails cross multiple properties; start by who owns each parcel of land you are considering for the trail.

Your club must obtain permission for each separate parcel of land you plan to cross. Good landowner relations are the key to maintain trail connectivity within the network, so always be respectful.

Public Land Managers

Public land can be owned by a town or a city, by the State or the Federal Government. It can also be owned or held in easement by a land trust. Each organization managing public lands has different goals and is governed by different rules.

It is essential to develop and maintain relationships with public land mangers. They often have higher standards of maintenance, water quality protection, and sustainability. Additionally, they may require that many or all of the trails serve multiple user groups and need to be built accordingly.

When you are contemplating a project on the public lands, you will have to start planning for projects a year or more in advance. Contact the appropriate public representative before you contact adjacent private landowners.

Private Landowners/Managers

Landowner dinners are a great way to say 'Thank you!'

Private lands can be owned by an individual, a company, or have multiple owners such as being held in a trust. Over 85 percent of the VAST trail network is on private land and these relationships are critical to maintain.

At any point in the process from planning to construction to riding during the season, the landowner always has the right to deny access to their property. Always be respectful of their wants and wishes for their land.

Landowners are a part of the community, the same as the club and its members are. If the club has a good relationship with the community through respect and civic involvement, it will make interactions with landowners more pleasant and productive.

Control Points

Control points can be features that you want to highlight or features that you want to avoid. Identify ways to connect to positive control points while avoiding the negative ones. This will give you a basic route to start with.

Some examples of control points are:

Positive	Negative
• Food, gas, or parking	• Open bodies of water
• Existing trails or skid roads	• Wetlands
• Scenic overlooks	• Steep or rocky terrain
• Points of interest	• Incompatible landowners
• Ideal river/stream crossings	• Areas that won't hold snow

Water Crossings

Water crossings are the most regulated, most expensive part of any trail and they should be minimized whenever possible.

The Flume is a model demonstration of river water flow dynamics put on by the Vermont Department of Environmental Conservation. It is a great resource for understanding how water and erosion work and demonstrates best practices when installing bridges and culverts. The video can be viewed at http://centralvtplanning.org/programs/watershed/ or by clicking on the adjacent picture.

Avoid a trail that runs closely along a river, as these areas are prone to flooding and erosion. If you do not have an alternate route, plan for a 25'+ buffer zone.

Some small streams may only require an armored ford while others with a higher flow will require a properly sized culvert. Culverts sized too small or installed incorrectly will plug and wash out the trail.

In the case of longer spans or higher water flows, a bridge will be necessary. When planning for a bridge:

- *Find the shortest distance to cross at a 90° angle*
- *Cross on straight stretches; curves erode faster*
- *Secure the appropriate permits (Local, State, or Federal)*

NO ICE IS SAFE ICE

Crossing over frozen lakes and ponds is always dangerous. Do not build a trail to cross an open body of water.

Riding Along Roads

By Vermont Statute, snowmobiles may be operated on a public highway if the operator is not closer than five feet from the plowed portion (this does not apply to class IV roads or trails that are privately owned and maintained), on highways that are not maintained or plowed for the use of motor vehicles during the snow season (most commonly on Class IV roads), and highways that have been opened to snowmobile travel by the selectman, trustees or local governing body.

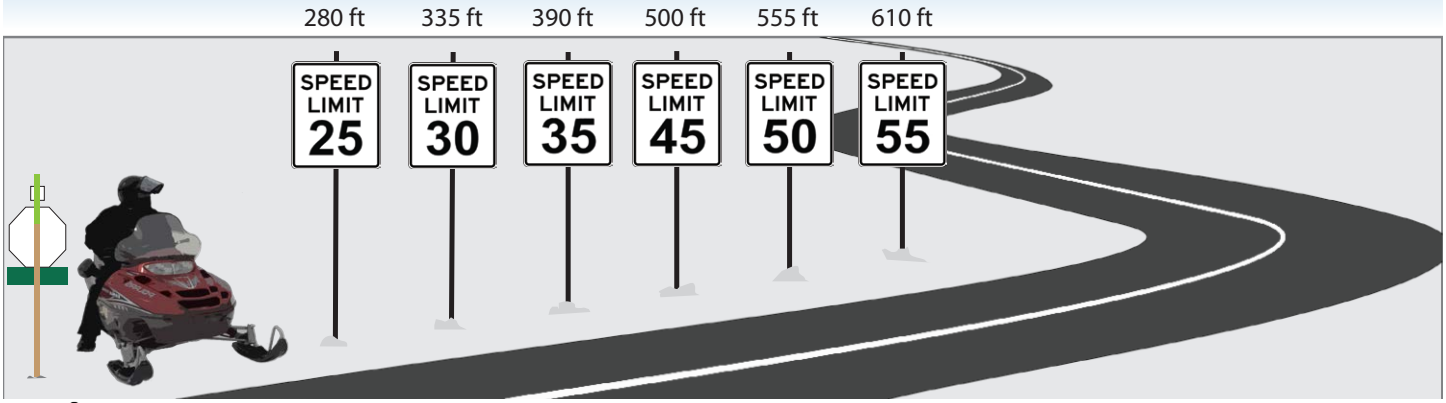
Road crossings should be made at an angle that is 90° to the direction of the road and should be clear from any obstructions that may hinder the operator's visibility when crossing.

Road and Rail Crossings

Road and rail crossings require careful consideration and should be kept to a minimum. To keep riders safe, cross roads and rails at 90° angles and ensure that they have proper sight distances.

Avoid crossing roads or railroads where you have to climb a steep bank to get to the road or railroad and do not cross at curves where sight distance is reduced. Your club may have to use existing railroad crossings on active railroads unless you obtain permission to cross them at other locations. Talk to State or local highway officials for help in determining safe crossing locations.

Minimum Sight Distance at Road and Rail Crossings



Landscape Considerations

One of the most unique and beautiful aspects of Vermont is its diverse landscape. When laying out a trail, there are many factors to consider.

Avoid Steep Slopes

Steep slopes require more and deeper waterbars to prevent erosion. The need for waterbars can be minimized (but not elimated) with good trail planning. Gain or lose elevation gradually rather than traveling straight up and down a slope.

Look for Drainage Opportunities

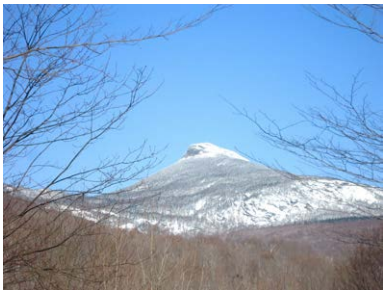
Proper drainage will mean longer riding seasons and save your club money in maintenance. Follow the contours of the land as they will provide natural drainage opportunities. Decrease the need of deep waterbars. Avoid putting a trail through gullies, seeps, or any other places that hold water.

Avoid Wetlands

Wetlands are heavily protected by State and Federal agencies. In some cases, snowmobiles are permitted to cross these areas in winter conditions, but it is best to avoid them all together whenever possible.

Avoid Deer Wintering Areas

Stands of conifers could be critical deer wintering habitat and possibly protected. Check with agencies like FPR and F&W to see where these areas are and plan your trail around them.



Avoid Elevations over 2,500’

High elevations hold snow longer and can be desirable places for trails. However, any development over 2,500’ elevation requires an Act 250 permit and should be avoided.

Do Not Alter Historic Sites

While cellar holes, stone walls, and cemeteries can be interesting features to highlight, it is important to stay away from the footprint and edges of visible historic sites. Do not to disturb these sites by moving them, removing them, or altering them in anyway.

TRAIL CONSTRUCTION: *Structures and Techniques*

The purpose of this section is to introduce different trail structures and techniques, define their purpose, and explain how to install them on a trail. The examples are taken directly from the VAST system and offer insight into the challenges that you will face out on the trail.

Before you begin any trail construction or maintenance project, you must first have permission from the landowner or land manager. Make sure that they know what you are planning to do, where you are planning to do it, and what that work entails (cutting trees, mobilizing equipment, etc…). The scope of work must be fully understood and agreed upon prior to beginning any work. It is not sufficient to contact a landowner or public land manager as you are driving to their property or after the work is completed. You **must** notify them in advance of any work.

Most public land managers require maintenance plans to be submitted in the spring for work to be conducted throughout the season. Each land manager is different, so check with them about their requirements before planning any projects. If emergency work needs to be conducted outside of the proposed schedule, give as much notice as possible to the land manager of where the problem is, how you plan on fixing it, and when you want to do the work. Remember that it is not your land to access at will.

Invasive plants are spreading across Vermont. They out compete native species and quickly take over fields or exposed soils. Invasives like wild parsnip and chervil cause chemical burns when their juices get on skin and come in contact with sunlight. To avoid spreading invsives:

- *Seed and mulch all exposed soils*
- *Clean all equipment before moving it onsite*
- *Clean all equipment onsite before being moved*
- *Equipment can be cleaned by sweeping, scraping, brushing, or blowing soil, dirt, mud, plant material, and debris from exterior surfaces of equipment*
- *Clean mowers and other equipment immediately after operating in infested areas*

Trail Tread

Tread refers to the trail surface underneath the groomed snow. A trail is only good as the surface it is built on. A smooth, well drained surface free of boulders and stumps is easy to groom and fun to ride. The following are some of the main considerations when constructing a trail.

Tread Surface Material

Open dirt trail surfaces are more susceptible to tread damage and erosion. Make sure to seed and mulch any exposed soil immediately after any work. Encouraging an even growth of grass will add stability and make maintenance cheaper and easier. This is especially critical and often mandatory in sensitive areas such as next to a stream or on steep slopes.

Don't wait to fix erosion in the trail. Once the fine materials wash away, it will be much harder and more expensive to fix. Well built and placed drainage structures will prevent erosion

After tread work, give the trail time to set and harden before running equipment or maintenance vehicles on it.

Vegetated trails need to be mowed. The longer the grass; the more snow needed to create a base. Avoid disturbing nesting wildlife by mowing outside of the breeding season of May 15 - August 15

Trails in some areas may need to be reinforced with crushed stone or gravel when native materials are unavialble or of poor quality. This helps elevate the tread and resist erosion. Make sure that you are not adding fill to wetlands, streams, seeps, and vernal pools..

Tread Evenness

A smooth, even tread allows a trail to be groomed and ridden upon much earlier and later in the season. Try to remove all stumps, stones, and any other object protruding from the trail.

The uneven surface of the trail will require more snow to build a base and will erode much quicker.

This trail has a more even tread but some stones and debris could be removed to improve the tread. If you can't remove or build up around an obstacle such as ledge, be sure to mark it with grade stakes and reflective markers to keep riders safe in the winter.

This smooth, even trail will be easy to groom and fun to ride in the winter. It also will be easier and less expensive to maintain

When removing trees:

- *Make sure you have landowner permission**
- *Never push down trees with equipment*
- *Clear all debris off trail*
- *Remove stumps when possible or cut trees flush with ground*

***Timber Trespass**

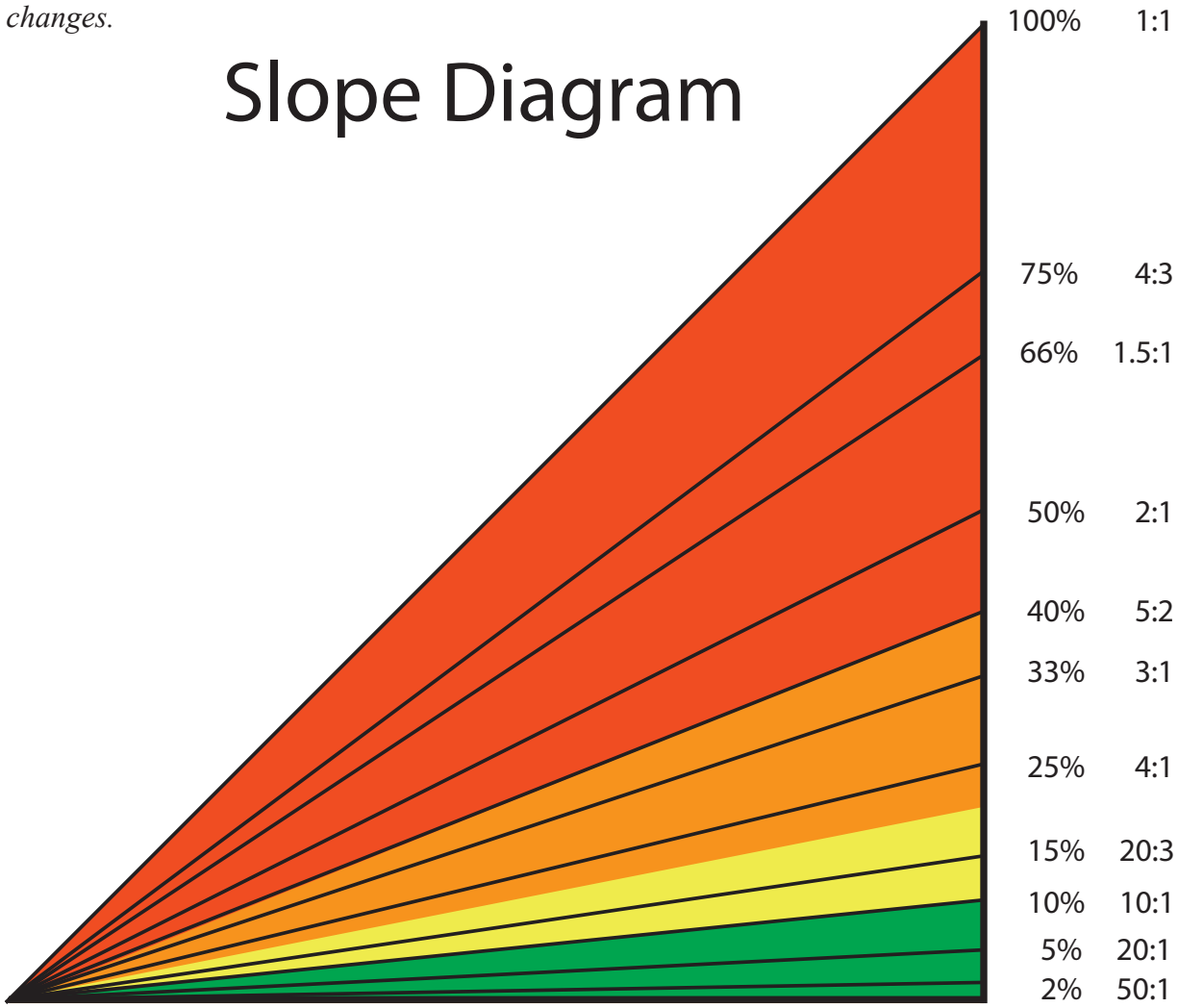
As of July 1, 2016 the State of Vermont has updated its Timber Trespass laws (Sec. 1. 13 V.S.A. chapter 77). There are now stiffer civil and criminal penalties for knowingly or recklessly cutting down or damaging trees and shrubs. It is important that before you cut any trees or vegetation on a property that you and the landowner are in complete agreement about the work to be done and what trees are going to be cut down.

Cross Grade

The cross grade is the subtle tilt in the surface of the tread that allows water to flow gently off the trail. The ideal trail is constructed with a 2% cross grade. Up to 5% cross grade is acceptable for short distances, but if continues for too long it becomes difficult for riders and grooming equipment.

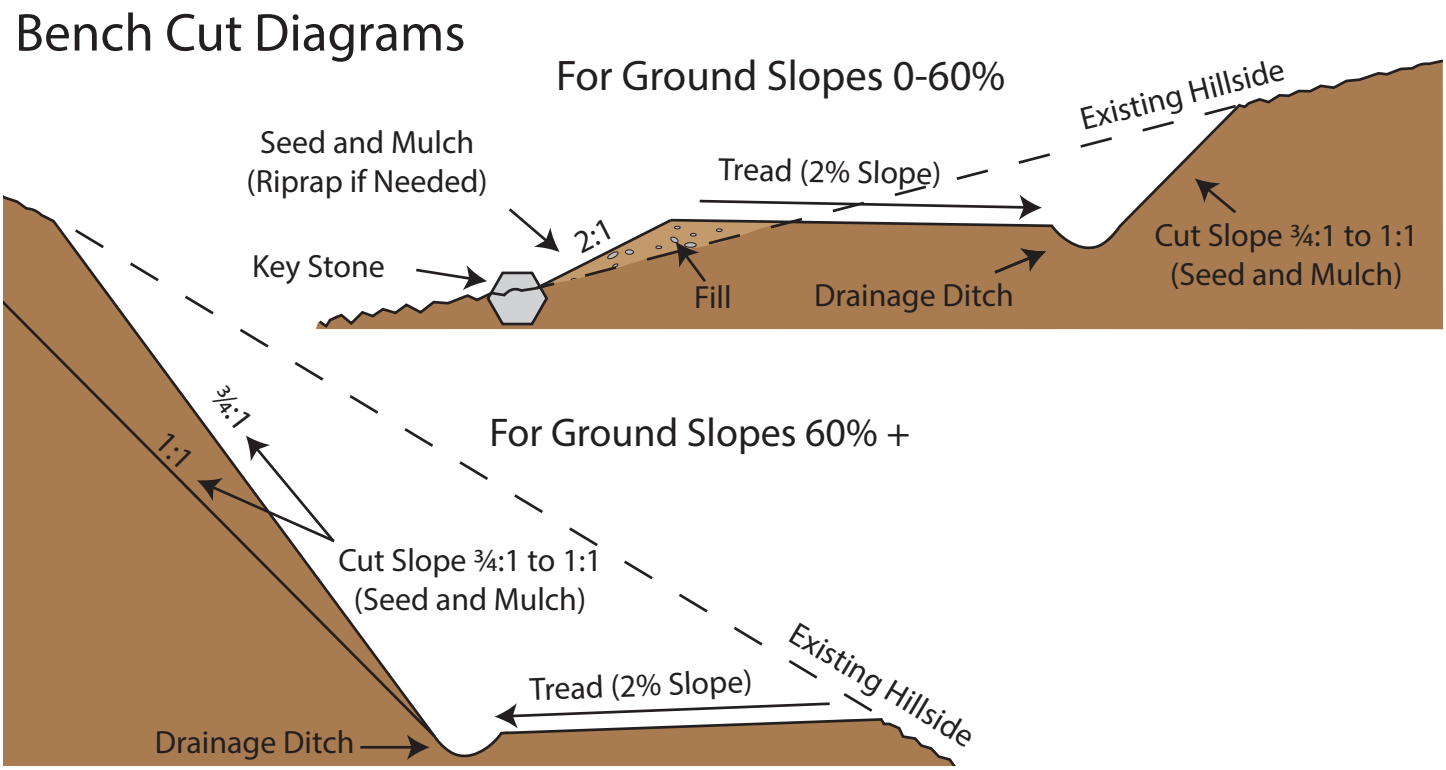
Consistent grades make for an easy to groom, enjoyable to ride trail. Avoid unevenness or abrupt grade changes.

When water cannot flow off trail, it will run down the trail damaging the surface.

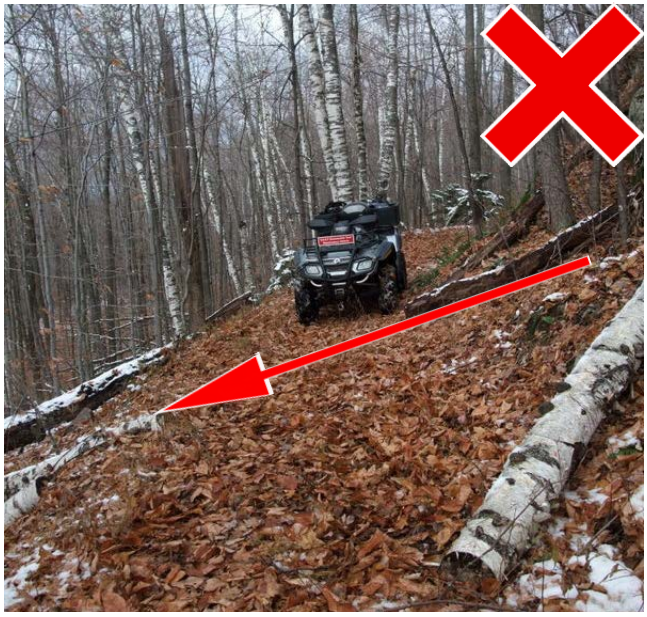


Bench Cuts and In-sloping

Benching a trail means building the trail into the side of an existing hill. This is the best way to gain or lose elevation. When benching a trail into the side a hill, always in-slope the trail towards the uphill side. This will keep riders and groomers from sliding off the trail if it ices over while keeping water from eroding the outside edge of the trail.



When in-sloping a trail, make sure to include a drainage ditch on the uphill side to control the water flow. Remember to seed and mulch exposed soils when finished.



This out-sloped trail can be hazardous for riders and groomers. Never out-slope a trail!

Curves and Turns

Curves and turns along the trail need to be wider than straight sections to accommodate grooming equipment and keep riders safe. When planning a curve, consider the design speed of the trail: the faster the speed, the wider the curve needs to be. Trails with steeper side slopes will need more width in curves as well to increase the sight distance.

This wide curve will allow riders to safely and comfortably navigate the turn.

Whenever possible avoid creating a tight S-curve in the trail. Not only will this be difficult to ride and groom, but the excess vegetation reduces sightlines.

This curve is too narrow and needs to be widened especially considering the reduced sightline from the hillside.

This curve is wide enough to safely accommodate riders. The stones on the outside of the trail could present a hazard to riders who take the corner wide and should be moved.

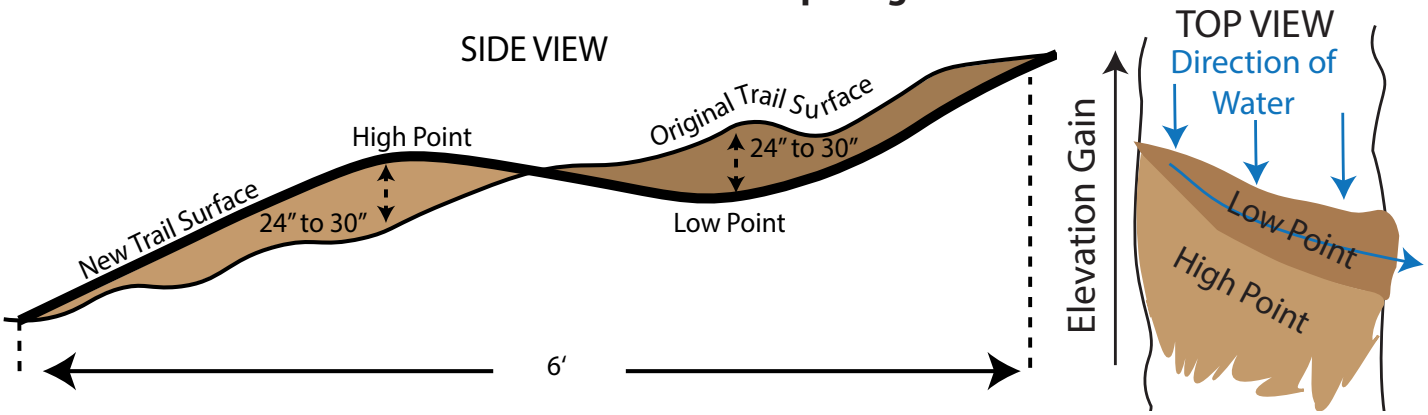
Drainage Structures

The key to a good trail is proper drainage. The goal with drainage structures is to allow for surface water to shed off the trail with out scouring the tread. Water will always seek the lowest point along the path of least resistance.

Broad Based Drain Dips

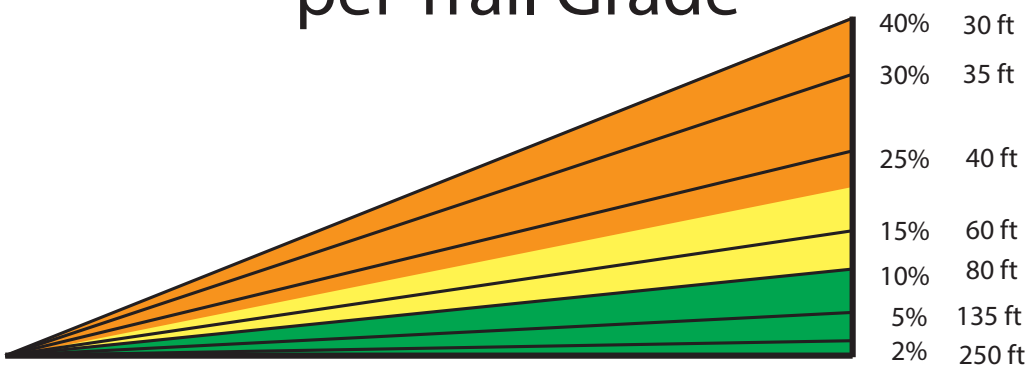
PURPOSE: The broad based drain dip is used to drain water across the trail tread or as relief for drainage ditches. They work by creating a low point for water to drain across the trail. A properly constructed broad based dip should have a gradual progression from the low to high points and not leave an aggressive bump trail. When installed properly they can prevent erosion on trails, especially on hills, while nicely accomodating the groomer. The steeper the trail, the more and deeper the drain dips that are needed to control water. These deeper structures are known as waterbars. Properly sited trails and drainage structures can decrease, but not elimate the need for deep waterbars, especially on trails over 8% grade.

Broad Based Drain Dip Diagrams



HOW TO BUILD: The broad based dip is constructed by digging a shallow dip across the tread at a 45° angle. The excavated material should be placed on the low side of the dip and smoothed out to a gentle grade. They should never drain into a river, stream, wetland, or any other body of water.

Distance Between Drain Dips per Trail Grade



This broad based drain dip is very well built. The shape of the dip is what should be funneling water off the trail via the low point, not the high point acting as a barrier. Drain dips require routine maintenance to function properly. Check them in the spring, fall, and after heavy rain events.

This drain dip will catch water, but should be broadened out for a smoother trail experience. Make sure that your outflow point is lower than the other side of the trail.

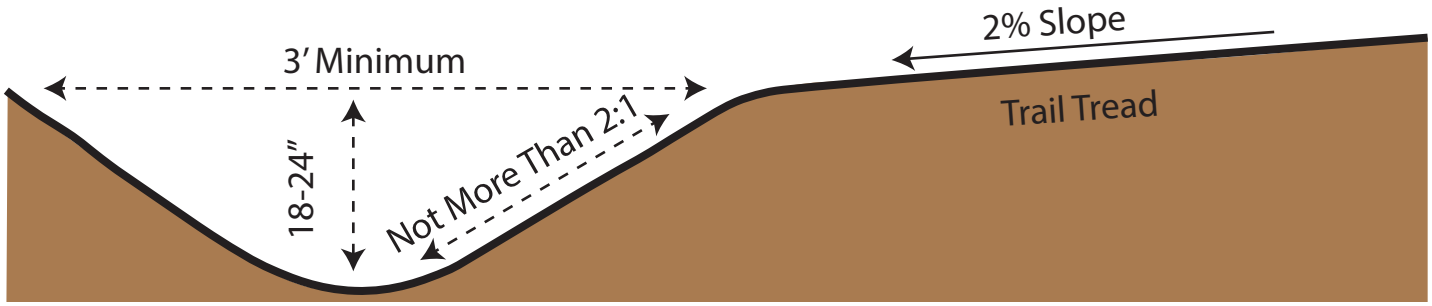
This drain dip is too large and will act as a barricade for trail riders and grooming equipment.

Drainage Ditches

PURPOSE: Drainage ditches serve as the lowest point, collecting and moving water alongside a trail to a point where it can safely be diverted into vegetated area. Ditches are constructed wherever the natural topography doesn't allow water to move away from the trail, such as flat, muddy areas.

Ditches can be used for long stretches but must be drained with dips or culverts. On side slopes, ditches will only be needed on the uphill side of the trail. On level areas or on steeper sections, ditches may be needed on both sides of the trail. The steeper the trail or the more water coming into the ditch, the more outflows that will be needed. They should never drain into a river, stream, or any other body of water.

Drainage Ditch Diagram



HOW TO BUILD: To form a ditch, excavate the soil along the edge of the trail. The side slopes of ditches should be constructed at a low angle (2:1 ratio) so they are stable. Larger ditches are less likely to be plugged by debris like leaves and twigs.

This uphill stretch has two ditches: the uphill ditch to catch water from upslope and the downhill ditch to direct water sheeting off the tread. It is a good idea to seed and mulch a ditch, as the grass will stabilize the soil and prevent erosion.

While this is a good example of a drain dip as an outflow, the water is flowing past the dip (bottom left). The tread is sloped away from the ditch instead of towards it.

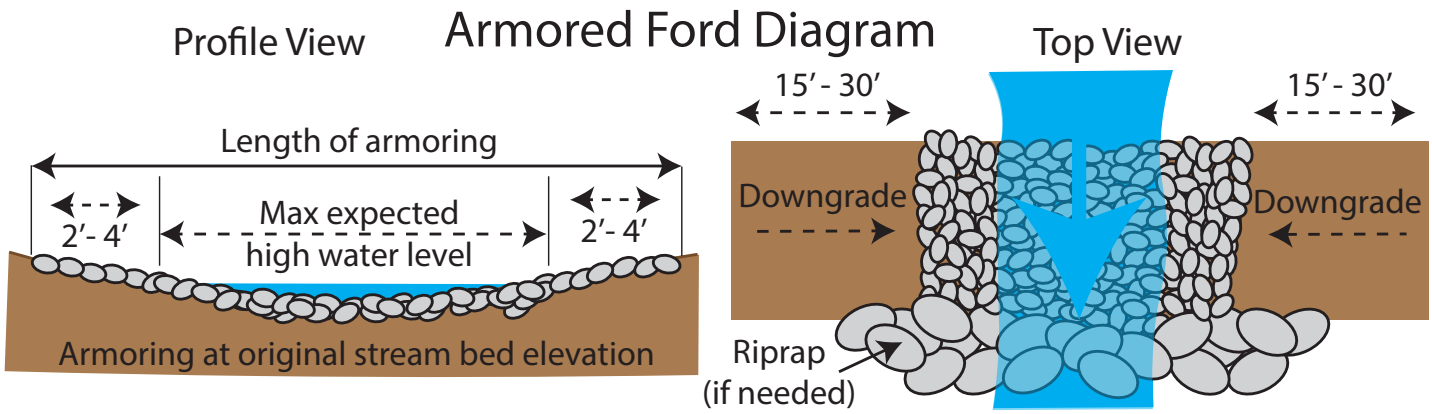
This ditch is far too shallow to control the flow of water. Remember that to move water in a ditch, one end needs to be lower than the other.

This is a good example of turn-piking. Turn-piking is the process of removing soil material from ditches in low, wet areas and using it to raise the elevation of the tread. Ditches will generally be on both sides of the elevated tread. Water is distributed with a series of cross-drains which are usually culverts but can be drain dips as well. In this example, the ditch could be wider and need to have the sides reshaped. The culvert header has collapsed a bit too. ***Remember that ditches require regular maintenance to work properly.*** *Make sure to remove any material that has built up to avoid damage to the trail.*

Armored Swales and Stream Fords

PURPOSE: Armoring is a term for using stone to reinforce a structure. Armored swales are drain dips reinforced with stone to provide further stability.

Stream fords are an alternative to a culvert or short bridge for crossing low flow streams. They should be built at straight, shallow sections of a stream. The advantage to this structure is that it is cheaper than a culvert and can easily handle variable flows of water without blowing out. The disadvantage is that it may be wet in the early and late parts of the season. Not every stream will be appropriate for a ford; make sure that you check with land managers or the VT Department of Environmental Conservation (DEC) River Management Engineers.



HOW TO BUILD: Identify the proper crossing location. Make a gradual transition down to the stream bed. Use stone to harden the stream bed and approach by pounding stone into the tread until they are level with the natural bottom of the stream. Use stones that are large enough to resist the water flow. The armoring should extend beyond the expected high water level for the stream. If needed, add larger riprap stone to the down stream side of the trail to keep the tread level.

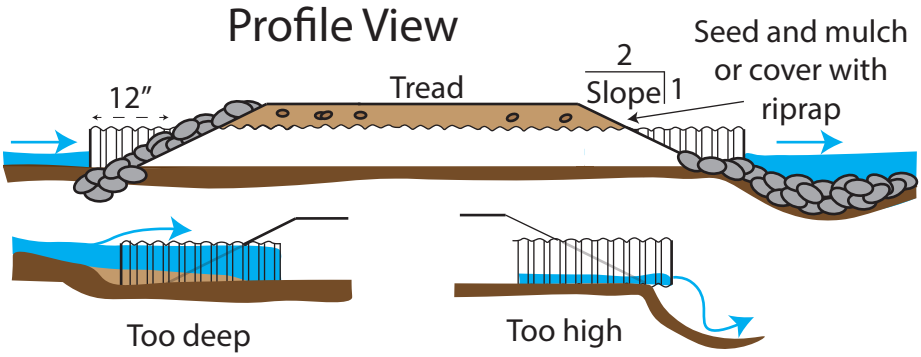

Photo courtesy of USFS

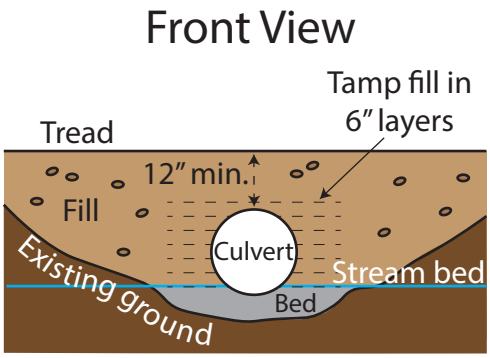

Photo courtesy of USFS

This armored ford is a good example of using riprap to build up the low side of the tread and keep the trail level at the crossing.

Culverts

PURPOSE: Culverts are used to drain water across the trail without causing any change in the grade of the trail. They are ideal for variable flows or as relief to ditch lines. Culverts are more expensive and labor intensive than a broad based drain dip but less so than a bridge. When sized and installed properly, they can handle varied or continuous volumes of water effectively.





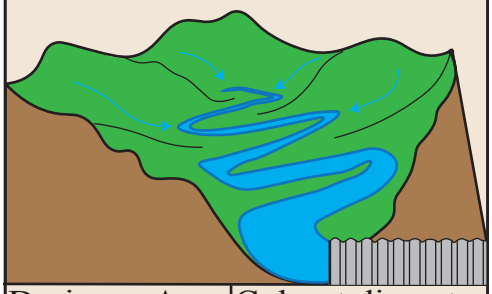
HOW TO BUILD: Culverts must be laid so that the bottom is slightly below the stream bed to allow for a natural bottom. Any gaps left by stones or loose material will allow water to flow underneath the culvert. Make a "bed" for the culvert by removing stones and adding gravel underneath for a tight seal.

To prevent it from being crushed by traffic, the depth of fill over the top of a culvert should be at least one half of the culvert diameter and not less than one foot deep for culverts less than 24 inches in diameter. Soil around the culvert must be firmly tamped in 6 inch layers. Stone should be used around both the inlet and outlet of the pipe to avoid erosion. Culverts need to be cleaned annually by clearing any material buildup in and around the culvert as well as removing upstream debris.

When properly sizing a culvert, consider the area to be drained, terrain, soil properties, vegetative cover, and inches of precipitation per hour. There are many formulas that can be used to determine the proper culvert size, the following formula is one of the easier ways of determining culvert size. The length of the culvert is determined by the width of the trail tread with an allowance of at least one foot at each end of the culvert.

Avoid using culverts less than 18 inches in diameter as they are highly prone to plugging. Installation of culverts greater than 36 inches in diameter or in areas of continuous flow should be verified with a River Management Engineer before installation.

Culvert Sizing Guide

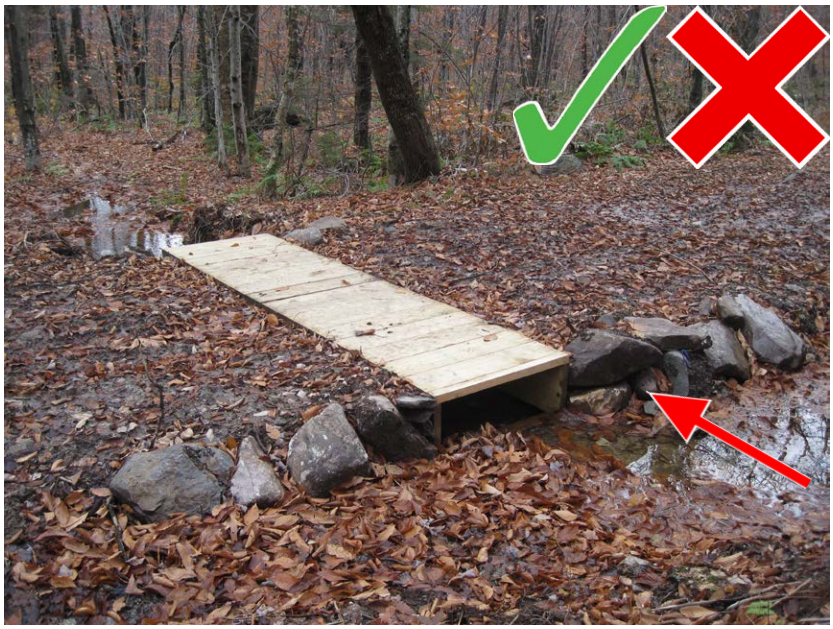


Drainage Area (Acres)	Culvert diameter (Inches)
7	18
16	24
27	30
47	36
64	42
90	48

When you are looking at installing a culvert 36" or larger, you should consider installing a bridge instead.

This properly placed culvert has a strong headwall that will keep fill in place and protect the top of the culvert from damage. Seeding and mulching when you are done will further stabilize the soils and prevent erosion. All culverts require annual maintenance ideally in both the spring and fall.

Plastic culverts can be more expensive than metal ones, but they last longer. Because they are much lighter, frost can shift them in the ground easier if they are not covered deep enough with good materials.



Wooden Box culverts are an inexpensive alternative when flows are small. When placing a culvert, make sure that it is in line with the water flow to prevent a washout.

Metal culverts are generally cheaper than plastic ones and their weight can keep the frost from shifting them. Acidic water and soils can quickly rust out the culvert causing it to fail.

A well placed culvert draining both a direct flow and a ditch line.

Never install two culverts side by side. Debris will collect between the culverts or water will seep in. If a culvert is too small to handle the water flow it needs to be up-sized or replaced with a bridge.

This culvert has a good headwall but is buried too shallow. The tread will quickly erode away exposing the top of the culvert to damage. Additionally, the culvert needs to be set lower to prevent undermining.

When a culvert is not sized properly, it can blowout causing a lot of damage. It is much cheaper to install a properly sized culvert than to repair a washed out section of trail.

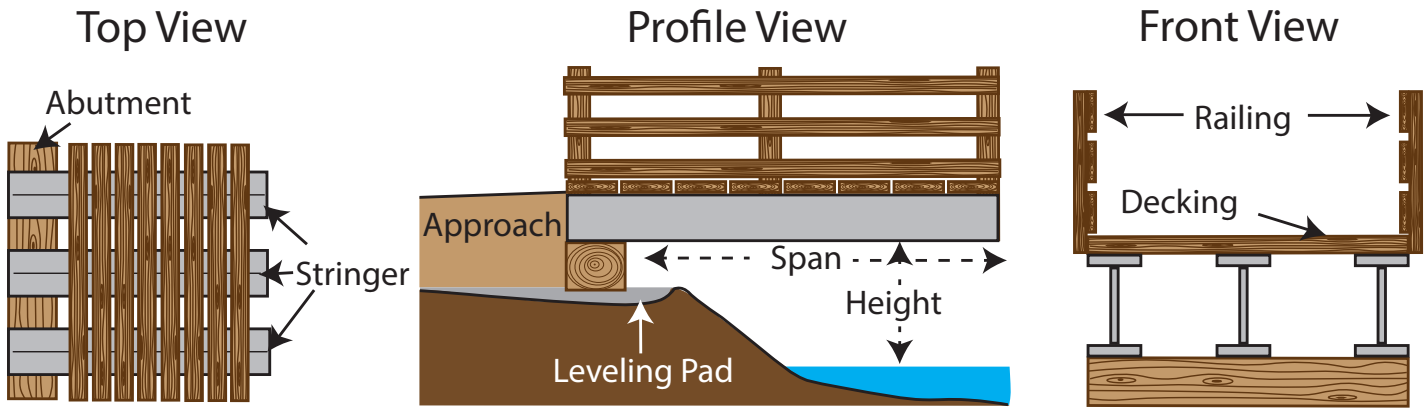
This culvert is set well with ample cover on top. The slope of the fill material is good, but needs seed and mulch or stone to keep it from eroding out over time. Make sure to minimize sediment washing off the construction area.

Bridges

PURPOSE: Bridges are generally the most regulated, high-risk, and expensive structures on any trail. If a culvert is not suitable for crossing a body of water, a bridge must be built. When deciding whether to use a bridge or a culvert, take into account the consistent and potential volume of flows, cost of materials and installation, effects on fish passage, the amount of sedimentation of aquatic habitats, etc.

There are many types of bridges that use a wide variety of different materials and construction techniques. It is important to choose the correct type of bridge and use the proper materials for your site conditions. Bridges need to be engineered or constructed using pre-engineered specifications as they need to support not only a snow load, but also a groomer and drag.

Check with any public land managers about their specific policies regarding bridges. It is likely that you will need a permit from DEC River Management, US Army Corps of Engineers, or your municipalities zoning board. Your bridge may even require multiple permits. Make sure to check with DEC, USACE, and your local municipality well in advance of construction to obtain any and all necessary permits.



HOW TO BUILD: Depending on the type of bridge you are building, it may require special construction techniques. In general, the basic steps to building a bridge are:

1. Obtain neccesary permits and permissions
2. Clear the site
3. Set the abutments
4. Attach the stringers
5. Put on the decking and railings
6. Finalize the site

Abutments

Abutments are the structures at the ends of a bridge that support the span. They can come in many different forms and materials such as wood, concrete, and stone. Site abutments back from the edge of the stream or river bank as required by permits and to prevent future erosion problems. Different or specialized abutments may require their own specific construction techniques, but the general process for installing abutments is:

- Remove old bridge material from site
- Clear the area where the abutments will be placed
- Make sure abutments are level with each other
- Make sure that abutments won't shift or settle after installation

This concrete abutment is a good choice for a location that may flood frequently. Note the use of rebar to secure the abutment to the ground as well as stone and geo-textile fabric to stabilize the area.

This simple span bridge with wooden abutments is typical for the VAST network. The abutments need to be in line and level with each other before the stringers are installed. Make sure to remove the leftover material from any prior bridges or structures.

This stone abutment was reconstructed to match the grade of the trail and protect the bridge from the river. Heavy crushed stone was brought into back fill the structure giving it stability and good drainage. Additional stones were used to help armor the upstream side of the abutment and prevent erosion from flooding.

Stringers

Stringers, also called beams, are the longitudinal support that make up the span of a bridge. Similar to abutments, they can come in many different forms and materials such as wood, cables, or steel beams. Stringers need to be properly sized to support the weight load necessary. This should be addressed in the planning/design phase of the bridge. It is important to also consider how to attach the decking to the stringers, particularly when using steel beams. For basic structures, the typical process for installing stringers is:

- Lay the stringers on the abutments
- Make sure that the abutments are spaced according to the design
- Secure the stringers to the abutments

Wooden stringers can be solid beams, dimensional lumber, glued or nail-laminated timbers, or even solid logs. Generally, pressure treated lumber is used. When using untreated lumber, rot resistant hemlock or cedar are the best choices.

Because of early American clear cutting of forests, the quality of available timber has been markedly reduced. As a result, the support strength of solid log stringers such as trees or used telephone posts has been repeatedly downgraded. While these may work for very short sapns, it is advised to use dimensional lumber or steel stringers for larger spans. Note the bow in the stringers above.

In some cases a bridge can be built on the trail and set in place as a single piece. This also works well for per-fabricated bridges or bridges brought in from off site.

Steel stringers can cost more than some options but are generally the strongest, most durable option. Depending on design specifications, bridges may require extra cross bracing also called diaphragms.

Decking and Railings

Decking is generally made up of treated or untreated lumber. It can be installed laterally across the span or longitudinally with the span. Each of these choices has its pros and cons. Railings can also come in a wide variety of designs. Factor them in to your bridge planning so that they tie in nicely to your structure. The general process for installing decking and railings is:

- Cut material to length and pre-drill bolt holes
- Install railing posts
- Secure decking to stringers
- Attach rails to posts
- Install hazard markers on the corner posts of the railings

The stringers of a bridge generally last much longer than the decking. Make sure to factor in future repairs when deciding what screws or hardware you use to attach the decking to the stringers.

A bulkhead is a cap at the end of the stringers that keeps dirt and moisture from rotting or rusting the beams. Bulkheads also help hold soil that is used to make a smooth approach to the bridge.

Many clubs use runner boards, a temporary deck for the track and carbides of sleds to run on so that they don't damage the decking. This can dramatically increase the life of your deck.

When ever possible, you should install railings on your bridge. Railings serve not only as a barrier to keep sleds on the bridge, but also as a visual cue for riders that a bridge is ahead and to ride accordingly.

Finalizing the Site

Once the bridge is built and installed, is important to take the final steps to ensure that riders have a great trail experience in the winter:

- Remove all unused materials and scraps
- Ensure a smooth transition up to the bridge
- Use waterbars or other drainage structures to divert water away from the bridge and abutments
- Seed and mulch any disturbed areas

This is a great example of using erosion control matting to stabilize a site until grass is established. In less steep areas, hay mulch and seed can be used.

Bridges are a significant investment for any club. Not armoring abutments or draining water away from the bridge means not protecting your investment and leads to costly repairs.

Diverting water away from the bridge is critical to preventing erosion. Five minutes with an excavator can save you thousands of dollars in repairs.

This smooth transition up to the bridge will be easy to groom and easy to ride. Approaches can be made up of gravel, soils, and stone or be a constructed ramp as necessary.

Summary

Trail work is about making decisions. Every trail has its own challenges to work around and not every structure will fit every situation. When you are making choices in the field, it is always important to use your best judgment. The goal is always to protect the land, protect the trail, and follow the wishes of the landowner.

The VAST network is 4,700 miles of snowmobile trails across Vermont. This amazing trail system exists solely because of the incredible effort that the local clubs and volunteers have put into it.