



WHISTLER

TRAIL STANDARDS

ENVIRONMENTAL AND TECHNICAL TRAIL FEATURES

AUTHOR'S NOTES

This document outlines standards, environmental and management guidelines for trails within the Resort Municipality of Whistler. The evolution of trails, recreational equipment, and environmental issues require that this document be amendable.

Thanks to North Shore Mountain Bike Association (NSMBA), Whistler Off-Road Cycling Association (WORCA) and the International Mountain Bike Association (IMBA) who reviewed the document and provided feedback. Special thanks to Channa Pelpola, Keith Bennett and Ken Neave for the feedback and insight. Cover photos provided by Bonnie Makarewicz Photography and David Diplock, Director of the North Shore Mountain Bike Association. Trail Types drawings by Jensen Resort Planning.

Andrew DeBoer,
Whistler Cycling Committee,
September 2001



DAVID DIPLOCK PHOTO

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INTRODUCTION

Whistler, British Columbia has been recognized as a premier destination resort for mountain biking. For the most part, this can be credited to an array of valley trails and off-road trails that provide a recreational and commuter experience for a wide range of residents and tourists. To maintain and manage this experience, the Resort Municipality of Whistler (RMOW) proposes to sign, map, maintain and manage this valley network. The following RMOW guidelines for Trail Standards were drafted to guide the management of our local trail network and further develop Whistler's reputation as a destination resort for mountain biking.

The Resort Municipality of Whistler's guidelines on recreational mountain bike trails were drafted to address two initiatives identified by Volume One of Whistler 2002: Charting a Course for the Future. The first and foremost initiative described in the Moving Toward Environmental Sustainability section, states "We've established a trail hierarchy and environmental standards to ensure the type of trail and its maintenance is appropriate to the setting." A land use compatibility matrix was developed to address this objective. The matrix outlines the Trail Type and Trail Difficulty Level acceptable in distinct land-use classes. The second initiative described in Enhancing the Whistler Experience states "Whistler is one of the top bike towns in North America, with world-class trails..." Of the many things that contribute to world-class trails, the RMOW has control over the following: signage; trail maintenance; construction standards. Attention to these guidelines will position Whistler as one of the top bike towns in North America.

Appropriate management of our on-and off-road trail network will elevate Whistler's status as a world class cycling destination with minimal environmental impact.



TRAILS AND LAND USE



LAND USE DIRECTIONS

Whistler's environmental values and principles direct us to address land use as an important environmental consideration. Whistler's principle of an ecosystem-based approach advises us to mesh our human purposes with the larger patterns and flows of the natural world, and to study these to inform and guide our activities on the land.¹

From the draft Whistler Environmental Strategy, six land use directions are defined for the valley. The first area is outside the RMOW boundary but within the Local Resource Use Plan (LRUP) boundary. The remaining five land use directions define lands within the RMOW boundary and include: Developed Areas; Recreational Greenways; Protected Area Network (PAN) categories PAN 3, PAN 2 and PAN 1. For the purpose of this document, the LRUP and PAN 3 are given the same level of conservation.

¹ The Whistler Environmental Strategy Moving Toward Environmental Sustainability; Discussion Paper; September 21, 1999; Executive Summary, Page x.

LRUP The Local Resource Use Plan was developed in response to public concerns over logging effects on the visual quality of landscapes and the recreation uses of the land in and near the RMOW. It was a joint effort by the Ministry of Forests, Squamish Forest District, and the RMOW. The LRUP boundaries extend from Brandywine Falls in the south to Cougar Mountain in the north². LRUP land contains rare and unique species or unique habitat features not found in other ecosystem types and are therefore important to protect³.

Developed Areas This land use direction includes industrial, commercial and residential areas.

Recreational Greenways An important means for creating linkages between the built and natural environments, and between the needs of human communities and natural ecological systems. Incorporating opportunities for both recreational activities and the maintenance of natural features and wildlife habitat, Recreational Greenways are a vital part of environmentally responsible land use planning.⁴

PAN Protected Area Network -Divided into the following three sub-categories of protection⁵:

PAN 3 – Reserve Lands Large tracts of relatively natural land, which could be subject to recreational or other development provided an Environmental Impact Assessment (EIA) is done. PAN 3 protection is generally used for second growth forests and other natural areas not described for PAN 1 and 2. Where some development takes place, key ecological components of reserve lands may be subject to PAN 1 or 2 protection after development. Most trail types are acceptable with the exception of paved Type I trails.

PAN 2 – Special Management Zones Well protected and allow some low-impact human activities or development (creation of trails). Priorities for PAN 2 protection include some streams and riparian areas, some old growth forests and wildlife corridors. Only low impact trails such as Trail Type III, IV or V are acceptable to be built in PAN 2 areas.

PAN 1 – Key Protected Areas Preserved to protect unique and sensitive ecosystems from any human development or use with the possible exception, in individual cases, of very low-impact nature trails, boardwalks or wildlife viewing platforms for the specific purpose of habitat protection. Priorities for PAN 1 protection include streams, wetlands, riparian areas, old growth forests, key wildlife corridors and unique or threatened habitat types. No new cycling trails are to be built in these areas.

² Forest Recreation Plan; Whistler Local Resource Use Plan; June, 1995; Page 1

³ The Whistler Environmental Strategy Moving Toward Environmental Sustainability; Discussion Paper; September 21, 1999; Section 4.0, Page 23.

⁴ The Whistler Environmental Strategy Moving Toward Environmental Sustainability; Discussion Paper; September 21, 1999; Section 6.0, Page 35.

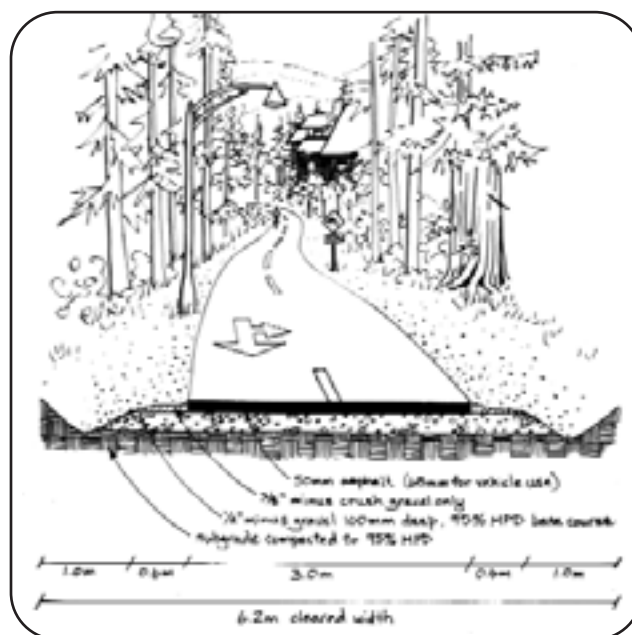
⁵ The Whistler Environmental Strategy Moving Toward Environmental Sustainability; Discussion Paper; September 21, 1999; Section 5.1, Page 29.

TRAIL TYPES⁶

All recreational trails used for mountain biking, rollerblading and hiking, fit within the following Trail Types. The degree of trail impact on the environment is associated with each Trail Type. Trail Types describe the trail characteristics without crossing over into Trail Technical Difficulty, which is sport specific. The main purpose of Trail Types is to cross-reference Trail Types acceptable in land use directions using the Compatibility Matrix.

TYPE I

- plan as paved two-way paths for smooth, all weather riding
- plan for walking/biking and inline skating where appropriate
- make accessible to wheel-chairs
- use asphalt or chip-seal coat surfacing
- provide 2-3m tread width
- clear width to max 6.2m
- clear height to 3.0m
- machine built
- use Type I trails for groomed cross-country ski trails if criteria are met
- provide interpretive and directional signs, benches, viewing areas where appropriate
- provide access to village, parks and subdivisions
- provide illumination for night use if appropriate



TRAIL TYPE I

TYPE II

- plan as surfaced two-way path
- plan for walking/biking, suitable for most users
- use crushed limestone with fines, well compacted gravel, or existing old roadbeds
- remove all embedded trail obstacles
- provide 2-3m tread width for two way traffic, 1m for one-way or mountain bike trails
- clear width to 5.0m max for two-way traffic and 1.4m for one-way
- clear height to 2.4m
- machine built
- use Type II trails for groomed cross-country ski trails if criteria are met
- provide illumination for night use if appropriate



TRAIL TYPE II

⁶ Source for these classifications are: BC Parks, BC Forest Service and RMOW P-4 Risk Management; Trail Classifications; Schedule C

TYPE III

- plan as unsurfaced one-way trail
- provide 50-70cm tread width on native soil
- clear width to 1-1.5m
- clear height to 2.4m
- may be machine built
- consider using Type III trails for ski touring trails if criteria are met



TRAIL TYPE IV

TYPE V

- plan as low-impact nature trails or lightly used wilderness trails
- provide 30-50cm tread maximum, avoid tread grubbing, sections of very rough terrain
- use boardwalks to traverse sensitive areas in low-impact nature trails
- clear height to 2.4m



TRAIL TYPE III

TYPE IV

- plan as unsurfaced one-way trail
- provide 30-50cm width tread on native soil, sometimes rough terrain
- clear width to 1m
- clear height to 2.4m



TRAIL TYPE V

MOUNTAIN BIKE TRAIL DIFFICULTY LEVELS

The following identify all the levels of trail technical difficulty as they apply to mountain bikes, starting with beginner and moving up to expert unlimited. Included are a general and detailed description of trails and technical trail features. This section quantifies the characteristics that compose trail difficulty.

LEVEL 1

NAME: Beginner

SYMBOL: White circle



GENERAL

- Fairly flat, wide and paved. Suitable for all first-time riders ⁷

DETAILED

- Maximum grade: 6° (11%)
- Preferred average grade: no more than 3° (5%)
- Maintain a minimum 2.5m curve radius

EXPECTED TECHNICAL TRAIL FEATURES

Technical Trail Features (TTFs) are not appropriate for level 1

LEVEL 2

NAME: Easier

SYMBOL: Green Circle



GENERAL

- Gentle climbs and easily avoidable obstacles such as rocks, roots and pot-holes. You couldn't ride it in your sleep, but most beginners will still enjoy these rides. ⁸

DETAILED

- Maximum grade: 9° (16%)
- Maximum sustained grade: 5° (9%)
- Curve radius: 2.4m

EXPECTED TECHNICAL TRAIL FEATURES

GENERAL

- Small roots & logs to cross
- Embedded rocks to avoid
- Wide bridges

DETAILED

- Embedded trail obstacles: up to 10cm high
- Logs and roots perpendicular to direction of travel (±15°)
- Bridge minimum 90cm wide, handrail required if height of bridge above surface exceeds 60cm
- No drops
- No jumps

LEVEL 3

NAME: More Difficult

SYMBOL: Blue Square



GENERAL

- Challenging riding with steep slopes and/or obstacles, possibly on a narrow trail with poor traction. Requires riding experience and some fitness. Previously graded for intermediate riders. ⁹

DETAILED

- Maximum grade: 15° (27%)
- Maximum sustained grade: 6° (11%)
- Curve radius: 1.8m

EXPECTED TECHNICAL TRAIL FEATURES

GENERAL

- Small bridges (flat, wide, low and rollable from section to section)
- Small rollable drops
- Small teeter-totters
- Small jumps
- Medium sized logs

DETAILED

- Embedded trail obstacles: up to 20cm high
- Elevated bridges: less than 1.8m (6') high above surface
 - 4 Width of flat decking is one-half the height above surface
 - 4 For connected sections, the bisecting angle between each connected section must be large enough to allow the bicycle to complete transition without requiring any wheel lifting techniques
- Teeter-totter: maximum pivot height, less than 60cm (2') high above the surface
 - 4 Width of flat decking is one-half the height above surface at pivot point
 - 4 Maximum climbing angle 5°
 - 4 Maximum descending angle 30°
- Exit ramps less than 30° to a maximum of 1m vertical
- Rock grades less than 30° to a maximum of 3m vertical
- Drop-offs not exceeding 30cm high with exit cleared of all obstacles
- Jumps
 - 4 No jumps with consequences for lack of speed, for example, coffin jump or gap jumps
 - 4 Table tops maximum height 1m (3.3')
 - 4 Jumps maximum height 45cm (18")

⁷ Paul Kennett; Classic New Zealand Mountain Bike Rides; 1996

⁸ Paul Kennett; Classic New Zealand Mountain Bike Rides; 1996

⁹ Paul Kennett; Classic New Zealand Mountain Bike Rides; 1996

LEVEL 4

NAME: Most Difficult

SYMBOL: Black Diamond

GENERAL

- A mixture of long steep climbs, loose trail surfaces, numerous difficult obstacles to avoid or jump over, drop-offs and sharp corners. Some sections are definitely easier to walk. Previously graded for experienced riders.¹⁰

DETAILED

- Maximum grade: 18° (32%)
- Maximum sustained grade: 9° (16%)
- Curve radius: 1.2m

EXPECTED TECHNICAL TRAIL FEATURES

GENERAL

- Elevated bridges and teeter-totters with maximum deck height
- Connected bridges
- Mandatory air
- Larger jumps
- Steep descents with sharp transitions

DETAILED

- Elevated bridges: less than 3m (10')¹¹ high above surface
 - 4 Width of flat decking is equal to one-quarter the height above surface
 - 4 Minimum bisecting angle between connected sections is 90°
- Teeter-totter: maximum pivot height less than 1.2m (6') above surface
 - 4 Width of flat decking is one-quarter the height above surface at pivot point
- Exit ramps less than 55° to a maximum of 1m vertical
- Mandatory air less than 90cm (3') vertical
- Rock faces less than 45° to a maximum of 3m vertical
- Rock faces less than 25° indefinitely
- Jumps
 - 4 Table tops, no maximum height
 - 4 Coffin jumps
 - 4 No gap jumps or rhythm sections



LEVEL 5

NAME: Expert Unlimited

SYMBOL: Black Diamond

GENERAL

- A level of trail not maintained or supported by the Municipality due to high risk.
- Trials skills essential to clear many challenging obstacles. High risk level. Only a handful of riders will enjoy these rides, apart from bike'n'hike enthusiasts.¹²

DETAILED

- Similar to Level 4

EXPECTED TECHNICAL TRAIL FEATURES

GENERAL

- Risk exceeds Level 4 due to height, widths and exposure
- Fall zones may not meet acceptable standards
- The consequences of errors may be severe and rescue may be difficult

DETAILED

- Exceeding Level 4



¹⁰ Paul Kennett; Classic New Zealand Mountain Bike Rides; 1996

¹¹ WCB requires "...that a fall protection system is used when work is being done at a place (a) from which a fall of 3m (10ft) or more may occur, or (b) where a fall from a lesser height involves an unusual risk of injury." Occupational Health & Safety Regulation Book; section 11.2, page 11-2.

¹² Paul Kennett; Classic New Zealand Mountain Bike Rides; 1996

COMPATIBILITY MATRIX

Whistler has five land use directions, five Trail Types and five Mountain Bike Trail Difficulty Levels. Only the four within Municipal standards are presented, Level 5 is not included. These three classifications interact in the following compatibility matrix.

		LAND USE DIRECTIONS																			
		Developed Areas				Greenways				PAN 3 include LRUP				PAN 2				PAN 1			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Mountain Bike TRAIL DIFFICULTY LEVELS		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
TRAIL TYPES	I	✓	×	×	×	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	II	✓	✓	✓	×	✓	✓	✓	×	×	✓	✓	×	×	×	×	×	×	×	×	×
	III	×	✓	✓	✓	×	✓	✓	✓	×	✓	✓	✓	×	✓	✓	✓	×	G	G	G
	IV	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	G	G
	V	×	×	×	✓	×	×	×	✓	×	×	×	✓	×	×	×	✓	×	×	G*	G*

✓ = Compatible × = Incompatible G = Grandfather Clause

TABLE 1 COMPATIBILITY MATRIX

COMPATIBILITY MATRIX

The Compatibility Matrix identifies Trail Difficulty Levels acceptable in each Trail Type and which Trail Type is compatible given the land use direction.

Example 1: Trail Type I is only compatible in Developed Areas and Greenways. Trail Type I is only compatible with a Difficulty Level 1.

Example 2: Both Trail Type I and II are incompatible with PAN 1 and PAN 2 Land Use Directions.

Example 3: Trail Type III in PAN 2 can have a Difficulty Level of 2, 3 or 4.

* Only hiking trails, in individual cases, on very low-impact nature trails, boardwalks or wildlife platforms for the specific purpose of habitat protection are permitted to be constructed in PAN 1.

GRANDFATHER CLAUSE for valued existing trails in protected areas when trail deactivation is unlikely to succeed, trail management is the preferred option. When considering the Grandfather Clause as an option, evaluate the continuing cost of maintenance to manage the trail.

A trail deactivation/closure may not be successful if the populace continues to try to use the trail due to a popular feature or area, short-cut or habit. The resulting damage may be worse than had the trail remained open and effectively managed.

GRANDFATHER VS DEACTIVATION

For existing trails in PAN rated areas, some of the criteria to consider when deciding to deactivate or manage are:

- Is the trail popular?
- Is the level of impact reasonable or can it be made reasonable by managing?
- Can the trail or part of the trail be rerouted to avoid sensitive areas?
- Are there suitable alternatives for users if the trail was deactivated?

When considering managing trails, the trails must have:

- 4 Bridges over streams with overlap to the top-of-the-bank to prevent sedimentation of the streams
- 4 A way to minimize dog access to streams to prevent damage in riparian areas and sedimentation of the streams
- 4 No man-made Technical Trail Features in PAN 1, (bridges/ boardwalks are exempted)
- 4 For maintenance details, see the maintenance section on page 18.

When considering deactivation of trails, steps may include some or all of the following:

- 4 Consult user groups
- 4 Public notice
- 4 Debris placement such as rocks and branches
- 4 Fences
- 4 Monitoring to ensure trail remains closed



DAVID DIPLOCK PHOTO

SUPPORTING STANDARDS

ENVIRONMENTAL GUIDELINES¹³

The benefits of a trail network must be balanced with the desire of protecting our natural environment. The RMOW is actively pursuing environmental sustainability, which can be described as a condition where we use only as much of nature's resources that can be replenished indefinitely while viable habitats continue to be maintained for living things. Trail construction must strive for minimal impact on our natural surroundings. Trails that adversely impact the environment will not only have a low aesthetic value, but also incur a high maintenance cost. Trails should be designed with consideration for the specific environment and the trails intended use.

All intrusions into the environment have some degree of impact. However, these impacts can be minimized to balance the need for a recreational experience with the impact on the surrounding environment.

GENERAL GUIDELINES

- Trail placement should avoid hazard areas such as steep ravines, bluffs, cliffs, embankments, hazardous trees, snags, undercut stream banks, etc.
- Assess the impacts of trail use on wildlife species.
- Avoid unstable slopes, erodible soil and shallow rooted trees with high windthrow potential.
- Avoid critical habitat of rare or fragile plant species. If there are fragile plant communities next to the trail, delineate the trail edges by using logs or rocks.
- Avoid sensitive or fragile archaeological or historic sites.
- Avoid trail routing that encourages users to take shortcuts where an easier route or interesting feature is visible. If an interesting feature exists, locate the trail to provide the desired access to the trail user. Use landforms or vegetation to block potential shortcut routes. Alter the shortcut route if it is superior to the original route.
- Deactivate shortcuts by obstructing access with rocks, branches, fallen trees or new plantings. Provide signs, explaining trail closure rationale.
- Avoid building trails in community watersheds.
- Alternate trails should not be visible from original trails to prevent trail proliferation.
- Avoid cutting down live trees.
- Avoid exposing roots or cover exposed roots.
- Use downed cedar for construction material where possible due to its natural preservatives.
- Route trails on bedrock or hard packed surfaces and avoid organic materials.

- Use set cobblestones in sensitive areas and steep descents to minimize trail erosion.

AQUATIC ENVIRONMENTS

- Trail construction near an aquatic area, within 30 meters of streams and within management zones as per Forest Practice Codes, must minimize vegetation removal and soil disturbance. Construction standards should be consistent with trail use, thereby minimizing trail width requirements.
- Avoid construction on erodible stream banks, lake shores and wetlands. If no alternative route exists, raise the trail tread with log stringers and wood chip fill or use boardwalks to cross standing water or wet organic soils.
- Avoid drainage features (for example, seeps, springs, ephemeral channels, etc.), streams, wetlands, and floodplains.
- Structures in direct contact with water should be inert (for example, natural untreated cedar, precast concrete or steel) to avoid water quality impacts associated with chemical leaching from treated wood. All treated wood structures should be constructed with material that has been pressure treated off-site at specialized wood preservation facilities with Chromated Copper Arsenate or Ammoniacal Copper Arsenate. If pretreated wood has been used for structures being placed in the ground, the structure should be isolated in poly wrap below grade.

¹³ Information for this section taken from the following sources: Ministry of Forest, Recreation Trail Management Access Near Aquatic Areas; A Guide to Sensitive Planning, Design and Management; Province of BC <http://mypage.uniserve.ca/~otar/trails/standards/3-5.htm>

BRIDGES

- Locate bridge crossings to minimize disturbance to streambeds and banks. Those sections of the waterway that are straight and where banks are stable are preferred for crossing.
- Construct bridges across streams to top-of-the-bank. This minimizes erosion of stream banks and sedimentation of streams.
- For bridges requiring supports in contact with the stream, in aquatic environmentally sensitive areas, pile supported structures are preferred over slabs or floats.

USE OF MACHINERY

- Limited access trails that penetrate sensitive areas should be constructed manually with materials and equipment that can be easily transported by small work crews.
- If machinery is required, minimum standards as per Forest Practices Code should be adopted (i.e. no machinery within 5m of any water-body.) Low impact construction techniques should be employed such as small underinflated, rubber tired vehicles, and construction pads, platforms or cranes. Prefabricated structures that can be manually assembled on site should be used, if possible.

SIGN STANDARDS

Signs are a necessary component of trail management. It provides the user with information that will allow them to make an informed and educated choice. Two types of signs are proposed for the trails.

EN ROUTE SIGNS along the trail indicating to the user they are still on the desired trail and/or gives warning of the difficulty of an upcoming technical trail feature (TTF) if it is rated higher than the overall trail rating. En route signs display difficulty in the following three ways: shape of sign, color of sign, trail profile symbol on the sign. The signs are numbered to distinguish between different trails. The number corresponds to a base map (for example, the signs along the trail would all have the same number). Sign color and shape are consistent with North American downhill skiing standards.

- En route signs to be placed at junctions with alternate trails giving clear indication of each trails' direction
- For TTFs rated more difficult than the trail rating, en route signs to be mounted on 4x4 posts beside entrance to TTF. Height of en route sign, 1.0-1.5m above trail tread. Easier bypass route must also be signed.

TRAILHEAD SIGNS are necessary to inform the rider of the trail technical difficulty and conditions expected. Signs at the trailhead displays trail information such as: topographical map and trail profile; trail length; elevation gain; elevation loss; technical difficulty; range of completion times from walking pace to World Cup racer; cautionary notes and information such as IMBA Rules of the Trail; contact information to get involved and report required maintenance.

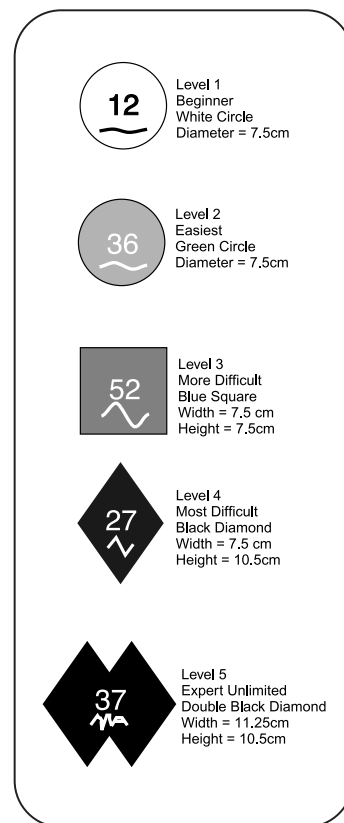


FIGURE 1 EN ROUTE SIGNS



FIGURE 2 TRAILHEAD SIGN

- Trailhead sign dimensions: 30-36" x 24"
- Trailhead mounting: Trailhead sign to be mounted on two 4x4 beams, one mounted to each corner and fixed soundly into the earth.

TRAIL HEAD SIGN LEVEL SPECIFIC WORDING

Level 1 – This trail is a multi use paved trail with two-way traffic

ROLLER BLADE DIFFICULTY SCALE as applied to the Valley Trail within the RMOW:

GREEN CIRCLE Trail is flat with occasional gently sloping hills. Beginner and intermediate in-line skaters.

BLUE SQUARE Trail has gently sloping and steeper hills of moderate length. Advanced to expert in-line skaters. Use caution.

BLACK DIAMOND Trail has steep or longer hills with difficult corners. Not recommended for in-line skating.

Level 2 – This trail may contain embedded objects such as roots, logs and rocks to a maximum height of 10cm

Level 3 – This trail may contain technical trail features such as bridges to a maximum height of 1.8m and teeter-totters to a maximum height of 60cm at pivot point, drops to a maximum of 30cm and jumps

Level 4 – This trail may contain technical trail features such as bridges to a maximum height of 3.0m and teeter-totters to a maximum height of 1.2m at pivot point, drops to a maximum of 90cm and jumps

Level 5 – *The RMOW does not sanction Level 5 trails*

FALL ZONE STANDARDS

The Fall Zone is the area adjacent to a technical trail feature that the rider may deviate into should they fail to negotiate the technical trail feature (TTF). Included in the fall zone are the sides of the trail, the bottom of descents and the outside of corners.

Injury may be avoided with careful review of the area surrounding the trail. Potential causes of injury are branches or stumps and roots that are not cut flush with the tree or the ground, rocks and debris as well as the TTF itself if it has not been finished to acceptable standards.

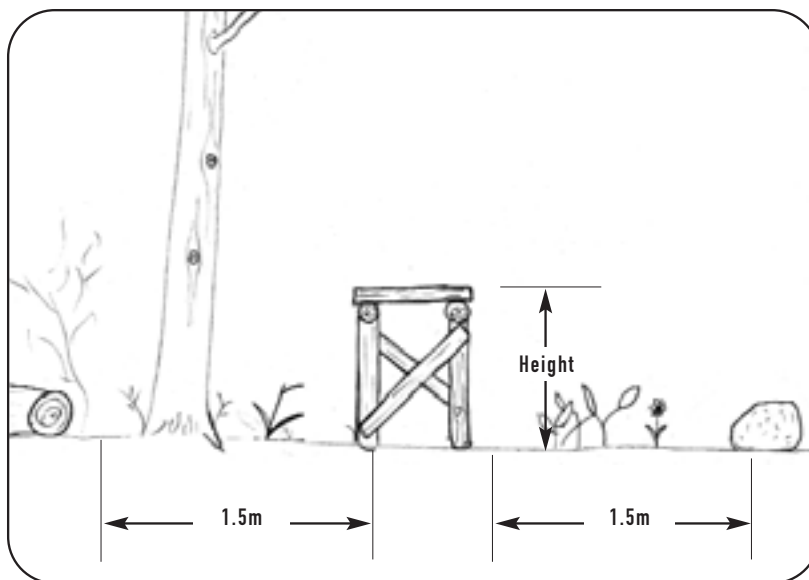


FIGURE 3 CLEARING OF FALL ZONE

STANDARDS

Clear the fall zone of potential dangers to a minimum of 1m on all sides of the TTF up to 30cm high and 1.5m on both sides for TTFs that are 30cm and higher. Height is measured vertically to the lowest point within 1.0m adjacent to TTF (figure 4).

METHODS

Clearing fall zones include but are not limited to:

- Cutting or digging out any sharp objects
- Trimming tree branches to branch collar or shoulder
- Covering of hazards is another option if material such as rotten logs, bark, mulch, dirt etc. is available.
- 4 Areas where falls are frequent may need re-covering
- Dulling of sharp points or edges of exposed rocks

NOTE

The fall zone should not be cleared of all foliage, since the purpose of Fall Zone Standards is to minimize the chance of injury should a fall occur. Replanting of the fall zone with a durable species may be considered.

FOCUS

The primary focus for fall zone clearing should be in the trails rated More Difficult where a rider is learning how to ride TTFs and their falling skills may not be perfected.

MAINTENANCE STANDARDS

Trail maintenance is an integral part of managing trails. In general, high volume and high PAN rated trails will receive a greater level of maintenance and an expedited response to trail deterioration. Trails with man-made TTFs also require more frequent inspection.

HIGH PRIORITY TRAILS will be inspected twice a year (April and July). These include all Trail Type I trails and all trails in PAN 1 environments.

MEDIUM PRIORITY TRAILS will be inspected in the spring of each year or prior to the start of the trail use season. These include all trails in PAN 2 and PAN 3 environment, and all Trail Type II trails and trails with known man-made TTFs.

LOW PRIORITY TRAILS will be inspected in the spring of each year or prior to the start of the trail use season. These include all remaining mountain bike trails.

MAINTENANCE TRIGGERS

Triggers for trails requiring additional maintenance:

- Short-cutting of climbing turns and/or switchbacks
- Trail drifting or sliding down the hill
- Vegetation cover loss
- Trail proliferation (widening or braiding)
- Trail incision and soil loss (ruts exceeding 15cm depth)
- TTFs deteriorating

MITIGATION MEASURES

If resource damage caused by mountain bikes is located, determine the reasons it is occurring and take measures to correct the situation. Consider hardening trails, installing water bars, using seasonal closures, relocating the trail, or recommending alternate routes. Inform riders of the problem and suggest measures they can take to correct the situation.¹⁴



¹⁴ Mountain Bikes on Public Lands: A Manager's Guide to the State of the Practice, September 1990, Page 21.

CONSTRUCTION STANDARDS

The RMOW is concerned with the safety, durability, design, height and surface finish of the technical trail features.

SAFETY

Technical trail features must exceed the minimum strength and stability standard. The structure should be built and finished to minimize potential injury to a falling rider colliding with the structure or its' supports.

STRENGTH AND STABILITY

The TTF must be capable of supporting a centered vertical load of 200kg (440lb) and a horizontal load of a 80kg (180lb) adult leaning against the constructed feature with less than 5cm of displacement.

TTF DESIGN PHILOSOPHY

- Make riders fall early:
 - 4 By placing a narrow section or difficult turn early while the TTF is still close to the ground (known as a gateway), the inexperienced riders will dismount early, before the TTF is high above the ground where the rider is more likely to be injured should a fall occur. For example, place a 10cm wide gateway less than 40cm off the ground as a gateway to a 30cm wide section 1.2m off the ground.
- Make the most difficult section visible from the entry
 - 4 By placing the difficult section in view, the rider can make an informed decision before they may get into difficulty with a TTF that may be beyond their ability.
- Avoid wide, easy entrances leading to high, narrow exposed features.

TTF HEIGHT AND WIDTH

As outlined in the Technical Trail Difficulty section, maximum height and minimum width are dependent on the TTFs difficulty. As the height increases, the consequence of injury in the case of a fall increases.

Height is measured vertically to the lowest point within 1.0m adjacent to TTF (figure 4).

Tread Width is the amount of flat tread (figure 5).

Bridges exceeding standards require alternate safety methods such as railings. Note: width of handlebars may be as wide as 75cm (29in).

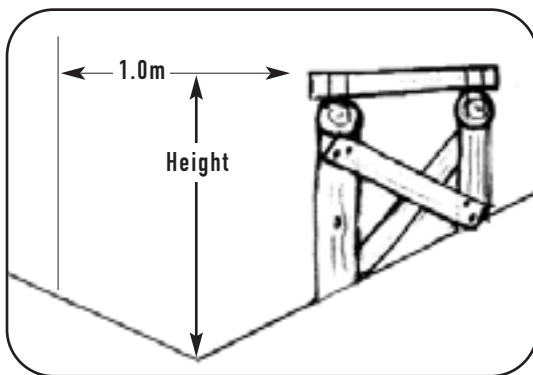


FIGURE 4 MEASUREMENT OF TTF HEIGHT

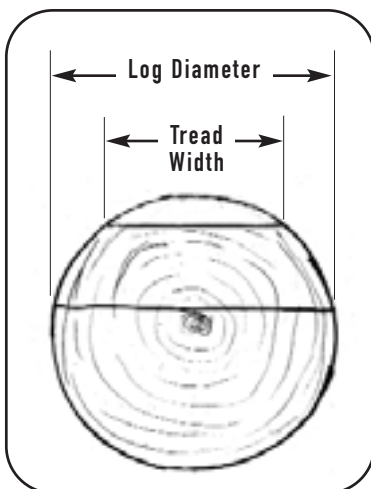


FIGURE 5 TREAD WIDTH MEASUREMENT

CONSTRUCTION PRACTICES

Cross bracing of vertical members is required. Also, TTFs should not be mounted to living trees for three reasons:

1. The tree will continue to grow, compromising the integrity of the TTF.
2. The tree may sway due to wind, weakening the TTF.
3. Nailing to live trees is harmful to the tree.

The preferable method of joining members together is nuts and bolts, the second choice is screws and the last method is ardox nails. Ensure two-thirds of the nail or screw length penetrates the stringer.

Loading on member should be done in such a way as not to rely exclusively on the shear strength of the joining method.

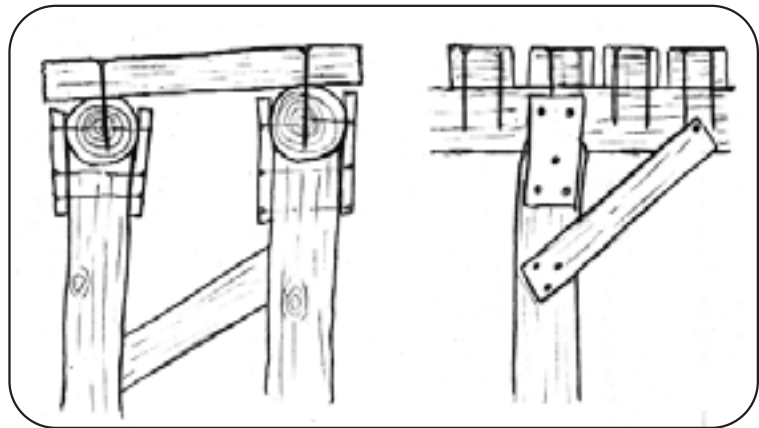


FIGURE 6 BRIDGE STRINGER SUPPORT AND CROSS BRACING

BRIDGE RUNG SPACING

Deck rungs must be placed tightly so that children will not catch their feet between rungs, arms will not fit between rungs and dogs will use bridges. An appropriate spacing between rungs is 1-2cm to promote drainage of water and mud. Rungs should not overhang stringers by more than 5cm (2in) (figure 7).

BRIDGE SURFACING

It is recommended that wood surfaces, particularly those with a slope exceeding 10°, have an applied anti-slip surface. The exception being split wood, having a rough surface finish. Recommended methods are expanded diamond lath or rolled roofing material. Chicken wire, although popular, is not durable.

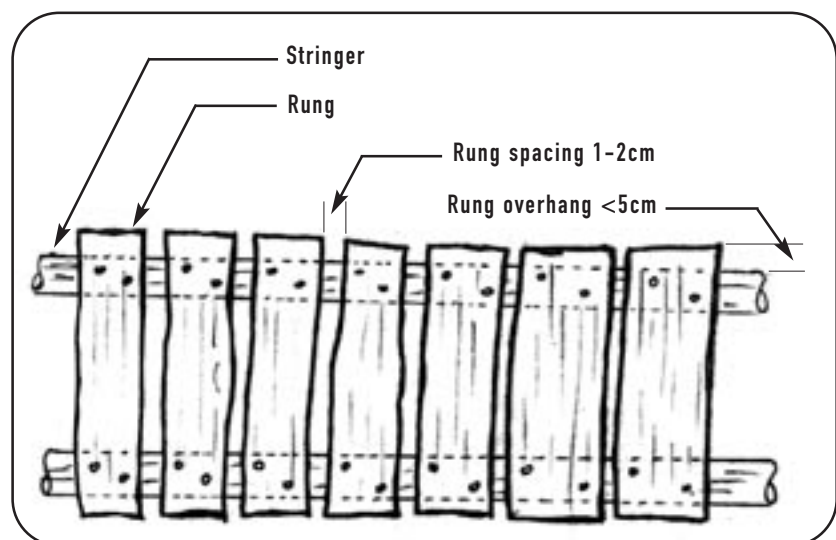


FIGURE 7 BRIDGE RUNG SPACING, RUNG OVERHANG

APPLICATION OF POLICY

PROCESS

1. Trail identified as a valuable resource.
2. Decision to manage trail.
3. Review trail and Technical Trail Features (TTF) for Trail Difficulty Levels. The trail can be rated a maximum of one level of difficulty easier than the most difficult TTFs on that trail provided the following four conditions are met:
 - 4 The most difficult TTFs are clearly marked for difficulty level;
 - 4 There are easier bypass routes around the most difficult TTFs;
 - 4 The quantity of most difficult TTFs are less than 50% of the total TTFs;
 - 4 Additional notation on trailhead must be provided to indicate that there are more difficult marked TTFs with easier bypasses.

EXCEPTION: remote trails with potentially long rescue times (approaching 1 hour) in the case of an injury are to be rated Level 4, Black Diamond.
4. Review trail for Trail Type.
5. Using the Compatibility Matrix, determine if the Trail Difficulty Level, Trail Type and Land Use Direction are compatible.
6. Obtain permission to use the land and manage the trail, from owner or caretaker:
 - 4 Obtain consent under Section 102 of Forest Practices Code of BC Act if land managed by Ministry of Forest;
 - 4 Secure permission to use private lands.
7. Measure trail statistics:
 - 4 GPS survey trail route to calculate trail total elevation gained and lost, trail profile, route and trail length;
 - 4 Measure time to complete trail by a racer and a walker for two contrasting points of reference.
8. Create trailhead and en route signage using templates.
9. Post signage and document signage locations with GPS.
10. Maintain trails as set out in Maintenance Standards.

TERMINOLOGY

A-FRAME	– two ramps (approach and exit) placed together with no level section at the apex. Typically used to bridge deadfall across the trail.
BERM	– built up bank on the outside of a corner to improve cornering.
BOARDWALK	– a raised walkway made of boards; used to traverse sensitive areas; similar to bridge.
BRIDGE	– a structure that is built above and across a river or other obstacle allowing passage across or over obstacle.
COFFIN JUMP	– a jump constructed from material excavated from behind the jump, leaving a hole.
DANGER	– likely to cause harm or result in injury.
DROP-OFF	– a drop in the trail, possibly at the end of a log or off a rock; may require a technique depending on the vertical drop and/or the angle of descent.
EXPOSURE	– placing a rider in the position or location that an error in balance or maneuvering may result in an injury; for example, a narrow bridge above rocks, would be exposure and the greater the elevation of the bridge above the rocks the greater the level of exposure.
FACE	– the steep exposed side of a rock.
FALL-AWAY	– a drop-off which incorporates a turn in the trail.
GAP JUMP	– two ramps placed back to back with a space between them, the rider must travel with enough velocity to cross the space and land on the second ramp.
GATEWAY	– a qualifier placed before a trail or TTF; for example, a 2x4 placed before an elevated bridge or a difficult corner. If the rider can successfully negotiate the more difficult gateway, then they will likely be able to negotiate the TTF.
GRANDFATHER CLAUSE	– provision exempting certain pre-existing trails from the requirements of a new regulation
LADDER	– a TTF with rungs attached to sides (stringers) made of metal, wood or rope, used for climbing up or down
LOGJAM	– a pile of logs placed near perpendicular to trail to make a ramp, usually placed in front of and behind deadfall to ease passage.
MACHINE BUILT	– constructed with the use of an excavator.
MANDATORY AIR	– a TTF requiring a wheelie drop or other advanced technique to exit due to a steep or undercut exit.
MANUAL	– technique used to lift the front end of a bike up without the use of a pedal stroke; can be used off mandatory airs, etc.; generally requires more forward momentum than a wheelie drop.
PAN	– Protected Area Network, sometimes know worldwide as greenways, environmental corridors, landscape linkages, wildlife corridors or riparian buffers.
RAMP	– any inclined structure, typically used as an approach to or exit from a TTF. A ramp can also be a jump.
RHYTHM SECTION	– series of gap jumps placed end to end. Most technical form of jumping due to skill, timing, technique and failure consequence.
RIPARIAN ZONE/AREA	– land between the water and the high water mark on the riverbanks. Riparian areas typically exemplify a rich and diverse vegetative mosaic reflecting the influence of water.
ROLLABLE	– a section that can be ridden without requiring higher-level rider skills; for example, an elevated bridge intersection/corner that can be ridden without having to hop and rotate.
ROLL OVER	– usually a rock that gets steeper the farther the rider advances, to the point where stopping may not be an option and the rider must continue despite not being prepared for what's ahead.
TEETER-TOTTER	– a TTF consisting of a long plank balanced on a central support for riders to cross over, providing an down motion as the rider passes over the pivot.
TONGUE	– a steep ramp on the exit of a TTF, often as an easier alternative to mandatory air.
TOP-OF-THE-BANK	– a) the point closest to the boundary of the active floodplain of a stream where a break in the slope of the land occurs such that the grade beyond the break is flatter than 3:1 at any point for a minimum distance of 15 meters measured perpendicularly from the break, and b) for a floodplain area not contained in a ravine, the edge of the active floodplain of a stream where the slope of the land beyond the edge is flatter than 3:1 at any point for a minimum distance of 15 meters measured perpendicularly from the edge.
TREAD	– the traveled surface of the trail.
TTF	– Technical Trail Feature – an obstacle on the trail requiring negotiation, the feature can be either man made or natural, such as an elevated bridge or a rock face respectively.
WHEELIE DROP	– technique used to pedal off drops-off or logs with the back wheel landing before the front wheel.



4325 BLACKCOMB WAY, WHISTLER BC CANADA V0N 1B4
TELEPHONE (604) 932-5535 FACSIMILE (604) 935-8109

www.whistler.com/rmow