

District of Squamish Trails Standards



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ACKNOWLEDGEMENT AND DEDICATION

This document could not have been achieved without the invaluable input and collaboration from the original Trails Standards Working Group. The volunteer members of the committee included: Bob Brant, Vince Hoog, John Howe, Chris McCrum, Cliff Miller, Neil Plumb, and Brad Walkey. There were also a large number of individuals and staff who, from time to time, have contributed to various sections of the Trail Standards Manual. The Squamish Trails Society (STS), Squamish Dirt Bike Association (SDBA), and the Squamish Off-Road Cycling Association (SORCA) have supported and nurtured this long process and provided their knowledge and expertise to its development.

This document is dedicated to the memory of Councillor Ray Peters. Ray Peters was the Council representative on the Working Group. His passion and commitment to his community and his beloved trails both inspired and led the working group. It was Ray's vision to see the District play a lead role in the future of our extensive trail system and to continue to develop Squamish as the "Outdoor Recreation Capital of Canada".

We also acknowledge the many great resources drawn upon in creating this document, including:

- Corridor Recreational Trail Management Plan
- Trails Strategy for British Columbia
- SORCA's Squamish Mountain Bike Management Plan
- Sea to Sky Corridor Recreation Strategy
- Whistler Trail Standards: Environmental and Technical Trail Features
- Trail Solutions: IMBA's Guide to Building Sweet Singletrack



INTENT AND OPERATING PRINCIPLES

The intent of this document is to provide consistent guidelines and standards for trail development and maintenance for the District of Squamish and other potential trail builders in the community. All new trail development will be built and maintained to these standards. Existing trails will be “grand-fathered” and upgraded to these standards as time and resources permit.

Effective “Trail Standards” provide a strong foundation for good trail design, construction, and maintenance and will provide a safe and enjoyable experience for users. A successful trail system is dependent on the cooperation, communication and courtesy of the users, builders, and the landowners. The underlining philosophy of this document is that all public access trails are a “shared resource and a shared use” and as such no public trails are of exclusive use. Different courtesies and “rights of the road” may apply depending on the primary use of the trail.

These guidelines and standards are applicable within municipal boundaries and as supported by the landowner, which may include the District of Squamish, private landowners, and public agencies, such as the Ministry of Tourism, Culture and the Arts and the Ministry of Forests and Range. Outside of District boundaries, the Squamish/Lillooet Regional District Trails Coordinator should be consulted along with the Sea to Sky Corridor Recreation Trail Steering Committee on trails issues.

As user volumes, physical environments, and trail usage may change with time, a periodic review of these guidelines and standards by the District of Squamish will be done to keep them effective and relevant.

The District of Squamish should be contacted about any enquires or clarifications of these standards. There are many stakeholders who need to be part of the process of developing and maintaining trails. It is important to engage the District of Squamish in the planning stages of trail projects and to consult with all stakeholders in the development process.

For safety and maintenance reasons, there is limited access to trails for motorized vehicles with the exception of maintenance/service vehicles and battery-powered wheelchairs and carts. Other motorized vehicles may be operated only on “specified” trails within certain areas and warning signs to the area must be posted at all access points. In the future there may be new “designated” areas that are developed and maintained by local motorbike clubs (ex: SDBA).

INVENTORY AND MAPPING

NEW TRAIL DEVELOPMENT APPLICATION PROCESS

All new trails must be approved through an application process. This process will be managed by the District of Squamish, through the Trails Coordinator, in cooperation with local trails user groups. If the trail falls on Crown Land, the Provincial Standards set out in the Sea to Sky Corridor Recreation Trail Strategy must be followed. The appropriate landowners must be contacted and provide written approval before making an application for trail construction. An application form and a Trail Plan must be submitted for approval. The location and route must be flagged, GPS'd, and inspected prior to any approvals or development. All safety and security issues must be addressed in the Trail Plan, including any technical trail features (TTF'S) to be added.

Once approval has been given, the trail will be re-inspected and any outstanding issues will be addressed. The trail will be classified, named, GPS mapped, and added to the trail inventory.

TRAIL NUMBERING AND MAPPING SYSTEM

All "authorized" trails will be classified, numbered, named and mapped using a GPS system for mapping and signage purposes. The intent of this requirement is to have a consistent and accurate system that works for all user groups and enables trail maps to be coded, indexed and consistently named.

ESTABLISHED TRAILS

Section 56 of the Forest and Range Practice Act allows the minister to order the establishment of a recreation trail on Crown Land. These 'established trails' are legal trails that must be given consideration during land-use planning decisions. Infrastructure development, maintenance, and resources will be invested on these trails. A higher level of preservation applies to these trails; however, establishment of a trail does not guarantee conservation in the same sense as a Provincial Park or Protected Area. Section 56 also allows the minister to order the disestablishment of a recreation trail on Crown Land.

If a land-use decision may impact an 'established trail', local communities, trail clubs, and users will be consulted. A wide-spectrum of trail impact mitigations (TIMs) may be used, dependent upon the significance of the trail and its amount of use. An example of TIM's may be a forested buffer along the trail or the trail may be relocated or re-established after harvesting or other industrial activity.

Section 57 Forest and Range Practice Act states no recreation trails may be constructed on Crown Land unless authorized by the minister. The minister may authorize the construction, rehabilitation, or maintenance of recreation trail on Crown Land and may impose conditions that must be met. These trails are not established as in section 56 and are therefore not protected. The minister may revoke authorization.

For more information about 'established', 'authorized', and 'unauthorized' trails, and information about applying for authorization, please see page 16.

TRAIL CLASSIFICATION SYSTEM AND STANDARDS CHART

The trail classification charts on the following pages divide the trail system into five types or classifications of trails. The function and description define each classification, and the left side column provides detail on specific aspects of the trail.

Further to this Trail Classification system, The Sea to Sky Corridor Recreational Trail Strategy Draft, February 2007, from the Provincial Government, breaks down the Trail Classification into Roman Numerals I-V. (#1 is also a Type I, #2 & #3 could be a Type I or II whereas #4 ranges from II-V) For further clarification see the Mountain Bike Section on Page 18.



TRAIL TYPE CLASSIFICATION TABLE
 From Sea to Sky Corridor Recreation Trail Strategy Draft February 2007

Trail Classification	#1 Primary/Corridor	#2 Area/Collector	#3 Neighbourhood	#4 Specified Use Trail/Area	#5 Designated On-Street Cycling
Function	-To provide a paved corridor/connector trail linking up local communities within urban Squamish.-To provide a linear commuter route that is accessible to all trail users.-To provide a north and south link to the proposed Sea To Sky Trail.	To provide a collector trail(s) that links the local neighbourhood trails to the corridor trail or other major artery.	To provide connecting trails within a community area that enables ease of movement for local residents, walkers, hikers, joggers, cyclists, and bike commuters.	To facilitate, or enable, specified use trails or areas for designated recreational activities (such as mountain biking, rock-climbing, access, trails riding, horseback riding, etc.). Refer to Specified Use Trails & MTB Sections in this report for details.	To provide designated cycling routes throughout the District that link street routes and "shared" trail routes to enable safer commuter cycling movement. To link the cycling routes to the Corridor Trail at key connectors in each local community.
Description	Wide, paved, 2 way trail, suitable and accessible for all users, that accommodates linear connectivity through the urban community.	A medium width, 2-way trail that connects local neighbourhood trails and links them to the corridor trail. This includes all public accessible dykes paths.	Narrow to medium width trails that enable pedestrian/cyclist links to various parts of a neighbourhood. Designated "Nature Trails" would also be included in this classification, or a higher classification if considered a high usage trail.	Narrow paths, usually with natural ground materials, minimal maintenance and minimal clearing. Maintenance and development may be by an "authorized" user group. Examples: single or double track mountain bike trails, horseback riding trails, "trials" motorbike riding area or trail.	Designated paved bike lanes "on shoulder grade" with paved roadways. Commuter routes are planned and developed by the District of Squamish and are designed to comply with Ministry of Transportation (MoT) Bikeway Standards.
Difficulty Grading	Difficulty Grading – Green Circle (Easy) Distances and gradient (degree of climb) will also be posted, where required, at Trail Heads.	Same. Except, some gradients and surfaces may not be appropriate for wheelchairs.	Same	Same. Difficulty grading will range from green circle coding (appropriate for all users) to double black diamond (expert hikers and riders only). See the Mountain Bike Section for Trail Grading System details.	Location for mapping will come from existing street mapping, unless the route is part of the corridor commuter trail.
Authorizing and Registering	All "authorized" trails and routes will be numbered, named and GPS'd for mapping purposes. New trail construction must go through an application process and be authorized and registered with the District of Squamish.	Same	Same	Same	See "Description" above
Restrictions	No motorized use, except to accommodate physically challenged accessibility or as specifically "designated". Dogs must be on leash. DOS or authorized service vehicles permitted.	Same	Same	"Shared Use" as allowed/signed, trail courtesies and right of ways will vary. Occasionally some small isolated areas may be restricted for safety reasons to specified activities only. Restrictions as appropriate for activity or environment.	No motorized vehicles, except for handicap accessibility. No dogs. No horseback riding. No Parking.

Trail Classification	#1 Primary/Corridor	#2 Area/Collector	#3 Neighbourhood	#4 Specified Use Trail/Area	#5 Designated On-Street Cycling
Trail Surface Width	Minimum – 3.0 m. Preferred – 4.0 m.	Minimum – 2.0 m. Preferred – 3.0 m.	Minimum – 1.5 m. Preferred – 2.0 m.	See MTB Section	Minimum – Shared roadway with minimum 4.0 m. width. Preferred – 1.5 m. (each way)
Cleared width for drainage.	Minimum – 7.0 m. Preferred – 8.0 m. to allow for drainage and buffers. 2.0 – 5.0 m./side. As topography indicates and/or as required for future growth.	Minimum – 4.0 m. Preferred – 5.0 m. 1.0 – 2.0 m./side. Same	Minimum – 3.0 m. Preferred – 4.0 m. 1.0 – 1.5 m./side. Same	As appropriate for activities. As appropriate for activities.	Not applicable
Right of way setbacks from cleared width	Minimum – Highly compacted screenings (low use urban areas). Preferred – Asphalt or highly compacted alternative (high use urban areas). Colorized and stamped concrete may be used at intersections or rest areas.	Min. – Highly compacted screenings. Preferred – Asphalt or alternative (closer to Corridor trail connections).	Min. – Fine compacting gravel (equestrian use). Preferred – Compacted screenings.	As appropriate for activities, including natural surfaces.	Asphalt on shoulder of road, painted white line between roadway and cycling lane. White line – 10cm. width
Surface	Refer to Attached Drawings and Specifications.	Same	Same	As appropriate for function.	As per road construction standards of DOS
Sub-grades	Average – 0 -3% Max. – 5% or 8% over 4 m. 2 -3%	0 – 10% 15% or 20% over 30 m. 2 -3%	0 -15% 30% over 150 m. 2 – 3%	As appropriate for function.	0 – 5% 10% 2 – 5%
Gradient	-Brush - Trail Cleared Width plus min. 2 m./side - Height - 3.5 m. to branches - Retain trees when practical.	-Cleared Width plus min. 1m./side - Same - Same	-Cleared Width plus min. .5m./side - 3.0 m. to branches - Same	Site and use specific.	Not applicable. As per road construction standards. 3.0 m. clearance
Cross-slope	Good visibility for 20 m.	Good visibility for 10 m.	Good visibility for 8 m.	As safety permits.	Not applicable
Clearance:	Maintain clear surveillance from Highway, except where environmental or technical issues require rerouting. Maintain natural buffers where they do not compromise safety.	Maintain natural buffers where they do not compromise safety. Buffer from homes and businesses to mitigate impacts (ex. fencing, landscaping).	Same	Not applicable	Not generally applicable. At the discretion of the District, and for unique safety considerations, an artificial barrier may be used to separate cyclists and traffic.
Width - Brush - Height - Branches	Landscaping appropriately between trail and adjacent facilities and amenities. Landscape at appropriate trailheads with native vegetation.	Same	Site specific, as required.	Not applicable	Not applicable
Sightlines					
Buffers					
Landscaping					



Trail Classification	#1 Primary/Corridor	#2 Area/Collector	#3 Neighbourhood	#4 Specified Use Trail/Area	#5 Designated On-Street Cycling
Lighting	Appropriate pedestrian-level lighting in forested urban areas to allow evening commuting and access.	Not applicable. Dawn to dusk use.	Not Applicable. Dawn to dusk use.	Not applicable. Dawn to dusk use.	Per lighting standards for roadways
Maintenance Access	Locked bollards at trailheads and intersections to allow maintenance and emergency vehicle access.	Same, where access is inappropriate. Some dykes on wide trails may require gate to control vehicle access.	Site specific, as required.	Site specific, as required.	Not applicable
Wheelchair Accessibility	Trail must meet minimum provincial standards for surface material, width and gradient to accommodate manual or motorized wheelchairs.	Same for paved sections of trail. Paving may be added as funding permits.	Site-specific restrictions may limit access because of various trail surface materials, natural gradients and restrictive trail widths.	Not applicable	Will accommodate "one way" wheelchair access, although this use is not recommended.
Signage/Markers	Signage includes trailhead and collector trail posts, including appropriate distance (5 – 1 km.) markers. Information kiosks and posted trail maps may be constructed at key intersections. Interpretive and special feature signs may be placed where appropriate. See Signage Section.	Includes trailhead posts and appropriate signage/markers. Interpretive signs where appropriate.	Trail indicator/post where appropriate.	Appropriate area alert/warning signage, including "caution use a town risk" or "shared usage" notice. May include "rules of the road" or user "code of conduct" notices. Trail head and trail directional signage, where appropriate. Trail Map Kiosk when required.	Minimum – 10 cm. painted white line for designated route. Preferred – Above plus Cycle route signage and painted symbol on route road surface.
Furnishings Amenities	May include: District approved benches. Strategic use and placement of rocks for sitting and controlling access. Shaded rest areas, landscaping, and information kiosks. Doggie Bag stations where appropriate.	Same	As appropriate and site specific.	As appropriate and site specific.	Not applicable
Designated Trail Parking Site Amenities	Minimum – Port-a-potty, garbage can, doggie-do station. Kiosk with signage and mapping. Preferred – Toilets (high use area)	Same	Same	Same, plus site-specific information.	Not applicable
Bridge Platforms	Require "environmentally sensitive", treated wood construction. Design for bridges or elevated platforms must be site specific and approved by the District. See Bridges and Platforms Sect.	Same	Same	The District must approve designs. The District must also approve other "built structures", i.e. Technical Trail Features See Provincial Standards	Not applicable

Trail Classification	#1 Primary/Corridor	#2 Area/Collector	#3 Neighbourhood	#4 Specified Use Trail/Area	#5 Designated On-Street Cycling
Garbage	Bear-proof garbage receptacles at appropriate intersections or trailheads. District of Squamish (Parks Operations) or designate. 1. During routine servicing do regular service checks on all operational issues, amenities, furnishings, and trail conditions. 2. Schedule quarterly safety and operational inspections and reports. 3. Schedule annual repairs and clean up of trail. 4. Ensure even and unobstructed trail surface. 5. Remove leaves and debris seasonally. 6. Collect garbage as scheduled. 7. Check/service lighting. 8. Clear snow in winter as prioritized. 9. Annually cutback or remove underbrush or trees that may create a hazard or security issue for users.	Bear-proof garbage receptacles at appropriate trailheads only. DOS or designate #1, 3, 4, 6, 9. Two scheduled annual safety and operational inspections and reports. NOTE ALL CLASSIFICATIONS: Safety Hazards must be reported and repaired or mitigated as appropriate. NOTE ALL CLASSIFICATIONS: Some trail maintenance may be carried out through the "Adopt a Trail" Program or through a Partnership Agreement with a "Not For Profit" Service Group or Society.	Bear-proof receptacles on a site-specific basis only. DOS or designate #1, 3, 4, 6, 9. Scheduled annual safety and operational inspection and report.	At designated areas assigned to specific user groups the group will collect and remove garbage, as appropriate. Maintenance needs to be carried out by authorized user groups and would include #1, 3, 6, 9 and scheduled joint (with DOS) annual safety and operational inspection and report. This process may include external submissions for consideration of operational or capital budget items by the DOS.	Not applicable As per DOS road maintenance standards. Patching – Higher quality patch material than regular road patching material. Sweeping as required. Snow Removal – As determined by DOS staff due to priorities, conditions and usage.
Maintenance: Responsibility, Servicing Standards					
Inspections	Quarterly (See Inspection Forms section)	Biannually	Annually	Annually	DOS will inspect condition of bike lanes when roads are inspected.
OCP Trail Plan Entrenchment	All existing and "authorized" planned trails to be entrenched (mapped and updated) and the system documented/designated in OCP Trail Plan. New trails to be added and Plan updated as appropriate. Changes to routes to be documented. NOTE: New or existing trails that are not registered, constructed, inspected, and/or maintained under the Trails Standards established by this document are not the responsibility of the District of Squamish or other partnering Trails Groups. Unauthorized trails or features may be dismantled/removed at the discretion of the DOS and at the expense of the trail builders.	Same	Same	Same	Same
Unauthorized Trails		Same	Same	Same	Not Applicable
Special Note	This Section will also follow the Provincial Standards outlined in the Sea to Sky Recreation Trail Strategy. See MTB Section				



TRAIL TYPES

The diagrams in this section illustrate trail construction standards.

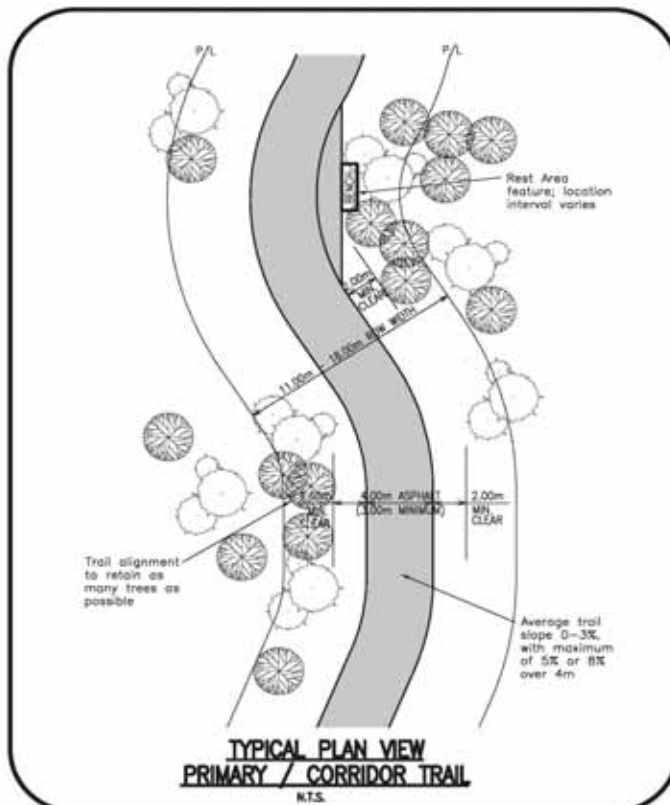
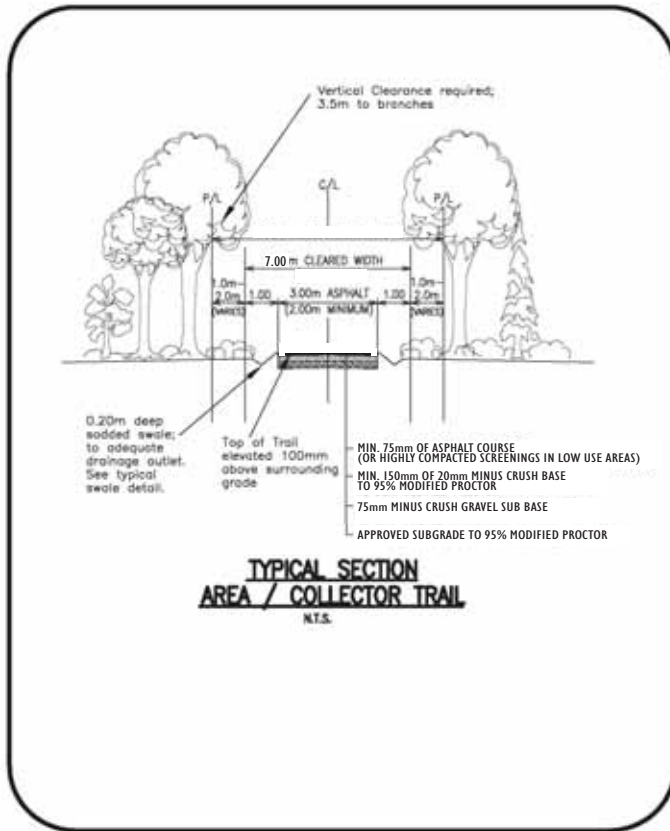


Photo: Courtesy of Randy Symons

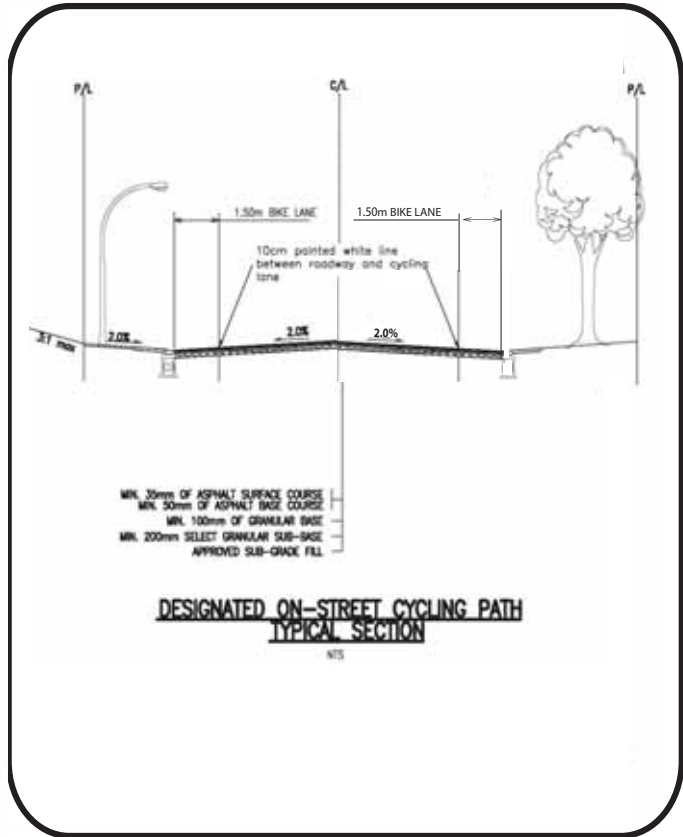
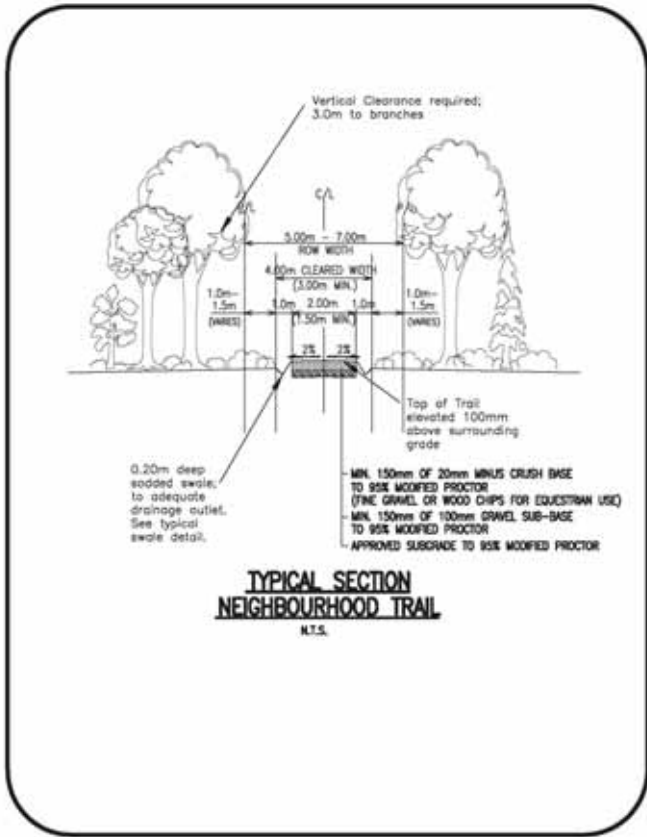


Photo: Courtesy of Sandra Koenig



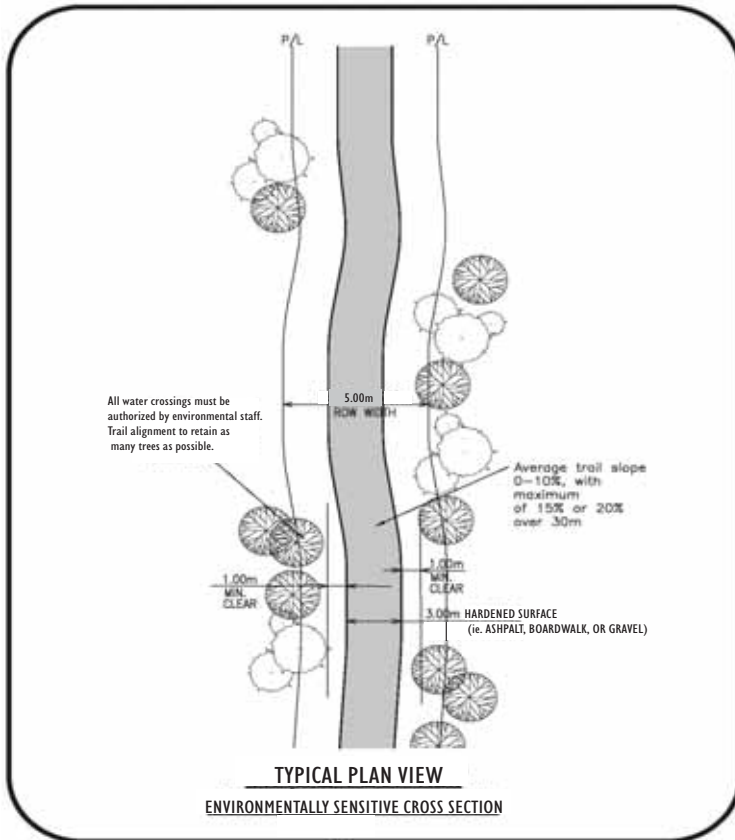
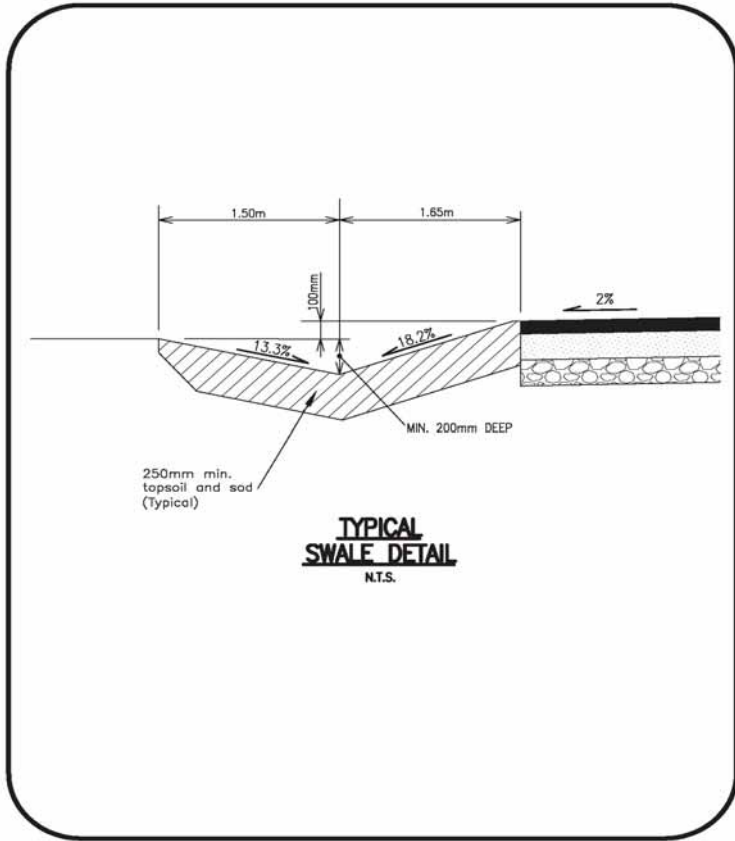


Photo: Courtesy of Sandra Koenig

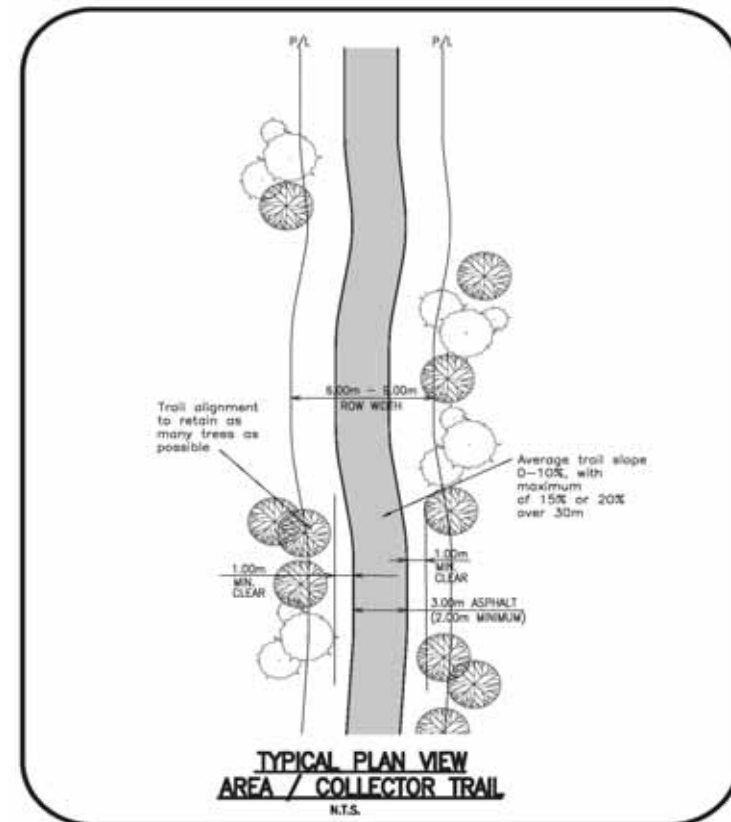
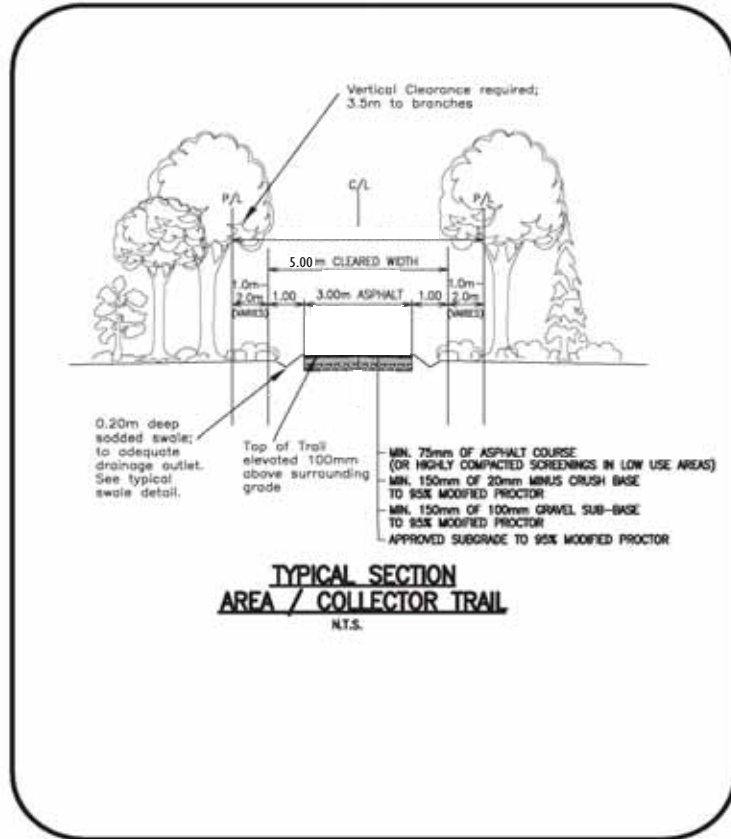


Photo: Courtesy of Sandra Koenig



TRAIL MAINTENANCE AND INSPECTION STANDARDS

An effective Trail Maintenance System requires regularly scheduled inspections, scheduled priority servicing, and proper record keeping.

INSPECTIONS, REPORTS, RECORD KEEPING

All trails that will come under these Trail Standards must be inventoried and have scheduled inspections and scheduled servicing when required. Trained Trail Inspectors will file reports and maintain records on all inspection and servicing requirements of the section of trail. The District of Squamish will schedule inspections and determine servicing requirements.

PRIORITIES

Effective risk management requires that safety, security, and critical signage issues take precedent over other issues such as underbrush/vegetation clearing, surface servicing, branch removal, and remedial work. In some cases environmental issues may require immediate response. The District of Squamish, in consultation with the appropriate bodies, will determine priority items along with the Sea to Sky Recreational Trail Steering Committee in conjunction with the Province.

SCHEDULED SERVICING AND UNSCHEDULED TRIGGERS

Schedule servicing may be changed/alterd by the District of Squamish based on a number of factors, including risk management issues, public complaints, Council or Administrative directives and unscheduled "windows of opportunity" where resources or time factors require a quick response.

Unscheduled maintenance triggers include:

- Vegetation loss
- Deterioration of Technical Trail Features (TTF)
- Soil Loss
- Trail widening
- Short-cutting of switchbacks or climbing turns

PUBLIC INPUT/CONCERNS

All public requests and concerns will be documented and responded to in a timely manner. Files and records of these issues will be maintained.

TRAIL DEACTIVATION/DEMOLITION/REMOVAL

Occasionally, it may be necessary to temporarily or permanently deactivate or remove a trail from public access. It is important that the reasons for such action are well-documented, that all known stakeholders are consulted, and appropriate internal and external communication is provided. When required, appropriate signage will be used to alert the public to closed or deactivated trails.

FORMS/RECORDS

See Appendix for Trail Inspections and Servicing Requests forms.

LIABILITY AND RISK MANAGEMENT

BACKGROUND

This Trails Standards Manual is a major step in formalizing the risk management program for the trail system in the District of Squamish. In Canada, the Occupiers Liability Act established a clear duty to ensure that a trail is reasonably safe. The Occupiers Liability Act also establishes that a person who enters “recreational trails reasonably marked as such” shall be deemed to have willingly assumed all risks. It is important to understand and ensure that the risks associated with trail use are properly managed and exposure to accidents is mitigated.

To prevent accidental injuries and potential claims, local governments need policies, standards, inspection and maintenance programs, and signage that provide a safe environment for trail users based on the financial abilities, resources and the service level provided by the municipality. In all municipalities, resources are limited and are allocated on a priority and needs basis. It is therefore critical to maintain documentation, maintain standards of service, and enforce policies that provide evidence that the municipality has taken reasonable actions to prevent accidental loss. Recent court decisions have reaffirmed policy as a reasonable defense for local governments.

RISK MANAGEMENT PROCESS

Risk Management is the process used to minimize the adverse effects of accidents. Loss prevention measures are steps taken by municipalities to reduce the likelihood of injuries. The following five steps are required in an effective a Risk Management Program:

- Identify Exposures – inspections, maintenance practices, training of workers and volunteers, signage, equipment, structures and facilities, incident reports, claims, public input, etc.
- Review current policies, procedures, priorities, standards, forms
- Refine or develop new policies or procedures to deal with identified or potential risks
- Implement changes
- Monitor results, and review annually

Risk Management cannot prevent all accidents from occurring, however, good risk management can control exposures to loss. Technology, mother nature, users, uses, and standards will change over time, so it is important to monitor risk management plans and activities to ensure that guidelines and operating policies remain relevant.



LIABILITY AND RISK MANAGEMENT

RISK MANAGEMENT RESPONSIBILITY

The Trail Coordinator will be responsible for managing, monitoring and evaluating the risk management process. The Coordinator will also be responsible to recommend policy updates and new policies affecting planning and operations.

SIGNAGE

Proper informational signage on trails is critical to an effective Risk Management Program (RMP). Users need to know where they are, where they are going, distances, and direction. They may also need to know degree of difficulty, type of trail (primary use), warnings and potential hazards, and reminders that use of trails is at their own risk.

There are many climbing trails and areas off of main trails that are dead end trails and can lead to difficult terrain and narrow paths. As resources and funds permit, it is important that these trails are signed and that the signage indicates potential hazards and warnings.

Trail mapping and informational signs on kiosks will help visitors find their way through unfamiliar territory. All unsafe trails must be properly signed and appropriate warnings posted.

INSPECTIONS, SAFETY AND SECURITY ISSUES

Inspections are also a critical element in the RMP. Inspection Reports and subsequent maintenance to rectify trails issues is a preventative measure design to identify potential or real hazards before there is an incident. Issues will arise from time to time on specific trails and they must be addressed through the Trail Maintenance process, the priority system in place, and the resources available.

EMPLOYEES, VOLUNTEERS, AND VOLUNTEER ORGANIZATIONS AND INSURANCE

All persons working on trails must be properly oriented and trained, including volunteers. The training may vary depending on the complexity of the task. WCB working standards must be maintained for all workers. Volunteers working under District staff will be covered for insurance and will be required to register as volunteers and sign-in on a daily basis. Volunteer organizations working with the District must carry their own liability insurance, indemnify the District and additionally name the District on their insurance.

Further information on this procedure and current minimum coverage amounts is available through the District of Squamish Finance Department.

PARTNERING/SERVICE AGREEMENTS

There will be more opportunities to work with existing or new community groups and service clubs on both maintenance and trail development issues. Where there are financial considerations, partnering and service agreements based on the trail standards and guidelines may be negotiated between the District and these groups. Examples include the Management Agreement with the Windsurfing Society who assist the District in developing the Windsurfing Park at the Spit, the Memorandum of Understanding with the Skatepark Group to develop the Skatepark, the service contract with the Sea To Sky Community Services Society to operate the Youth Centre, and the Smoke Bluffs Planning Group.

Squamish Trails Society, Squamish Dirt Bike Association, Squamish Off Road Cycling Association, and other community groups, have indicated an interest in partnering with the District on both projects and trail improvements.

This creates opportunities to explore mutually supportive initiatives that move the whole trail system into a more manageable and cooperative partnership.

There is also opportunity to work with developers, private businesses and individuals who recognize the importance of our trails and are interested in contributing to the trail system in a significant way.

OFFICIAL COMMUNITY PLAN AND TRAIL ENTRENCHMENT

It is important that the Official Community Plan (OCP) process includes an inventory of existing and future trails and appropriate policies, mapping, naming, and trail classifications. The trail system will be entrenched in the District of Squamish OCP so that, as opportunities arise, the trails can be preserved for the future. The current Draft OCP aims for no net loss of trails. When there is a trail on a property to be developed and it cannot be practically worked around, then arrangements will be made to build trail of similar length and character/standard in the same proximate area/lot.

Trails on private lands need to be protected with appropriate agreements with the landowners.

The Provincial government is currently working on legislation that will enable agreements to be negotiated on Crown Lands that will formalize and protect the trails that cross over these lands.

When this process is finalized, the trails identified in the OCP mapping become the basis for negotiations and candidates for formal approval from the Province. It should be noted that “entrenchment” does not mean that trail can’t be rerouted or altered later as covenants or conditions dictate, but it does mean that the process will involve cooperation and consultation between the stakeholders and landowners.

ACCESSIBILITY

Where possible, the District of Squamish will strive to meet accessibility standards related to width, surfacing and grade. See accessibility standards on page 6.



TRAIL CONSTRUCTION STANDARDS AND GUIDELINES

ESTABLISHED TRAILS

'Established Trails' are those trails on Crown Lands established by the minister. They are legal trails that must be given consideration during land use planning decisions. Infrastructure, maintenance, and resources have been invested on these trails. Authorization is the first step to an 'established trail'.

AUTHORIZED TRAILS

S.57 of the Forest and Range Practices Act provides that the minister may authorize the construction, rehabilitation, or maintenance of a recreation trail on Crown Land and may impose conditions that must be met. Authorization may be revoked or varied. Information about the application process is available on the Province of BC, Ministry of Tourism, Culture and the Arts website. The application form is available as a Word file download. (www.tca.gov.bc.ca/sites_trails/managing/Section_57.htm)

UNAUTHORIZED TRAILS

Unauthorized trails are trails on Crown Land not authorized by the minister. These trails are in trespass and will not be given consideration during land use management and planning decisions. No infrastructure, maintenance, and resources will be invested on these trails and the infrastructure may be removed.

The Ministry's website provides a form for reporting someone who is using Crown land without authorization, or is misusing Crown land, causing damage, or contravening their permit, licence or lease relating to Crown land. (www.tca.gov.bc.ca/sites_trails/using/reporting.htm)

"AUTHORIZED" TRAIL BUILDERS AND INSPECTORS

The District of Squamish will work with the local Trail Groups to develop a training and certification program for local groups and individuals on trail construction, maintenance and safety standards based on the criteria established in this document, IMBA Guidelines, common best practices, health and safety standards (WorkSafe BC), and the Sea to Sky Corridor Recreation Trail Steering Committee.

TRAIL UPGRADES AND REPAIRS TO STANDARDS

These Trails Standards apply to new trail construction and, where feasible, when existing trails, sections of trails, or trail features are upgraded or repaired. Because it is not financially possible to upgrade all existing trails to the new standards, the existing trails will be "grand-fathered" and upgraded as opportunities and resources become available.

BRIDGE AND PLATFORM CONSTRUCTION AND ENVIRONMENTAL STANDARDS

All built structures for bridges and platforms must be certified and authorized by the Community Development Department of the District of Squamish. Specifications will vary depending on the use, location, height, materials and size of the construction required.





In most cases, wooden structures are preferred with non-corroding hardware. All structures near waterways will need proper environmental authorization. See the environmental section of this document for guidelines.



*Photo George's Crossing Bridge
Courtesy of Todd Pope*

AN EXPLANATION OF TRAIL TYPES

From the Sea to Sky Recreation Trails Program Interim Terms of Reference – Draft March 2007

-  MOUNTAIN BIKE TRAIL RATING CHART
-  Trails are graded according to the green circle, blue square, black diamond, double black diamond system used predominantly in the ski industry and adopted by the International Mountain Bike Association (IMBA), and is defined in the following section.
-  Trail widths and standards generally match the difficulty of the trail, i.e.: a narrower steeper trail will be rated as more difficult, a wider gentler trail as easier. This is reflected in the rating system.
- 

	Type I	Type II	Type III	Type IV	Type V
Tread Surface	Concrete or Asphalt	Surfaced with Compacted Aggregates	Unsurfaced	Unsurfaced	Unsurfaced
Tread Width	2-4m	2m for double track trails; 1m for single track trails	50-70 cm	30-50 cm	30-50 cm
Clearing width	Tread width plus 1 m on each side	5m for double track trails; 1.6 m for single track trails	1.1 m – 1.3 m	1 m	N/A
Typical Use	Non motorized multi-use	Pedestrian Biking Equestrian Limited Motorized	Hiking Mountain Biking Trails Riding Equestrian Limited Motorized	Hiking Mountain Biking	Pedestrian Mountain Biking
Tread Type	Paved Double Track	Double track or Single Track	Single track	Single Track	Single Track
Typical Mountain Bike Difficulty Rating	N/A	Green Circle	Green Circle Blue Square Black Diamond Double Black Diamond	Blue Square Black Diamond Double Black Diamond	Black Diamond





MOUNTAIN BIKE TRAIL RATING DESIGNATIONS APPROPRIATE USER	GREEN CIRCLE (Easiest)	BLUE SQUARE (Challenging)	BLACK DIAMOND (Difficult)	DOUBLE BLACK DIAMOND (Most Difficult)
TRAIL DESCRIPTION	Beginners and Recreational Riders. Mountain Bikes recommended. Safety equipment required (including helmets). Gentle slopes and easily avoidable obstacles such as rocks, roots and potholes.	Intermediate Riders. Mountain Bikes required. Increased challenges and difficulty. Full safety equipment required. Challenging riding with steep slopes and/or obstacles, narrower trails with reduced traction. Requires riding experience.	Advanced/Expert Riders. Difficult and technical challenges. Full safety equipment required. High level of fitness required. Mixture of long steep climbs and descents, loose trail surfaces, numerous difficult obstacles to avoid or jump over, drop-offs and sharp corners. Some sections easier to walk than ride.	Expert Riders only. Most difficult and technical challenges. Highest risk level. Full safety equipment required. Do not bike alone. Recommend carrying a cell phone with you. Exceptional bike control skills and balance essential to clear many challenging obstacles. Higher risk level. Only a handful of riders will enjoy these rides. Some sections easier to walk than ride.
TYPICAL TRAIL TYPE FEATURES	II – III Embedded trail obstacles up to 10 cm. high.	III – IV Embedded trail obstacles up to 20 cm. high	III – V Embedded trail obstacles may exceed 20 cm.	III – V Same
MINIMUM WIDTH	1 metre	.5 metre	.3 metre	.3 m. or less
TRAIL SURFACE	Primarily soil and small loose rock, occasional screening.	Rough natural terrain and increased rock and root debris. TTF's (see below)	Rugged natural terrain. See TTF's below.	Same
AVERAGE GRADE	8%	10%	15%	May exceed 15%.
MAXIMUM GRADE	15%, except rock faces at 25%	Climbing – 25%, Descending – 35%, Rock Surface – 45%	Climbing – 35%	May exceed 35%
MINIMUM CURVE RADIUS	2.4 m.	1.8 m.	Sharp Corners	Same
EXPOSED NATURAL OBSTACLES (MAX. HEIGHT)	10 cm. max. height. Occasionally higher height for highly visible, easily avoidable obstacles.	20 cm. max. height	Various heights, some exceeding 20cm.	Same
BRIDGES (MIN. WIDTH)	Min. 1.0 m.	Minimum width of 50 cm. Flat decking is minimum one-half the height above surface.	Various widths. Minimum 30 cm. Flat width of decking is one-quarter the height above surface. Elevated bridges less than 3 m. high above surface.	Most difficult, exceeds Black Diamond.
TECHNICAL TRAIL FEATURES (TTF'S)	Small roots and logs to cross, embedded rocks to avoid.	TTF width to height ratio of 1:2. Small bridges (flat, wide, low and rollable from section to section). Small rollable drops. Small teeter-totters, less than 60 cm. high. Small jumps. Medium sized logs.	TTF width to height ratio of 1:4. Elevated bridges and teeter-totters with maximum deck height. Connected Bridges. Larger Jumps. Steep descents with sharp transitions.	Most difficult, exceeds Black Diamond TTF's.
ROCK FACE OR RAMP DESCENTS (MAXIMUM ANGLE)	Rock face descents not to exceed 25% grade.	45%	Not to exceed 120%	May exceed 120%
DROPS (MAX HEIGHT)	None	Drops up to 30 cm., with exit cleared of all obstacles	Drops greater than 30cm. Some mandatory air.	Mandatory air.
JUMPS (MAX HEIGHT)	None	45 cm. No jumps with consequences for lack of speed. Table top jumps max. 40 cm. high.	Table tops, no maximum height. No gap jumps.	Same, except may include gap jumps.
MOUNTAIN BIKE TRAIL RATING DESIGNATIONS	GREEN CIRCLE (Easiest)	BLUE SQUARE (Challenging)	BLACK DIAMOND (Difficult)	DOUBLE BLACK DIAMOND (Most Difficult)
ROCK FACE OR RAMP DESCENTS (MAXIMUM ANGLE)	Rock face descents not to exceed 25% grade.	45%	Not to exceed 120%	May exceed 120%
DROPS (MAX HEIGHT)	None	Drops up to 30 cm., with exit cleared of all obstacles	Drops greater than 30cm. Some mandatory air.	Mandatory air.
JUMPS (MAX HEIGHT)	None	45 cm. No jumps with consequences for lack of speed. Table top jumps max. 40 cm. high.	Table tops, no maximum height. No gap jumps.	Same, except may include gap jumps.

MOUNTAIN BIKE TRAILS

BACKGROUND AND RATING DESIGNATIONS

Squamish is an international mountain biking destination. Countless volunteer hours have gone into creating an exceptional trails network that provides for the fitness-oriented cross-country rider, the all-day epic rider and hard-core freeride/downhill rider. Trails in such a diverse sport range from wide, flowing, and gentle that are very “obvious” to the untrained eye, to a 6 inch wide tread of moss scraped off a vertical rock face succeeded by a narrow log with mesh tacked on the top. Because of this great variability, the classification and duplication of trails is inherently difficult.

“The trail is the thing—not the end of the trail—travel too fast, and you miss all that you are traveling for!”

(Trailside sign on the Pinnacles Trail in Jackson Hole, Wyoming)

Mountain bike trails are, by nature, quite different from hiking, commuting, walking and equestrian trails. Hiking trails generally strive to reach certain points of interest via the route of least resistance, i.e. low grade and wide, or steep with less regard for terrain features. Mountain bike trails are constructed to maximize the esthetic appeal of the terrain at hand. Soil, logs, lumber, and rock are sometimes used to enhance and create new landforms. Trails meander through a landscape from one feature to the next, the most successful and popular trails “flow” through the landscape in this endeavour.

Mountain bike technology reflects this. Suspension, brakes, geometry and drivelines of bicycles have evolved rapidly in the last few decades. Trails and man-made technical features have evolved with these technological advances to encompass astoundingly creative and sometimes extremely difficult trails and structures. For this document, mountain bike trails are not grouped by function but rather by degree of challenge or difficulty.



*Photo
Courtesy of Todd Pope*

NEW MOUNTAIN BIKE TRAIL DEVELOPMENT

All new mountain bike trails must be approved through an application process. This process is managed by the District of Squamish in cooperation with the local mountain bike club, Squamish Off Road Cycling Association (SORCA). The appropriate landowners must be contacted and provide written approval before making application for trail construction. An application form and a Trail Plan must be submitted for approval. The location and route must be flagged and inspected prior to any approvals or development. All safety and security issues must be addressed in the Trail Plan, including any technical trail features (TTF’S) to be added. Once approval has been given and the trail has been constructed the trail will be re-inspected and outstanding issues will be addressed before it is open. The trail will be classified, named, GPS mapped, and added to the trail inventory.



CONSTRUCTION STANDARDS AND AUTHORIZED MOUNTAIN BIKE TRAIL BUILDING

Terrain, precipitation and riding styles in Squamish exceed the scope of this manual, specially when constructing black and double black diamond trails. The skill and know-how of an experienced trail builder is invaluable. Input from an "authorized" trail builder is mandatory for all new trail construction project.

Squamish is located in a coastal rainforest and it must be emphasized that water erosion is the largest detrimental force for trails in the Squamish area. Trails located on steep slopes with shallow bedrock are especially prone to turning into drainages when not properly constructed. Care must be taken, especially on steeper trails, to provide for proper water management.

Consultation, design approvals and inspections with an authorized trail builder are mandatory.

FALL ZONE STANDARDS AND INSPECTIONS

Fall Zones are areas adjacent to TTF's (Trail Technical Features), sharp corners, and steep descents. They provide a reduced-risk area for riders to deviate into. Fall zones will be established on the outside of steep corners, at the bottom of steep descents, and adjacent to TTF's.

Fall zones cannot eliminate the potential for injury; however, a commonsense approach to establishing safer trails through the minimization of trail-side hazards will mitigate the potential of injuries. Annual trail maintenance:

Fall zones shall be inspected twice per year and maintained as appropriate. Trail users are requested to report potential hazards or problem fall zone areas to the District of Squamish. All trail inspections and repairs must be documented, including TTF's and on-going reports of potential safety issues.

Hazards may include rocks, stumps and roots, branches, trees, and parts of the TTF. Trails will be closed until safety or risk issues have been mitigated or addressed.

SIZE OF FALL ZONES

Fall zones shall be cleared of the following materials to a minimum of 1 m for TTF's lower than 30 cm, and 1.5 m for higher TTF's. Steep hills and sharp corners shall have a 1.5 m. fall zone on the downhill or outside area:

- Large shrubs with hard woody branches
- Stumps cut flush with ground or pulled out
- Tree branches trimmed to branch collar
- Non removable hazards covered with mulch or decayed wood
- Rocks with pointed or sharp edges should be dulled, or removed



Photo: Courtesy of Pat Gilbert

Not all ground covering vegetation should be removed from the fall zone. Moss, grasses, herbaceous and small shrub cover should be left to avoid soil erosion and to deter riders from enlarging the trail into the fall zone. Fall zones shall be considered especially important on blue and single black trails, where less experienced riders may be honing their riding skills and the opportunity of falling is increased.

TECHNICAL TRAIL FEATURES MATERIALS AND CONSTRUCTION STANDARDS
From the Provincial Document the Sea to Sky Corridor Recreational Trail Strategy Draft 2007.

Man-made Technical Trail Features (TTF) must conform to an **engineered** standard of minimum strength, stability and construction. Poorly built features are a potential source of injury and require extra maintenance

Man-made structures must be authorized and inspected to ensure compliance to construction and safety standards. The IMBA Trail Solutions Book has guidelines in their reference section pertaining to TTF design and construction. The Whistler Trail Standards: Environmental and Technical Trail Features is becoming the international standard for Technical Trail Feature construction. The information in this section pulls from both these resources.



Photo: Courtesy of Pat Gilbert

TTF DESIGN REQUIREMENTS:

VISIBILITY

By making the most difficult section of the TTF visible from the entry, riders can make an informed decision if they wish to proceed or not. By placing a narrow or difficult section at the beginning of a longer TTF, where it is low to the ground, less skilled riders will dismount early where the consequences of a fall are the choice of the rider.

STRENGTH & STABILITY

The structure must be capable of supporting a centered vertical load of 200 kg and a horizontal load of an 80 kg adult leaning against the constructed feature with less than 5 cm of displacement.

HEIGHT & WIDTH

Maximum height and width are dependant on the trail, and the feature's difficulty rating. Difficult features should be located on difficult trails, and vice versa. Bridges on green, blue and black trails that exceed height standards should be equipped with a railing for safety. Please note that handlebars can be as wide as 75 cm. Minimum distance between railings should be at least 1 m.

CONSTRUCTION STANDARDS

When possible, native materials should be used.

- Sills should be cedar or treated wood.
- Douglas fir is the preferred material for weight bearing members (stringers, purlins, beams), split cedar rails are the preferred material for surfacing.
- Weight bearing members should be notched and cross-braced where they join.
- Whole logs should be peeled to slow the onset of rot, and increase joint strength and fastener penetration.
- Dimensional lumber may be used, it should be noted that standard SPF (spruce pine, fir) materials are not very durable when exposed to weather.
- Treated lumber is preferable.

Acceptable fasteners are, in order of structural integrity:

1. Galvanized carriage bolts and nuts (with galvanized washers)
2. Galvanized lag screws and washers
3. Galvanized Ardox spikes and nails (spiral spikes for their superior holding strength)

NOTE lag screws and nails should be of adequate length to allow for 2/3 penetration of the member being screwed or nailed into.

Deck rungs shall be spaced 1-2 cm to allow for water and mud drainage.

BRIDGE RUNG SPACING & SURFACING

- Rungs shall not overhang stringers by more than 5 cm.
- Rungs shall be securely fastened with a minimum of two or more (preferably four, if practical) large bolts, lag screws, or Ardox nails (see above).

It is recommended that wood surfaces, particularly those with a grade, have an anti-slip surface. Expanded diamond lath or granular roofing materials are both acceptable. Chicken wire is not acceptable because it wears quickly. The anti-slip surface should be fastened every 15 cm square.



Photo: Tracks from Hell
Courtesy of Chris McCrum

EQUESTRIAN TRAILS STANDARDS

The following standards and guidelines are intended for trails that have a significant use (20% or more) by horseback riders. These trails will be designated as "Equestrian Trails" and signed accordingly.

SPECIFICATIONS

The equestrian trail surface material is finer and more compactible than the regular grades of trail material. This material is intended to reduce equestrian wear and tear. The trail width is wider than the Type 3 trail to allow for two horses and their riders to pass safely. The following specifications apply to new or rebuilt equestrian trails only:

- Minimum Trail Width – 2 m
- Preferred Trail Width – 3 m
- Width Clearance – 1 m per each side of trail,
- Height Clearance – 3.5 m
- Surface Material Type – Screened Gravel, Grade – ½ inch or less crushed minus
- Subgrades as per Type 2 Trail
- Maximum Trail Grade – 15%

GENERAL

The same principles of alignment and design (not covered in this manual) that apply to regular hiking trails also apply to equestrian trails. The size of the gravel may vary with the terrain and/or erosion and drainage issues. Bark mulch is not recommended as a trail surface material due to the higher level of maintenance required and a need to keep the mulch out of waterways and drainage areas.

BACKCOUNTRY EQUESTRIAN TRAILS

These Standards and Guidelines are not intended to apply or impact equestrian use of trails beyond the District of Squamish boundaries.

WATER CROSSINGS AND BRIDGES

Bridges are to be engineered to support equestrian use or alternate routes provided, with proper signage, to allow equestrian crossing.

These structures must be inspected annually. When a bridge is not available and there is significant equestrian use across a waterway the District Environmental Department should be consulted about alternatives that provide easy fish and debris passage, as well as reducing the stirring up of silt. For example, a French Ford - two parallel logs imbedded across a stream with small to medium rocks set between the logs - allows water to flow easily across and impacts are mitigated.

*Photo: Elvis
Courtesy of Kim Muller*



ENVIRONMENTAL REQUIREMENTS: WORKING IN AND AROUND STREAMS

REGULATORY REQUIREMENTS

Some regulatory requirements should be kept in mind when planning and building trails, particularly with respect to stream crossings. A brief overview is provided here. The District of Squamish Environmental Department can advise on potential site-specific regulatory requirements

DISTRICT OF SQUAMISH SITE ALTERATION BYLAW

Sections of bylaw 1886, 2005 that apply to trails construction include provisions for tree removal as well as deposit or excavation of material. The District of Squamish Environmental Department can discuss compliance of individual projects with trails organizations.

DISTRICT OF SQUAMISH WATERCOURSE REGULATIONS

District of Squamish Bylaw 2062, 2008 requires the assessment of any development proposed within a 30 m stream corridor (termed the “riparian assessment area”). Consult with the District of Squamish Environmental Department to discuss how these regulations may apply to your project.

FISH PROTECTION ACT

The Provincial Fish Protection Act (FPA) was enacted in 1997 to help protect BC fish stocks. Its fundamental objectives are: to ensure sufficient water for fish; to protect and restore fish habitat; to improve riparian area protection and enhancement; and, to support local government powers in environmental planning.

BC WATER PROTECTION ACT

This Act is the main Provincial statute regulating water resources within BC. Under the act, it is an offense to divert or use water or alter a stream without approval from Land and Water BC; however, Section 9 of the Water Act allows for some activities to be conducted under the Notification system, as opposed to the formal approval process. Many trail construction activities (such as bridges) can be directed through the simpler Notification Process.

FEDERAL FISHERIES ACT

The Department of Fisheries and Oceans Canada (DFO) has the ultimate authority over fish habitat through the Fisheries Act, which is the main federal legislation affecting all fish, fish habitat and water quality. Any proposed trail building or maintenance activity that has the potential to deposit a deleterious substance (such as sediment or concrete wash water) or to alter or destroy fish habitat invokes this act.

APPLYING THESE REGULATIONS WITHIN THE CONTEXT OF TRAIL BUILDING AND MAINTENANCE

In general, most works within stream channels or riparian areas that are in support of trail building and maintenance will not require a Fisheries Act authorization. However, any trails proposed trails to be located within 30 metres of a stream may require municipal permit and must be discussed with the District of Squamish Environmental Department.

The Environmental Department will communicate with the local DFO habitat biologist and determine the best trail alignment through sensitive riparian habitat areas; the Environmental Department will also work with DFO and the trail builders to establish site-specific impact reduction measures during the trail design and construction practice.



ENVIRONMENTAL STANDARDS AND GUIDELINES IN TRAIL DEVELOPMENT

Trail builders may be subject to any permit requirements under either the BC Water Act or the Riparian Areas Regulation. Contact the District Environmental Department for assistance in preparing a Notification Form (Water Act) or to ensure that your project is in compliance with the Fisheries Act and the District of Squamish Watercourse Regulations.

STREAMS: TRAIL BUILDERS' DUE DILIGENCE

When working in and around water, it is the trail builders' responsibility to:

- Be aware of the legal municipal, provincial and federal requirements for working in and around water.
- Recognize the potential impacts from proposed works and the need to mitigate or lessen those impacts.
- Ensure the protection of fish and wildlife populations, including Species at Risk.
- Obtain appropriate permits and authorizations from regulatory agencies prior to proceeding with trail construction and/or maintenance.
- Conduct work activities to limit impact and comply with the law.



Photo: Courtesy of Sandra Koenig



STREAM CROSSINGS AND SETBACKS

Installing stream crossings for trail building and maintenance is the area of a trails project that could result in the greatest environmental impact. If done improperly, stream crossings can have both short-term and long-term impacts on streams, including sediment transport and deposition and blocked fish access to spawning and rearing areas.

Some terminology is introduced here to aid trail builders in understanding the legislation and Best Management Practices (BMP) applicable to stream crossing projects.

The International Mountain Bicycling Association (IMBA) has an excellent publication called "Trail Solutions" which outlines the construction of mountain bike trails. Portions of this environmental section reference specific sections of this IMBA publication.

DEFINITIONS

RIPARIAN AREA

Sometimes referred to as "riparian zone". This is the area on either side of a stream. For the purposes of this trails standards document, the riparian area extends 30 m landward from the top of bank of the stream channel.

The riparian area performs numerous beneficial habitat and flood control functions; including supplying food and nutrients to aquatic species (fish, invertebrates, etc) and storing runoff from large storm events.

RIPARIAN SETBACK

Sometimes referred to as "riparian leave-strip", "leave-strip", or "buffer". The setback denotes the zone immediately adjacent to the channel where development is either, a) not allowed, or b) allowed only in a very limited capacity. Typically, riparian setbacks are as follows:

- 30 m from channel top of bank for fish-bearing and/or permanent watercourses;
- 15 m from channel top of bank for non-fish-bearing and/or ephemeral watercourses.

The District of Squamish Environmental Department can advise as to whether the stream you are working on is fish bearing or non-fish-bearing.

PERMANENT STREAMS

Watercourses that contain year-round flows.

EPHEMERAL STREAMS

Watercourses that only flow part of the year (for example, flow approximately 6 months of the year, or only during large storm events).



STORM WATER MANAGEMENT AND TRAIL BUILDING

The District is increasingly advocating the infiltration of storm water as a policy for all new developments. Returning storm water to the ground helps to maintain summertime base flows, thereby ensuring sufficient water supply for rearing fish. While recreational trails arguably may not have much impact on local hydrology, the District still believes that infiltration of rainwater should be a priority on all new trails, particularly for the larger Primary and Area/Collector Trails (#1 and 2).

Vegetated swales along trail alignments can be used to aid in infiltrating the rainwater that would otherwise be conveyed off the trail via surface runoff into the closest municipal storm sewer culvert and lost for groundwater recharge.

The swale system can be effective even in soil types such as clays, which have a very low infiltration rate. However, use of the swales may be limited in areas where the water table is very near the surface (< 0.6 m). The District Environmental Department and the project engineer can provide guidance in selecting an infiltration measure suitable to the trail site conditions.

EROSION AND SEDIMENT CONTROL

(Reference Trail Solutions: IMBA's Guide to Building Sweet Singletrack. Section Understanding Soils, pages 84-85)

Best Practices during trail construction: working within the riparian area or "in stream"

Next to poorly constructed stream crossings, erosion at the works site and sediment deposit in adjacent watercourses have the next greatest potential to impact streams and riparian habitats.

Numerous guidelines for erosion control on trail projects exist. This section provides a brief overview of erosion/sedimentation Best Management Practices (BMPs) for trails projects in Squamish.

The District Environmental Department can provide additional design details for selected sedimentation control measures on a site-specific basis.

Water drainage features are necessary to prevent erosion along trails on slopes and to avoid standing water on trails on flat ground. The frequency, size and type of control structures depend on erosion potential of the soils under the trail. For example, sandy soils are less erosive than clay soils because of the large grain size and porosity of sands. Two other important factors include the velocity of water along the trail (which depends on the slope), and the length of time, or distance, running water is allowed on the trail. Most erosion control measures are designed to reduce the velocity and/or the distance of water running on the trail. Such measures must be installed immediately after clearing and prior to trail construction.

The trail design process can incorporate recommendations to minimize soil erosion for specific soil types. Details of the prescriptions, and where they occur, should be described in the final trail plan for individual projects. Some erosion/sedimentation BMPs appropriate for trails projects include: straw bale barriers, silt fencing, and temporary sediment traps.



FISHERIES ISSUES

Construction timing and work windows guidelines.

Construction sequencing and the timing of in-stream works during the “fish window” will significantly reduce a trail project’s potential for adverse environmental impact. In general, keep these guidelines in mind:

- Coordinate the construction schedule to minimize the amount of area disturbed at any one time.
- Coordinate land clearing for the trail and stream crossings with the installation of erosion control measures.
- Minimizing the disturbed area reduces the potential for erosion.
- Halt clearing and in-stream works during periods of heavy rainfall.
- Construct in-stream works (channel crossings) during the summer work window (the “fish window”) when use of watercourses by salmon is at a minimum. The District Environmental Department can advise on specific dates of window, but in Squamish, it’s generally from mid-June to mid-August, depending on weather.

Work area isolation

When installing watercourse crossings

Isolate work areas within streams to minimize erosion and sedimentation.

Pump water from within the in-stream work area to a land site where it will infiltrate through the soil, or settle out sediment, prior to returning to the stream.

Revegetate areas of disturbed riparian vegetation.

Fish Salvage

Fish Salvage is the relocation of live fish from a work site to a safe location above or below the site. If channel dewatering is required to complete the trail project, fish should be salvaged from the dewatering site and returned to the stream. The person undertaking the fish salvage and/or fish passage operations should consult with the District Environmental Department and obtain and hold all necessary permits required by DFO.

Fish Passage

For Stream Crossings (Reference section: IMBA Wetlands and Water Crossings, pp.176186).

All stream crossings must be constructed so as to allow upstream and downstream access for migratory fish (e.g., salmon). Passage must be ensured during both high and low flows, and for juvenile as well as adult fish. Bridges are the preferred crossing mechanism, installed from just above the channel top of bank. Where bridges are not feasible, culverts can be installed in accordance with the following requirements:

- Provide culverts large enough to allow fish passage in all flow conditions. Open bottom culverts are a viable alternative.
- Maintain a minimum depth of water to allow continuous fish passage at all times.
- Maintain drops in water surface small enough to allow fish passage upstream.
- Install the culvert such that the downstream invert is well below grade to accommodate changes in streambed elevation.

Round or elliptical corrugated metal culverts do not provide good fish access, concentrate flows and velocity (increasing erosion potential), and are generally unsuitable for fish passage.

MONITORING OF WORKS

The independent environmental monitoring of works is an activity undertaken to ensure that works are completed in compliance with the required standards, best practices, and regulatory conditions. Depending on the nature of the works and the sensitivity of the site, the District Environmental Department or DFO will advise whether an environmental monitor is required.

CONCRETE WORKS

A trail bridge over a stream often requires the installation of concrete bridge abutments or retaining structures. Concrete, cement, mortars, grout and other Portland cement or limestone containing construction materials are basic or alkaline materials (high pH). They are highly toxic to fish and must be used near water with extreme care. In general, it is preferred that precast materials are used, as opposed to cast in place. If cast in place abutments are proposed, consult the District Environmental Coordinator for guidelines.

TRAIL ALIGNMENT AND VEGETATION REMOVAL

In general, vegetation removal for trail alignment does not constitute a significant environmental impact. Trail alignment must be discussed with the District Environmental Department for any trails proposed within the riparian setback. In addition, keep these guidelines in mind:



Photo
Courtesy of Todd Pope

- Limit vegetation clearing for access and at the work area. Consider other options when contemplating the need to remove vegetation.
- Wildlife trees are important for numerous species in Squamish. Avoid removing trees that are used for nesting or roosting by songbirds and/or raptors.
- Where a danger tree can be removed by topping or removal of the dead limb(s), this should be undertaken in preference to removal of the entire tree.
- Discuss with the Environmental Department about the possibility of replacing trees in a nearby location in "exchange" for the removal of valuable trees to accommodate a trail alignment.



TRAIL SIGNAGE STANDARDS GUIDELINES

Signs are a critical part of Trail Management. They provide vital information to trail users to enable them to make informed choices about trail use by identifying trail difficulty rating, risks, length, and primary use. Signs are an important part of a Risk Management Program.

All signage used at trail heads, trail connections/links, and directional signage must conform to the District of Squamish signage guidelines. Because these guidelines may change from time to time, please consult the District of Squamish and the District of Squamish Sign Bylaw before initiating. Also refer to the Provincial Sea to Sky Corridor Recreation Trail Strategy page 48.

The following specifications are intended to summarize current signage guidelines as they apply to trails:

SIGN MATERIAL: Aluminum - minimum 2.3 mm thick

DIMENSIONS: Note: Heights may vary depending on the volume of information.

Trailhead: (Width) 300 to 450 mm. X (Height) 450 to 600 mm

Trail Marker: (Width) 180 mm. X (Height) 225 mm

Directional/Distance Posts: (Width) 85mm. X (Height) 85mm

FASTENERS: Vandal-resistant, stainless steel or hot-dipped zinc galvanized lag bolts.



Photo:
Courtesy of
Todd Pope

SURFACE FINISH: Aluminum sign sheet with vinyl skin (minimum thickness .091 in.)

SURFACE/BACKGROUND COLOUR: To match 3M Dark Forest Green

GRAPHICS:

Colour: Matte White

Material: Vinyl Lettering:

Titles: Capital Letters.

Height: 30-50 mm.

Copy Height: 20-40 mm.

Font: Frutiger 55

Symbols: As per symbols in the current signage guidelines. See #3 below.

Logos: As supplied in appropriate colours and sizes, and as space allows.

TRAIL HEAD SIGNAGE INFO:

- 1: Trail name and map reference number (capital letters – bold).
- 2: Trail distance/directional Information (km) and special features, degree of difficulty symbol.
- 3: User and restriction symbols (black symbol on white circular background), including “No motorized vehicles” symbol.
- 4: “Use at your own Risk” and “Please Keep Clean” and other appropriate risk management requirements, such as uneven terrain, blind corners, etc.
- 5: Appropriate sponsors or constructor logos.
- 6: District of Squamish Logo and website and/or landowner’s identification
- 7: Separate or add-on signage – trail map, special safety considerations, trail etiquette Info., “No Motorized Vehicles” sign, and additional symbols, etc.

TRAIL MARKER: Signage information from above. Items 1, 2, 6 & 7



Photo: Courtesy of Sandra Koenig

DIRECTIONAL/DISTANCE SIGN POSTS: Signage information from above. Items 1 & 2 at trail intersections.

TRAIL HEAD: Either 8 X 8 inch treated (brown stains and preservatives) western red cedar (preferred) or minimum 50 mm diameter zinc galvanized steel post with cast brackets and cemented base.

TRAIL MARKER: 8 X 8 or 4 X 4 inch treated, western red cedar.

TRAIL DIRECTIONAL & DISTANCE POST: 4 X 4 inch treated, western red cedar



KIOSKS: Usually located at major parks entrances, key trail heads or on dyke trails. Design and size must be approved by District of Squamish and will vary depending on use and location.

Colour schemes should be consistent with regular trail signs. Kiosks will be used to highlight area/park trail maps, local protocols/courtesies (ex. climbers' code, right of ways, trail courtesies, safety issues, etc.), special interest areas, message boards, sponsors, etc.

TRAIL MAPS: Usually located at major trail heads or on trail kiosks. Sections of the District of Squamish trails mapping and numbering system will be used, or a graphic representation of the localized trail will be used, noting the users location (you are here) and distances to the next trail section(s) or other trail intersections. Maps may be printed/duplicated on vinyl and attached to aluminum signs or mounted and protected on kiosks with plastic lamination and lexan.



Mapping may also include key destination points, special interest points along the trail, and/or degree of difficulty sections. "Designated" trails such as mountain bike, climbing, equestrian use routes are shared use trails, but rights of way and courtesies are different and should be noted on the map or legend.



DIRECTIONAL ARROWS: Used to point to landmarks, special interest points, climbing sites, viewpoints, etc. May be attached to existing trail posts or may require own post. Design and size of arrows need to be established. Colour schemes should be consistent with regular trail signs and the Provincial Standards where applicable.

All sign photos
Courtesy of Todd Pope



STREET SIGN DIRECTIONAL ARROW: Attached to regular street sign poles and used to direct trail users when a "special" trail route uses a path beside, or on, a street way. Requires approval from DOS for designated and dedicated routes (ex. "Test of Metal" mountain bike race route). Colour schemes will be different and distinct from street name signs and easily identifiable.

SIGN APPROVALS AND ORDERING: All trail signs will be approved by the District of Squamish (DOS), or designate, and will be ordered by the DOS, or designate. Placement and mounting of signs will be done by the DOS or an approved agent (for example, the Squamish Trails Society, Squamish off Road Cycling Association, Squamish Access Society, Squamish Dirt Bike Association).



Photo
Courtesy of Todd Pope

USER HARMONY

Squamish's extensive trail network is used by a wide variety of users including hikers, trail runners, mountain bikers, motorized bike riders, equestrian riders, and climbers. Many trails are 'shared use' and conflict can arise between users. Signs that identify a trail as multi-use (ex. mountain biking and motorized biking) inform users to expect to encounter each other, identify the primary use of the trail and who has the 'right of way', can reduce the likelihood of conflict.

User groups such as Trials Riders, Squamish Off Road Cycling Association, Squamish Dirt Bike Association, and Squamish Climbers' Associations have created codes of conduct to help minimize potential user conflicts and promote respect between user groups.

All users - motorized or non-motorized, wheeled or non-wheeled - should respect each others' right to trail access and enjoyment. All users should be familiar with the other groups' user information. When in doubt, please be courteous and give the other user the right of way.

To get involved, please contact the your local users' group or visit www.squamish.ca.

DOGS ON TRAILS

On main hiking trails dogs must be on a leash, even for cyclists. On designated back country mountain bike trails, while it is not safe or practical to expect mountain bikers to have dogs on leash, it is expected that dog owners will have their dogs under control. Complaints about dogs may result in the owner's dog being barred from mountain bike trail access.

Dog feces creates hazards to humans and wildlife. Owners are to clean up after their pet.

HORSES

All users should be aware that horses can be shy and easily frightened. Extra care should be exercised when encountering an equestrian user. Please see equestrian section on page 35 for more details.

RESPECT BEAR HABITAT

Trails users should not only respect each other but also the area's natural inhabitants.

Squamish is located in prime black bear habitat and trail users should be prepared to encounter a bear. These guidelines help ensure any encounters with bears are positive and free from conflict.

- Stay alert and look for signs: scat, claw marks on trees, broken up rotted logs, overturned rocks, berry bushes, and possible daybed areas.
- Make some noise: traveling fast on moving mountain bikes can lead to surprise encounters.
- Avoid surprise encounters: make your presence known by talking loudly, singing songs, cracking sticks, or banging rocks especially when near loud stream/streams, going around blind corners and when in areas with dense berry bushes.
- Pack out what you pack in. Bears have a keen sense of smell. Never feed a bear – intentionally or unintentionally.
- Keep all dogs on leash and under control. Dogs can be helpful in detecting bears but they may also aggravate or lead a bear back to you.
- If you see a bear remain calm and assess the situation. Identify yourself as human by talking in a calm tone of voice. Back away slowly in the direction you came from to increase the distance between you and the bear. Do not run. In most cases the bear will flee.



CLIMBING

SMOKE BLUFFS PARK: CLIMBERS' "CODE OF ETHICS"

Some of the crags and trails in the Smoke Bluffs Park are close to residential areas, in particular "Burger and Fries", "Alexis" and "Neat and Cool". In order to foster good relations between neighbours and climbers, a "Courtesy Code" was developed and is supported by the District, the Squamish Access Society, the Federation of Mountain Clubs of BC, the Climbers Access Society of BC and the Squamish Trails Society. The Code is on a sign at the entrance to the main trail from the Climbers Parking Lot off of Loggers Lane and at other locations in the park. Please follow and support this park user's Courtesy Code:



Photo: Courtesy of Sandra Koenig

- Please minimize your noise impact, especially at Neat & Cool, Penny Lane, and Burgers & Fries
- Please park in the Loggers Lane parking lot and not in residential areas
- Please use the toilets provided (Parking lot, start of Smoke Bluff Loop)
- Keep dogs under control at all times and pick up after them.
- Cyclists – avoid excessive speed and yield to pedestrians
- Avoid monopolizing popular climbs; organized groups do not have precedence over others and should consider using less popular crags

Climbing group volunteers, such as those in the Crag Keepers program, regularly perform "vertical terrain management", including the clean-up and maintenance of popular or under-utilized climbing routes.



Photo
Courtesy of Garry Broeckling

EQUESTRIAN

The following standards and guidelines are intended for trails that have a significant use (20% or more) by horseback riders. These trails will be designated as “Equestrian Trails” and signed accordingly. For safety reasons, riding on trails should be “single file” except when passing.

SHARED USE

All public trails in urban Squamish are shared use, and this includes “equestrian” designated trails. Some trails, due to safety or sensitive habitat issues, may not be appropriate for equestrian use. Please observe posted signage.

TRAIL COURTESY

Horses can sometimes be shy, frightened or unpredictable, therefore, for safety reasons, trail courtesy on both regular and equestrian designated trails requires that the horse will have the right of way over the walker and the cyclist. Cyclists and walkers should provide as much room as possible and, when it is safe to pass, provide a verbal warning to the horse rider.



Photo: Elvis & Jan
Courtesy of Todd Pope

HORSE DROPPINGS

The horse rider will be responsible for the cleaning up, bagging, and proper disposal of all horse droppings on all trails throughout the District.

GALLOPING

Riders are not permitted to gallop or race on any District trails as this action can endanger other users, in particular small children, the physically challenged, and elderly. Galloping can also cause damage to the trails. Equestrian Groups may want to get landowner permission to create appropriate “equestrian runs” off-trail or gallop only in open, safe, off-trail areas.

PEDESTRIAN

Hiking and trail running are becoming increasing popular. To avoid conflicts, pedestrian users should recognize other groups’ right to access and be familiar with their codes of conduct.

Pedestrian users should note the trail’s primary designation and when on trail designated for motorized bikes, mountain bikes or equestrian use, pedestrian users should yield the right of way.



Photo
Courtesy of Todd Pope



MOTORIZED BIKE

LIMITATIONS

For safety and maintenance reasons there is limited access to trails for motorized vehicles with the exception of maintenance/service vehicles and battery powered wheelchairs and carts. Other motorized vehicles may be operated only on "specified" shared use trails within certain areas and warning signs to the area must be posted at all access points. Negotiations are currently underway to improve access for off-road motorcycles.

The OFF-ROAD VEHICLE BYLAW NO. 1716, 2002 and amendments is the current District of Squamish bylaw related to off-road vehicles. A copy of the bylaw is available at the District website www.squamish.ca or at municipal hall.

DESIGNATED/SHARED TRIALS BIKE TRAILS

The Park Avenue (Boulderdash) trail (in Smoke Bluffs Park) is an example of a designated trials bike trail. It will be "shared use" with appropriate warning signage, posted trail courtesies and degree of difficulty markings. Almost all Trials Bike shared trails will, by nature of the use and degree of physical challenge, have a "difficult" or "very difficult" rating. The same construction, maintenance, and inspection standards will apply to these trails as the Mountain Bike Standards. Some trails, or portions of trails, will also be designated (signed/marked) as permitting Trials Bike access.

On designated motorized bike trails the motorized bike will have the right of way and approaching hikers and mountain bikers should step aside and wave the bike through. The same courtesies as on regular shared trails apply.

- Learn about the area you will ride in. Contact your local user group for more information to ensure that you understand area restrictions and have permission to ride there. Get maps of the area, and stay on the designated trails
- Contact the SDBA for your BCORMA Trail Pass.
- Respect the rights of all recreationists to enjoy the beauty of the outdoors. Respect public and private property.
- Park considerately, taking no more space than needed, without blocking other vehicles and without impeding access to trails.
- Keep your dirt bike quiet – spark arresters mandatory and 96 DB noise limits.
- Obey trail markers and closure signs. There are many reasons why an area may be closed, if it is posted as closed, stay out.
- Respect designated areas, trail-use signs and established trails.
- Realize that destination objective and travel speed should be determined by your equipment, ability, the terrain, weather, and the traffic on the trail.
- Be courteous to other recreationists you may meet on the trail. Yield the right-of-way to traffic moving uphill. Pull off the trail and stop your engine for horses. Slow down and use caution when approaching another.
- When stopping do not block the trail.
- Pack out everything you packed in and do not litter.
- When talking to another trail user, take your helmet off. The helmet can make you appear to be intimidating and unfriendly. Be friendly and don't interfere with or harass others. Recognize that people judge all trail users by their actions.

TRIALS RIDING

TRIALS BIKE INFORMATION AND CODE OF CONDUCT

Trials Trail riding is a sport of skill, balance and precision. The Howe Sound Trials Riders Club contribute to trail construction and maintenance. They support shared access and typically have interest in access to a few trails that will get them away from higher public use routes.

Their codes of conduct listed below help create mutually respectful relations between all users.

Trials bikers belonging to the Howe Sound Trials Riders Club have created and agreed to the following "Code of Conduct". They also educate and do follow-up with their members and visitors from other Clubs about this Code:

- Promote the "shared" use of trails by hikers, climbers, mountain bikers and trials riders.
- Ride only on signed "designated use" trails.
- Do not enter areas or trails that restrict "motorized" use.
- Smoke Bluffs Park Use the segregated "put in" area at the back of the Loggers Lane parking lot to access "Park Avenue/Boulderdash". The Smoke Bluffs parking lot is a "No Riding" area.
- Promote courteous and respectful behaviour at all times with all trail users. Be an ambassador for Trials Biking. Wave and/or stop to greet people you meet on the trail. Give directions and be helpful.
- Give the right of way to other users whenever possible. Always slow down when approaching other trail users and pass only when safe to do so.
- Whenever possible maintain any trail you ride on by trimming back underbrush and branches, clearing hazards such as fallen rocks, branches and trees, picking up garbage, etc.
- Avoid riding near housing developments or places that might be impacted by noise. Maintain proper muffler systems and standards. Avoid ecological sensitive areas, and overriding of trails or areas.



Photo: Courtesy of Francesca Knight

MOUNTAIN BIKE

COURTESIES, RULES OF THE ROAD

All trails in Squamish are shared. When mountain bikers are on general hiking trails the person on foot has the right of way and caution should be exercised in passing or approaching. Slow-down, be courteous, warn of your approach and thank them for giving you room.

On "designated" mountain bike trails hikers should physically step aside and wait while a mountain biker rides through, again a wave and a thank you will earn respect from both users.

While these "courtesies" will be posted at appropriate trailheads it will take time to educate all users. Squamish Off Road Cycling Association, Squamish Trails Society, Squamish Dirt Bike Association, Squamish Access Society, Federation of Mountain Clubs, the District of Squamish and other local groups will assist in educating their membership and the general public about trail courtesies.



Photo
Courtesy of Pat Gilbert

SORCA has the following Responsible Riding Tips posted on their website www.sorca.ca

1. Be Prepared

Know your equipment, your ability, the weather, and the area you are riding and prepare accordingly. A well-planned ride will go smoothly for you and your companions.

2. Don't Ride On Closed Trails

Whether it is to protect the environment or for rider safety, a closed trail is off limits for a reason. Riding closed trails is not only illegal; it gives mountain bikers a bad reputation.

3. Respect the Trail, Wildlife and Environment

Be sensitive to the trail and its surroundings by riding softly and never skidding. Do not litter and never scare animals.

4. Stay On the Trail

Do not intentionally ride off trail. Riding off trail can damage the ecosystem. Never cut switchbacks.

5. Ride Slowly On Crowded Trails

Just like a busy highway, when trails are crowded you must move slowly to ensure safety for all trail users.

6. Pass With Courtesy and Care

Slow down when approaching other trail users and respectfully make others aware you are approaching. Pass with care and be prepared to stop if necessary.

7. Share the Trail With Other Trail Users

Mountain bikers, hikers and equestrians must share multi-use trails. Remember: mountain bikers should yield to hikers and equestrians.

8. Don't Do Unauthorized Trailwork

Unauthorized or illegal trailwork may lead to environmental damage, injury or even potential trail closure. Don't change a trail just because you don't like it or can't ride it. Send us an email if you have a trail issue.

9. Get Involved

If you want to make a difference in your mountain biking community get involved with SORCA.

SPECIAL EVENT ACCESS/APPROVAL TO USE TRAILS

GENERAL

The District of Squamish encourages and supports special events in the community. The intent of the application process is to foster and enable good planning and positive experiences for the organizing groups and the general public. The process is designed to enhance the event by improving communications and clearly outlining expectations.

APPLICATION PROCESS

All community special events that utilize trails, both internal and external, must go through an application process with the District of Squamish. There are standard forms to be filled out by each event organizer. The intent of this process is to monitor, control and protect the trails from overuse, user conflicts, and potential abuse of the resources and facilities.

The process will also be used to inform and educate the users and the public, and in some cases enhance trail maintenance or amenities. The Application Form will require event information (including date, time, type of event, anticipated number of users, route description and mapping, cost for participants, and whether or not it is a private, public, or commercial event, etc.).

REQUIREMENTS

Depending on the complexity of the event, the application may involve a site visitation, safety inspections, event reports, and a list of requirements (or expectations list) for the event organizers.

There may also be a trail/amenity/facility cleanup requirement following the event. Major or commercial events may be required to complete a consultative process with specific trail community groups. Some events may require Council approval.

APPROVAL PROCESS AND TIME


Depending on the complexity, sensitivity or history of the event, the process can be relatively simple or the consultative process can take some time. It is important that all first-time events get their applications into the Trail Coordinator as soon as possible (even if it is only in the planning stages).

Major events or commercial events should apply a minimum of two months in advance of the event. Late applications may not be approved.



TRAILS INSPECTION CHECK LIST

The checklists on the following pages are available from the District of Squamish.

 TRAILS INSPECTION CHECK LIST								
Trail Name								
Trail Location								
Date of Inspection								
Overall Inspection Comments								
				CONDITION				
SPECIFIC INSPECTION FINDINGS	REFERENCE NUMBERS	REFERENCE NUMBER AND DESCRIPTION OF PROBLEM	GENERAL LOCATION OF PROBLEM	ADEQUATE BUT WILL NEED			IMMEDIATE MITIGATION	
				GOOD	UPGRADE	POOR		
Litter/Garbage		1						
Edge Brushing		2						
Brushes and Windfall		3						
Safety Hazards		4						
Slope Erosion		5						
Riparian Crossings		6						
Bridging and Decking		7						
Sightlines		8						
Surface Conditions		9						
Signage in Place		10						
Hazard Signage		11						
Technical Trail Features		12						
Fall Zones		13						
Vandalism		14						
Trail Braiding		15						
Fence/Barrier Condition		16						
Cultural Areas Protected		17						
Please use the back of this sheet for any further comments, including suggestions for improvement of any kind.								

RESOURCES

TRAIL MAPS Current Trail Maps are available at the Squamish Municipal Hall, the Squamish Adventure Center and local businesses for a small fee. Net proceeds from these sales go to the Squamish Trails Society for further work on the trail system.

The interactive trails map available online through www.squamish.ca (follow links to trails) contains excellent information. Users can search by area, difficulty, and by trail type (ex: hiking, SDBA, access trails).

FORMS (Available through the District of Squamish):

- Trail Safety/Maintenance Inspection Form
- Special Event Application Form for Trail Use

OFFROAD VEHICLE BYLAW NO. 1716, 2002 – Available through Municipal Hall or online at www.squamish.ca.

District of Squamish Watercourse Regulations. Available through Municipal Hall.

British Columbia Ministry of Forests and Range website:
www.gov.bc.ca/for

British Columbia Ministry of Forests and Range statutes section 57 proposal applications:
www.tca.gov.bc.ca/sites_trails/managing/Section_57.htm

Squamish Adopt-a-Trail
www.adoptatrail.ca



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Resort Municipality of Whistler. Whistler Trail Standards Environmental and Technical Trail Features.





37955 Second Avenue. Squamish BC Canada V8B 0A3
604.892.5217

WWW.SQUAMISH.CA