

Basic Trail Maintenance Guide

for Trail Captains and Trail Workers



Bruce Trail
CONSERVANCY

Basic Trail Maintenance Guide

for Trail Captains and Trail Workers

2nd Edition

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Introduction

This guide is aimed at providing basic knowledge of Trail maintenance on the Bruce Trail to Trail Captains and Trail Workers.

It also explains what the Bruce Trail should look like, how to keep it that way, and what to watch out for when doing Trail inspections.

The information contained herein comes from the "Guide for Trail Workers", other publications, club Trail Workers, several Bruce Trail members and my own experience as Trail Worker, Trail Captain, Trail Director and Trail Auditor.

All illustrations are grouped together starting on page 20.

Trail Directors and work party leaders will find more comprehensive information, including that pertaining to Trail construction, in the "Guide for Trail Workers". This guide can be found on the BTC website at the following address.

brucetrail.org/pages/volunteer/training-resources

In this second printing we have made the print larger and updated the Guide to reflect new ideas, to correct errors, and to fill in gaps where they existed.

I would also like to express my appreciation for the contribution John Cunningham, John Grandy, Beth Kümmling, Peter Leeney and Scott Langley have made to this edition.

The Bruce Trail has been much improved over the last 5 years, mainly due to the hard work and dedication of our Trail Captains, Trail Workers and Trail Auditors.

Eric Best

Trail Inspections

A thorough inspection should be conducted at least 2 times per year, and an official report submitted 2 times per year, as required by the Bruce Trail Conservancy (BTC).

These reports are extremely valuable from a risk management point of view. Evidence of inspection on the Trail goes a long way towards defending us in a possible lawsuit as a result of an accident on the Trail. At the same time these reports are a very useful means of improving our Trail.

Unauthorized use of the Trail by mountain bikers, ATVs etc (unless permitted by the landowner) should also be reported. This is very important from a legal point of view as well.

In order to do the job of Trail Captain properly, additional visits may have to be made depending on the amount of work required to keep your section in shape.

And don't forget to bring a garbage bag for picking up litter on the Trail!

Trail Audit

Once every 5 years the BTC conducts an audit of your section of the Trail. Your Trail Director will be notified well in advance of such an audit. Try to bring your section up to standard prior to the audit taking place. That will greatly simplify the task of the auditor, who is also an unpaid volunteer.

Tools

You may already be familiar with the tools you need; if not, your local Club will soon familiarize you with them. The Appendix contains a basic list of tools you may require, depending on the type of Trail section you are maintaining.

One tool that needs to be mentioned specifically is the chainsaw. You may have one or you may have access to one. You are not permitted to use a chainsaw on the Bruce Trail or on BTC-Managed land unless you have passed a BTC-approved chainsaw course and are accompanied by at least 2 other people.

If you are a novice, one of those persons has to be an experienced chainsaw operator. You must wear the prescribed safety gear.

Some Clubs may have additional safety rules; please be sure to abide by them.

The BTC has a power tools policy. Please obtain and read this before using any power tools on the Trail.

Trail Maintenance

Maintaining a Trail means making any corrections necessary to bring the Trail up to Bruce Trail standard and to maintain that standard.

Trail Corridor

The Trail corridor (area free of vegetation) is 1.5 m (5') wide and 2.5 m (8') high (Figure 1).

The actual treadway - which could be bare soil or bare rock, or grass cut short - should be at least 0.6 m (2') wide, and it should be kept clear of obstructions at all times.

The rest of the 1.5 m (5') width should be cut back to about 15 cm (6") or less (ankle height).

Summer Growth

Fast growing weeds and shrubs, such as Burdock, Wild Raspberry and Wild Rose, should be dug out, root and all, or at least cut back down to the root. This will make maintenance that much easier.

Poison Ivy, where it is a menace to the hiker, can be suppressed with concentrated vinegar.

Intruding tree branches should be cut right back to the main trunk, leaving a "collar" around the base of the branch. Don't leave any "spears that protrude"; they can cause injury to the hiker.

Most important of all, start cutting back on your summer growth early, no later than the end of June before it becomes unmanageable (if it is a problem on your Trail section).

Large, sunny, grassy sections of the Trail may have to be cut back with a large wheeled lawnmower, or a wheeled weed cutter. This would require a small work party.

Fast growing vegetation also has the nasty habit of obscuring blazes and signs. Some rigorous precautionary cutting will eliminate the need for constantly having to cut back vegetation to ensure visibility of signs and blazes.

Tree Problems

The Trail is not only threatened by returning vegetation. There are windfalls (trees brought down by wind) which could sometimes block the entire Trail. In any event, if the windfall or any other obstruction across the Trail is higher than 12" it should be removed. More often than not you will require some assistance with that.

To reduce the occurrence of windfalls, you may want to take an inventory of potential windfalls - old dead trees standing beside the Trail which are likely to fall across the Trail some day - and ask for a chainsaw crew to take them down.

Live tree branches or tree sections which are partly broken off and are dangling above the Trail are a serious hazard and should be dealt with expeditiously, by a work party or a chain saw crew.

Then there are the small protruding tree stumps, difficult to see and a real hazard for the hiker. They must be removed, preferably by digging them out.

Wet Spots

Wet spots and wet sections can be found along the Trail. Frequent use will often "hollow out the treadway", making it a collector of water and mud. This will require building up the Trail by digging a trench beside it and depositing the dug out material on the Trail (when dry), (Figure 2).

Wet spots (as opposed to wet sections) can often be drained by digging a trench to lower ground, if there is lower ground.

Dense clay soils become "slippery when wet", no matter how much you drain them. One solution is to use woodchips. They will decay in time, but the residual soil mixture will be less slippery.

Some wet spots and shallow creek crossings can be dealt with by installing stepping stones. Make sure they are well dug in and solid when stepped on.

Most of these projects, unless they are fairly small, require the assistance of a work party - don't hesitate to ask for one. The Trail does not have to be wet and muddy - it is up to you to draw attention to it.

Water running down sloping Trails is a source of erosion. Treatment is the same, except that water-bars may be needed (Figure 3).

Another solution would be to move the Trail to the side on higher ground and let the old Trail be the water carrier, without widening the Trail/trench profile too much.

If all else fails, a boardwalk may be required.

Maintenance of Structures

In some locations landowners may have restrictions on work being done on structures. Check with your Club Trail Director or the landowner before starting work.

All BTC structures except side-logs, have to be identified with an ID tag (available from the BTC). They should be attached to the Niagara side of the structure, on the right hand side when facing Tobermory.

For side trails the location is on the km 0.0 side of the structure, also on the right hand side.

If it is not possible to attach the ID tag to the structure, then fasten it to a tree or a short post .

Structures you may encounter on the Trail are:

Stiles

What to look for:

- Missing cross braces (needed for stability), and angle braces.
- Wobbly (due to inadequate anchoring).
- "Listing" to the left or to the right - requires leveling of the stile and anchoring.
- Inadequate handholds - they should be a minimum of 2 feet long and there should be 4 of them.
- Missing platforms - they should be installed.

- Areas of decay - should be replaced or treated with wood preservative (if in the early stage of rot). "Endcoat" is the only really effective wood preserver.
- Distance between rungs should not exceed 12".

Bridges

What to look for:

- Solid supports on each end (cribbing or sleepers) which are not undercut by erosion from the creek below.
- Reasonably level - if not level, the sagging end or corner should be repositioned.
- Handrails - one handrail is required for bridges more than 1 m above the creek bed; two handrails are required for 2 m above.
- Look for decay - if it's bad, then replace; if it's just starting, preservative can be used.
- Toe rails are recommended for bridges without handrails. These are usually 2"x 4" pressure treated boards nailed or screwed to the edge of the deck.
- Min. width 32". Under no circumstances should the width be less than 30" (24" for boardwalks).

Ladders and Stairs

What to look for:

- Must be solid, stable, and well anchored.
- Handrails, if there are any, should be solid and withstand sideways pressure. Look for signs of decay.

Steps

What to look for:

- Log steps are held in place by stakes or angle iron, and the stakes or angle iron must be nailed to the logs, and must therefore have nail holes.
- Decayed and washed out logs usually leave the stakes in place as a real hazard for hikers. Remove them as soon as possible and/or replace the log step.
- Stone steps sometimes require repositioning of some loose stones.
- Make sure stakes do not stick out above the level of steps - in the case of log steps, not above the thickest part.
- Recommended height of steps is 8". Higher steps may be difficult for some hikers, while lower steps would reduce the length of the horizontal part of the step, a possible inconvenience. Steps much higher than 8" should be reduced if possible.
- Hand holds, if any, should be sturdy and should be able to withstand considerable sideways pressure. Cables are not recommended.

Side-logging

What to look for:

- Erosion may wash away the soil below the side-log and make it ineffective. The open space can be filled with rocks and/or other logs to stop the erosion.
- Side-logs are usually subject to more decay than any other structure, and need to be replaced as required. Watch out for protruding stakes! They can be just as dangerous as stakes on a step.

Blazing

Blazes are necessary to guide the hiker along the Trail.

Mandatory locations for blazes are:

- As confirmation blazes at intersections and turns. (Figure 5). Confirmation blazes should be located within 20 m (65 ft) of the intersection or turn and should be visible from the intersection or turn.
- As required on the Trail.
- On roads, try to place the blaze on the side of the road where the hiker is facing traffic. This means blazes on both sides of the road.

How to apply blazes

- Blazes may be applied to many different objects (Figure 6).
- Some don't require any surface preparation however trees usually do, in particular those trees with rough or scaly bark. In these cases the bark will have to be scraped off until reasonably smooth, with a paint scraper. Avoid poplars as a base for blazing, as paint does not last long on these trees.

The paint to use is acrylic exterior latex white or blue. See Figure 9 for the right shade of blue. This is the "standard blue" of the Bruce Trail, and it is important that this shade of blue is used uniformly throughout the whole Trail.

- The brush normally used is 1.5" wide, sometimes clipped short.
- There are many techniques for blazing; most common are techniques using templates with a 2"x 6" hole, or a 2"x 6" piece of metal or wood that is traced on a tree. Another technique uses masking tape around the tracing, making for a nice sharp edge and sharp corners. It does not matter what method you use, as long as you wind up with a reasonable facsimile of a 2"x 6" blaze. Poorly painted blazes reflect badly on the Bruce Trail. We are a world class Trail, and we should have world class blazes.

- Blazes painted on light surfaces such as concrete poles, or bleached wood poles can be made more visible by “tuxedo” painting a ½” wide black border around the blaze. Be sure to limit the black border to ½” width. Anything wider will start to look unsightly. If you have some of those extra wide borders on your Trail you can scrape them off using a straight edge and a scraper.

Here are some more details about blazing:

Dimensioning

- A blaze is to be 2” wide and 6” high (Figure 4). It very often does not stay that way, particularly on young trees. The trunk grows and expands, and a 2”x 6” blaze can soon become a 3”x 6” or even a 4”x 6” blaze.
- Make sure it stays 2”x 6”; scrape the excess off with a scraper as necessary and also when you are repainting it.

Height

- The correct height from the treadway to the bottom of the blaze is 1.52 m (5 ft).
- Sometimes blazes will have to be located at a lower height, such as blazes on fence posts, etc., but there is almost never an excuse for a blaze that is located too high.

Spacing

- Blazes are necessary, but if we apply more blazes than required they become an unsightly intrusion in the landscape.
- Where the treadway is not too clear, and/or the Trail is not well defined, you should be able to see the next blaze from the one you are standing next to, but located at a reasonable distance from that blaze.
- Such locations may be beaches, open fields, or forests with very little undergrowth, and hazardous locations such as the proximity to deep crevices and/or steep cliffs.

- Where the trail is well defined in all seasons, even with a cover of snow or leaves, it is not necessary to see the next blaze right away, provided the space does not exceed 150 m (500 ft) (2 times the space between 2 hydro poles). This also applies to traveled roads and bush roads. Larger spacing could make the hiker wonder if he/she has missed the inevitable turn off the road.
- If your section is over-blazed (when you can see more than one blaze ahead), see what you can do to eliminate some blazes and possibly reposition them. This task could be much easier if it is done by 2 people (Figure 7).

A few NO-NO's regarding blazing

- Don't over-blaze – painting more blazes than required (Figure 7).
- Don't paint the blaze on too narrow a support, like the top of a T-bar, a 1" sapling, etc. Don't paint blazes on trees that are less than 3" diameter (Figure 8).
- Don't paint on dead trees unless the tree is cut down above the blaze. Dead trees will eventually fall down and your blaze will be gone.
- Don't paint on rocks. The blaze won't last very long and it is unsightly. If there are no trees around, some sort of blaze post will have to be constructed.
- Don't place a single blaze before a turn - A single blaze means go straight.

Turn-blazes

- Dimensions are the same as for single blazes, except that they are staggered 2" and separated 2" (Figure 4). They signal a turn of 90 degrees or more.
- They are to be located before a turn; and on travelled roads, on the L.H side of the road (Figure 5).
- When a side trail intersects the main Trail, a blue turn-blaze is required on the main Trail, before the side trail junction (Figure 5).

- When two side trails intersect, turn-blazes are NOT used, but each Trail is identified with a side trail identification sign. If one of the side trails is a dead end Trail, it will require a dead end blaze before the intersection.
- T-shaped intersections will therefore require 3 side trail signs and X-shaped intersections 4 signs.
- The first single blaze after a turn is called a confirmation blaze, confirming the change in direction. It should preferably be located within 20 m (65 ft) of the turn.
- Turns that are less than 90 degrees, and forks in the road, usually do not require a turn-blaze if the confirmation blaze is visible from the turn.

How NOT to paint a turn-blaze:

- On a space less than 4" wide (Figure 8).
- One straight above the other (not staggered, or partly staggered, (Figure 8).
- More than 2" apart.
- After a turn or on a turn instead of before a turn. This can lead to great confusion in more than one way. If it is unavoidable, then the turn-blaze should at least be painted on a flat surface, like a blaze-board, and should not be visible by someone coming from the opposite direction.

T-blazes

- These are required at the end of a side trail, including junctions with the main Trail.
- They are formed by painting two regular blazes in the form of a T - with the two blazes 2" apart (Figure 4 & 5, side trails).
- Turn-blazes from opposite directions should never be combined, such as on a hairpin turn or other sharp turn.

Final comment about blazing

Blazes don't keep their luster forever, and they should be repainted when required. Keep in mind that blazes should remain clearly visible, not just visible. This means repainting every year in some locations, in others they could last longer. When you repaint blazes, take the opportunity to resize them, if necessary; they may have grown with the tree or may have become otherwise distorted.

Prepainted aluminum blazes may be used on Hydro poles and fence posts, where painted blazes seem to fade faster than anywhere else. They should be fastened with aluminum or hot dip galvanized nails. They are not recommended for mounting on live trees.

Wood blazes made from pressure treated plywood may also be used (other types of wood are not suitable). They are usually attached with 1.5" - 2" smooth hot dip galvanized roofing nails, with heads painted white or blue, as required.

Diamonds

Diamonds are intended to accentuate single blazes (never turn-blazes), and to identify the Trail as the Bruce Trail. White diamonds for the main Trail and blue diamonds for side trails.

They are mounted on a 0.5" x 6" x 6" pressure treated plywood backing.

Diamonds should always be installed with the Bruce Trail arrow pointing upwards. They are placed 2" above confirmation blazes at intersections that are not marked by signs (Figure 5).

Other Locations

- To accentuate blazes which are difficult to see, due to distance, poor lighting etc.
- In remote areas, diamonds may be paced at 1km intervals (always above a single blaze), as a comfort to the lonely hiker.

How to Install Diamonds

- Drill 2 holes, one at the top and one at the bottom of the mounted diamond, to allow for 2.5" galvanized Ardox or smooth nails. Leave at least 0.75" space for the nail head above the diamond surface, to give the tree room to grow. Washers under the nailheads will reduce the possibility of a pull through, and of vandalism. Screws may also be used if that is your preference.
- Roofing nails (1.5" - 2" smooth, hot dip galvanized) are another option.

How NOT to use diamonds

Diamonds should never be placed:

- On the Trail in a random manner in locations other than those specified in the above.
- By themselves (without the single blaze below).
- Above a turn-blaze.
- With the arrow not pointing straight up.
- Without pressure treated plywood backing.
- Below, rather than above a blaze.

Improperly placed diamonds, where they exist on the Trail, should be removed immediately as they are a form of sign pollution and could also cause confusion for the hiker.

Signage

The most commonly used signs are main Bruce Trail access signs and side trail signs.

Location

Main Trail access signs at road crossings should be located close enough to the road that they are clearly visible by someone driving by. At the end of a travelled road, where the road turns into a Trail, there should also be an access sign and it should be clearly visible (Figure 5).

Signs that are not clearly visible should be moved to a more visible location, even if it involves a signpost.

Side Trail signs should also be clearly visible, usually from the main Trail, where all side trails originate.

Mounting should be 6' high or higher if possible, to discourage vandalism.

"Follow the Blazes" signs should be mounted on all main Trail and side trail access points, preferably below the Access sign.

An access point is classed as "major" if parking is available, and/or it is frequently used.

Other signs can be installed as required.

Beware of sign pollution, and remove signs that are no longer required or are redundant.

As a general rule, corroded and otherwise deteriorating signs should be replaced with new ones. We want to reflect the image of a first class Trail and no less.

Fasteners

- The appearance of signs is important. We must therefore use fasteners with maximum corrosion resistance.
- Use stainless steel screws for fastening of signs and diamonds to back boards. They are available from the BTC at no charge.
- Fasteners for mounting signs and diamonds to trees etc. could include hot dip galvanized nails, "duralized" deck screws, H.D. galvanized lag screws, etc.
- If you use galvanized fasteners, be sure to use hot dip galvanized ones, not electro plated or electro galvanized, because they don't last very long in an outdoor environment.

Some general comments on Trail Maintenance

When reviewing your inspection report, you may find the amount of items "to be done" overwhelming. Here is what you do to make it manageable:

First: Segregate all the items that require help or a workcrew. Pass this list on to your Trail Director.

Second: Prioritize the items. Those that affect safety on the Trail should come first, etc.

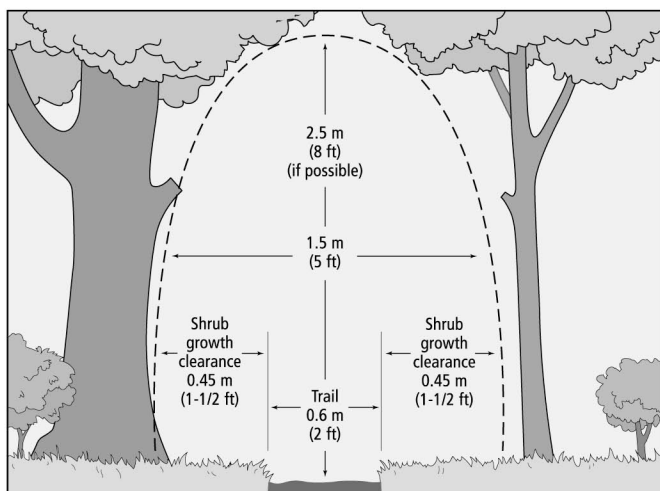
Third: Don't try to do too much at once. Work also becomes a lot easier if you do the Trail work together with someone else, and it's a lot more fun too.

In time, you can look with satisfaction upon all the improvements you have made. Then, when a hiker passes you by, while you work on the Trail and says "thank you for doing this", you know that it has all been worthwhile.

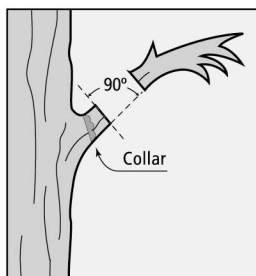
Figure 1

How high should you clear?

Cut as high as you can reach – up to 2.5 metres (8 feet) if possible. Some backpackers need well over 2 metres clearance. Remember that as branches grow longer they will droop lower, and rain and snow will pull them down still further.



Shrubs and trees that just clear the head will often obscure the vision of someone travelling downhill. On the other hand, try not to let too much sunlight into the trail, as this just encourages more undergrowth. If possible, work toward the development of a continuous canopy arching over the trail, so there is plenty of clearance for the hiker, but not too much penetration of sunlight.



How to deal with trees?

Cut off obstructing branches close to the main bough or trunk, but leave the "collar" around the base of the branch so that the tree can heal the wound. Cut-branches at right angles – acute angle cuts leave sharp points. In the case of very small-trees and seedlings, it is probably better to remove them

completely, since they would only grow and become a problem in the future. Cut them at or just below ground level to minimize tripping hazards and sucker growth, but leave the roots to stabilize the soil.

Figure 2

Side-logging

Where the trail crosses a slope diagonally, it is often a good idea to support the path on the downhill side, by means of a series of side-logs. These delineate the path, help to keep the trail surface relatively flat, and prevent the treadway from collapsing or being washed down the hill. It is sometimes possible to find suitable dead trees locally to do this work. Cedar or hemlock will last longer than hardwoods. The logs must be supported in place by trees, very large rocks, or some type of stake. A 60 cm (24 inch) long drilled-one-end steel angle-iron, or a fence post T-bar will do a good job. Ideally, the packed earth of the treadway will be slightly higher than the side-log, with a gentle slope toward the log, so that water will run off the trail, rather than along it. To prevent washouts of the path, you may also consider a shallow ditch along the uphill side of the treadway, with occasional water-bars to outlet the water in a controlled manner.

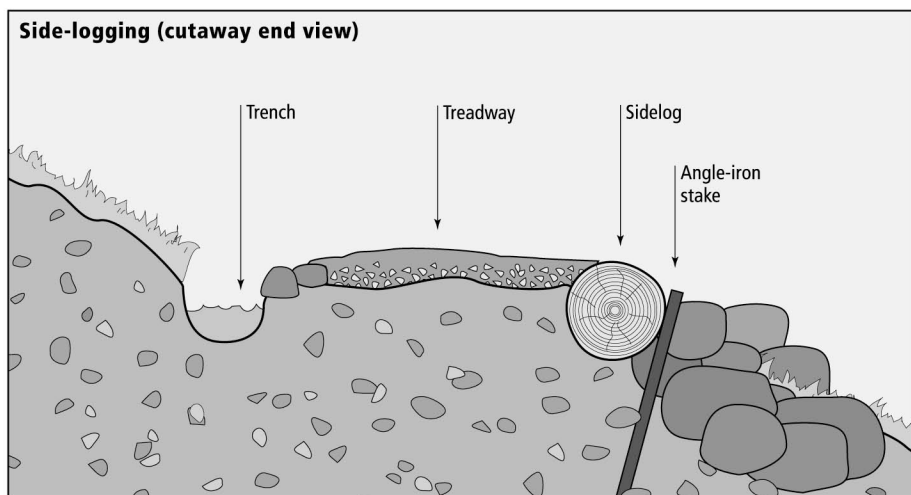
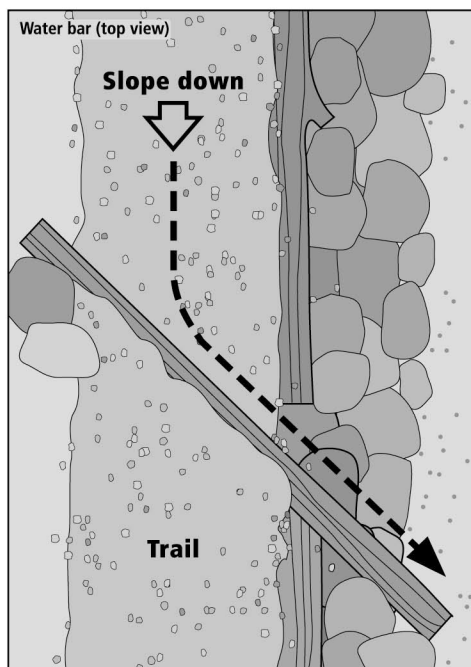


Figure 3

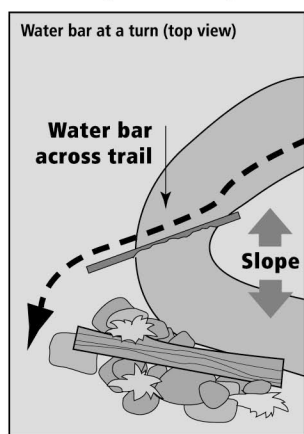


A water-bar usually consists of a log, cedar is best, laid across the trail at an angle of about 45 degrees from the direction of travel. The log should be about 15 cm (6-inches) in diameter, stripped of its bark, and must be long enough to fully span the width of the trail on the angle, intercept all water flowing down the path, and carry it completely off the trail. The log must be seated (dug in) to a depth of about half its diameter, and must be held firmly in place with stakes, preferably located outside the treadway proper. Trees,

roots or large rocks may also be used to hold the water-bar in place, or if the trail is side-logged, the bar may be nailed to the side-log using large spikes.

A slight depression may be excavated across the path above the bar, and the soil can be packed along the downhill side of the log to prevent leakage. The area into which the drainage is directed must be lower than the trail, should be stable and covered with healthy vegetation, and should be located so that the water will not find its way back onto the trail further down the hill. Generally, the steeper the slope, the greater will be the need for water-bars,

and the closer their spacing should be. Occasionally, a tree root or rock outcropping can be used as a natural water-bar, with only a little modification.



Note: Where a water-bar is placed at a turn on a switchback, i.e. where the hiker's direction of travel is changing, the angle of the bar may not be 45 degrees. It will probably be roughly parallel with the direction of the uphill portion of the trail, and will be at an acute angle to the direction of the downhill leg of the trail.

The configurations below apply to all Trail blazes

Figure 4

Blaze colours: White for the main trail

Light blue for side trails

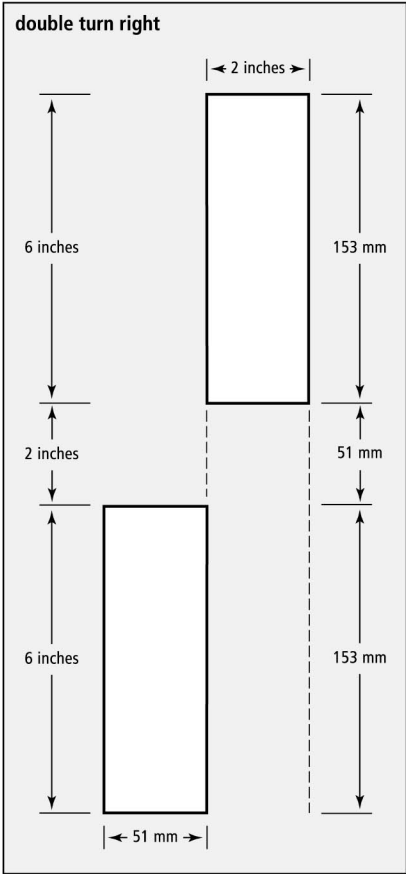
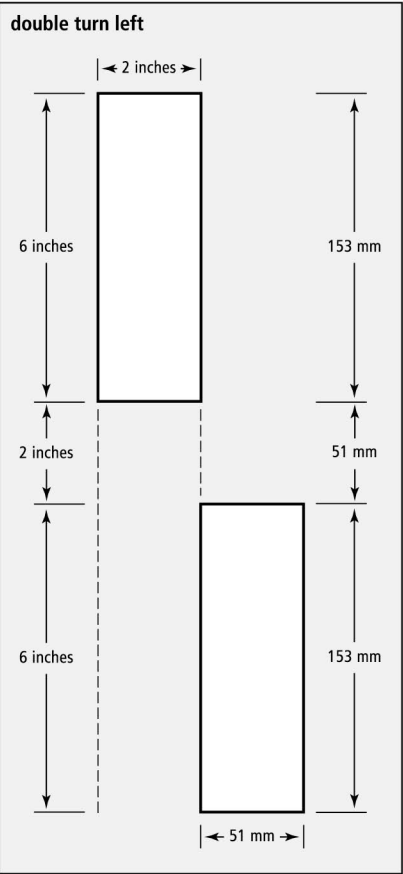
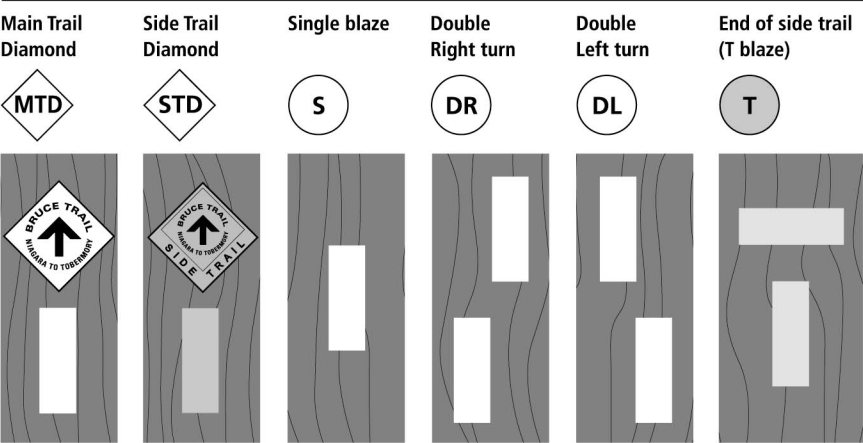
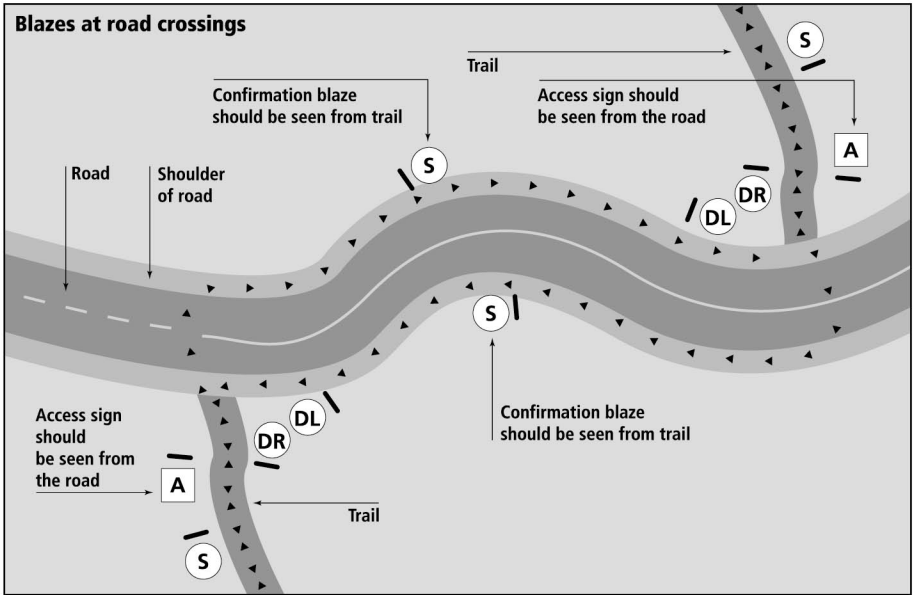
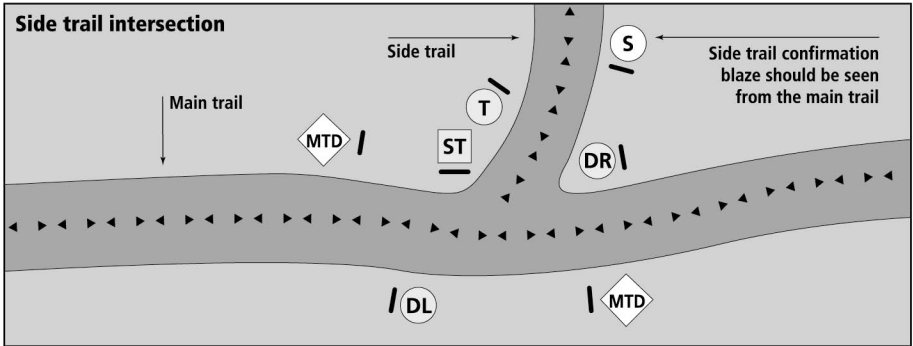


Figure 5



Legend for Figure 5:

- Blaze or sign facing
- Access sign
- BRUCE TRAIL ACCESS
- MTD
- S
- DR
- DL
- Direction of travel
One way
Two way



Legend for Figure 6:

- Blaze or sign facing
- ST
- NAME OF SIDE TRAIL
- MTD
- S
- DR
- DL
- T
- Direction of travel
Two way

Figure 6

Where to blaze

Blazes are normally put on trees, fence posts or utility poles. Blazes on fence posts should not run all the way to the top of the post, but should stop 2 or 3 cm short of the top, for better visibility. If suitable trees and posts are absent where directions are crucial, the trail worker should be prepared to erect a suitable post on which to paint the blazes. This could be a round cedar fence post, a cedar or pressure treated 4" x 4", or a steel post with a piece of wood, large enough to contain a blaze, attached to the top. A piece of 1" x 6" or 2" x 4" is large enough for a single blaze, while a piece of 1" x 6" or 2" x 6" is needed for painting a double (turn) blaze.

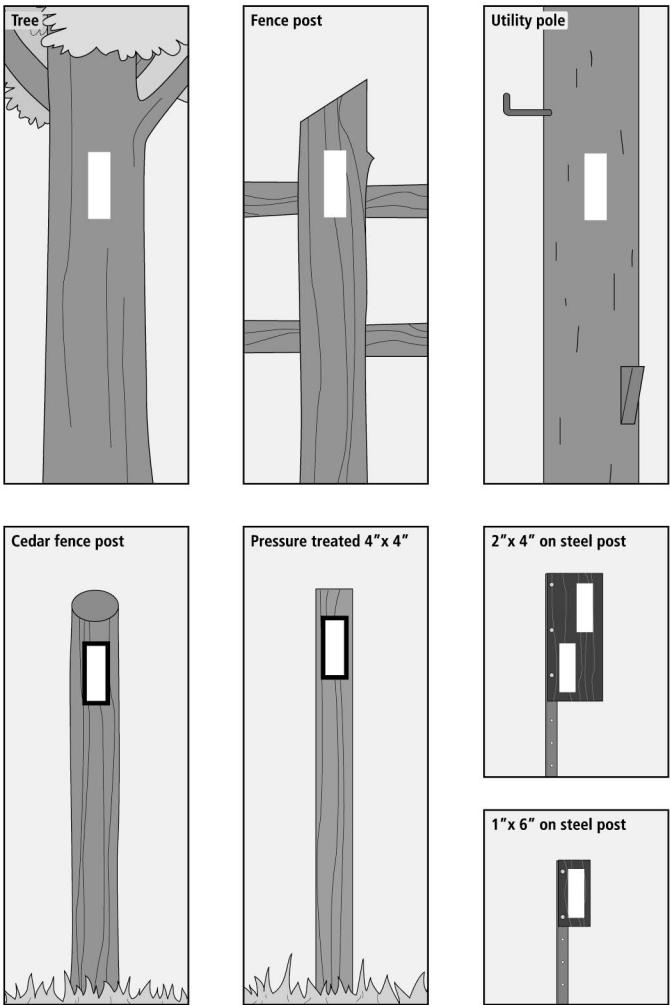


Figure 7



Example of over-blazing: There is at least one blaze too many.

Figure 8

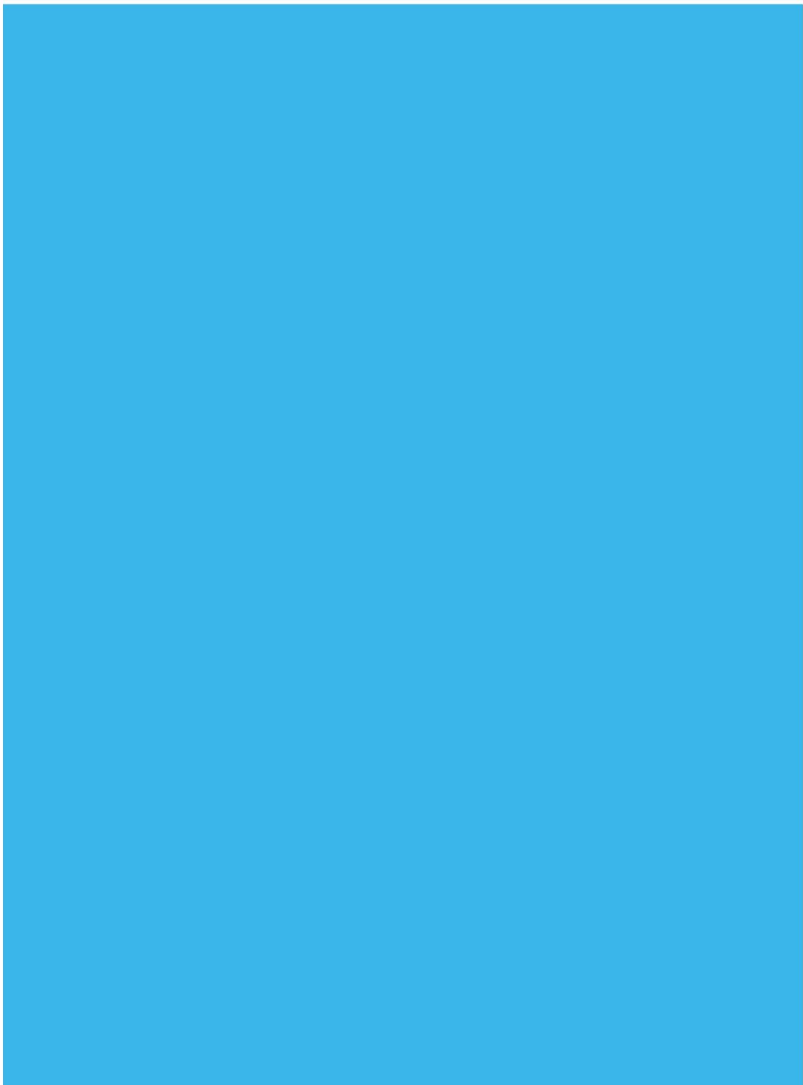


Example of an incorrect turn-blaze painted on a narrow surface which does not allow for the standard turn-blaze offset.

Figure 9

Side Trail blue

Below is the colour used for side trail blazing. Take this swatch with you when purchasing paint. Spread a sample of the paint on a piece of white card and let it dry to see if it matches. Keep trying until you match or come as close as possible. The type of paint you need is exterior latex, semi-gloss.



Pantone 2915 CVU

APPENDIX

Basic tools for a Trail Worker:

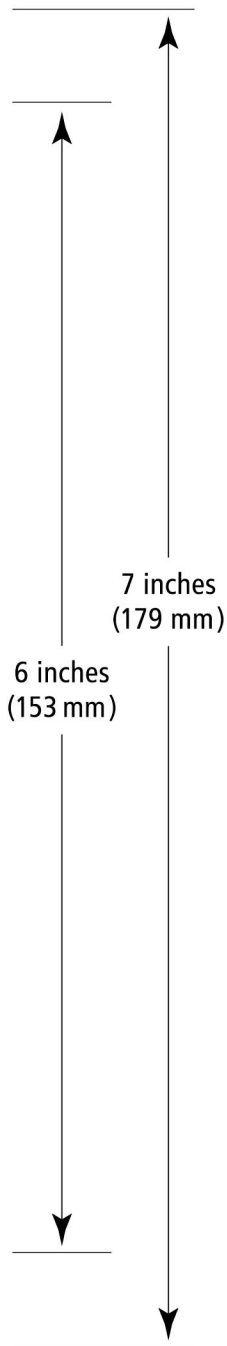
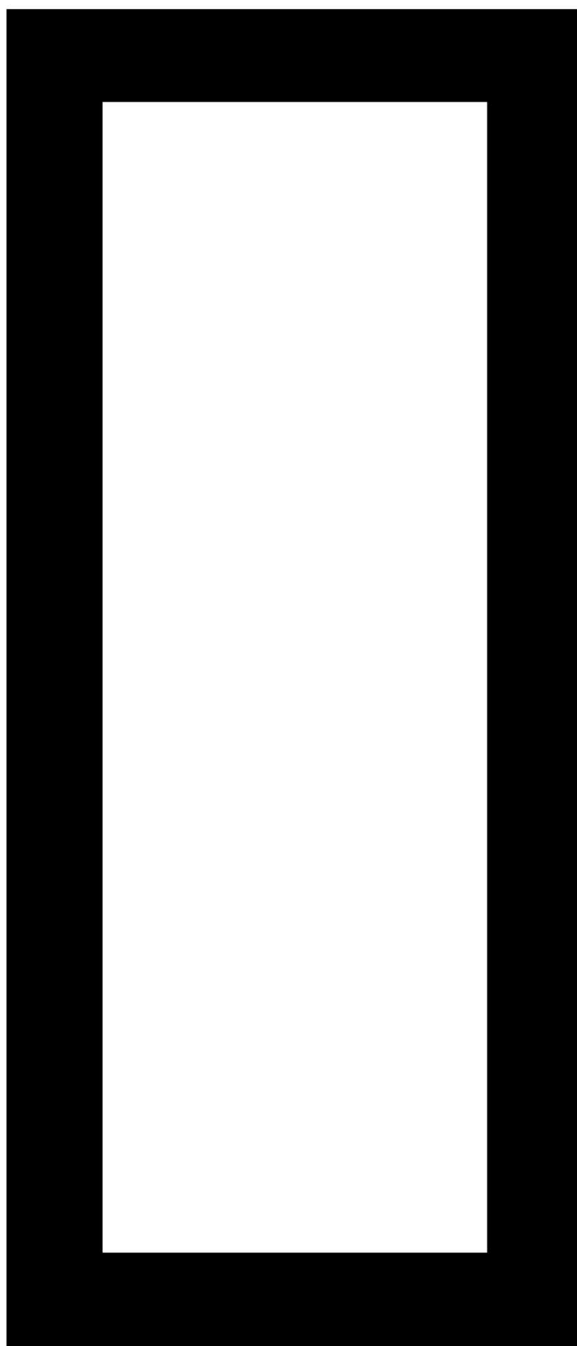
- Loppers (geared type preferred)
- Pruning shears or hedge clippers
- Pruning saw (folding type preferred)
- Bowsaw

Additional Tools may be required (depending on the type of Trail section to be maintained), as follows:

- Mattock (lightweight if the regular one is too heavy for you). A great tool for digging out roots or small treestumps.
- Long handled shovel.
- Weed whacker (manual or powered).
- Italian hoe or garden hoe.
- Sledgehammer, 4 lbs (for hammering protruding stakes)

Basic kit for blazing:

- Container such as a fruit basket, open toolbox or cut-away 4-liter jug.
- White paint (in a plastic jar)
- Blue paint, if side trails are involved
- Paint brush 1.5"
- Small container of water
- Rag or paper towels
- Scraper (long handle preferred)
- Template or tracing block
- Dishwashing gloves
- Measuring tape
- Masking tape



Standard Bruce Trail Tuxedo Blaze – actual size