

SECTION 3

MAINTENANCE GUIDELINES



Waterfront
Trail

2007



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1.0 INTRODUCTION

These guidelines have been developed in response to requests from municipal partners for information on trail maintenance and management.

A well-designed, constructed and maintained trail system is the foundation for many enjoyable years of walking, hiking, cycling, inline skating, and the like, as well as appreciation of the natural and cultural heritage of the waterfront. High quality design is the best preventive maintenance when one considers the trail's overall liability, aesthetics, and longevity. By incorporating quality design guidelines and construction practices, most major failures can be avoided.

Since trail construction represents a considerable capital investment by all partners, it is prudent to consider the associated roles, responsibilities and tasks for properly maintaining a facility.

To keep the trails safe, functional and attractive, it is advisable for trail managers to establish an operations team, a maintenance program, and a maintenance budget.

These guidelines will identify the basic tasks and issues associated with maintaining a multi-functional recreational trail and outline the current practices of trail managers operating similar facilities. The guidelines do not attempt to recommend any single approach to trail management. As each trail section is unique in its context, the level of associated maintenance and tasks will also vary. On-road sections of trail, trails through natural areas, and pedestrian-only trails, for example, will experience varying levels of maintenance, depending on type and quality of construction, as well as deterioration due to climate and use.

The trail manager should construct a maintenance plan based on the information provided in these guidelines. To assist in this,

where applicable, each section includes a list of actions, that when completed, form the basis of a maintenance operations plan.

The Appendices includes examples of programs and guidelines used by other trail managers. They are excerpts only, taken from documents available from the original source. Trail managers are encouraged to contact these organizations directly for more information.

“Trail design and management practices are constantly evolving. At the same time, most trail planning, fundraising, construction and maintenance is undertaken by volunteers. Trail organizations and their volunteers need to access best practices in trail design, management and safety.”¹

¹ Ontario Ministry of Health Promotion, 2005, p. 18.



2.0 OPERATIONS

2.1 MANAGEMENT SYSTEM

A management system is necessary for planning, costing, scheduling, implementing, and evaluating maintenance activities. A systematic approach to maintenance will also assist in avoiding liability claims purporting that trail facilities have not been maintained to accepted levels of safety. It is therefore important that regular inspections be carried out, normal maintenance tasks be performed, and that these activities be recorded in a maintenance log book (see also Section 4 - Liability and Risk Management Issues).

Maintenance management involves keeping a variety of records: trail inventories, trail condition surveys and analyses, inspection reports, cost estimates for maintenance tasks, implementation schedules, volunteer programs, maintenance contracts, liability claims, and so on. The objectives, guidelines and level of maintenance will vary with each segment of the trail, such as on-road trail vs. off-road trail, and in ecologically sensitive areas.

In addition to guiding trail managers and maintenance staff, guidelines are invaluable in utilising volunteer expertise, which is the backbone of many trails. The involvement of volunteers and service clubs will help to ensure that the Trail continues to improve, rather than simply maintaining its original state.

2.2 CORRIDOR MANAGEMENT - ROLES

Parks and open space are usually maintained by municipal parks and/or works departments. Since most off-road trails are located within municipal parks and open space, they are normally included within the maintenance and operating budget for each site. The department might have maintenance staff to manage and

implement tasks on the trail and for associated amenities, or might contract maintenance services to independent sources, volunteers or service clubs, or to a combination of all of the above.

Road-related trails are usually maintained by municipal transportation and/or works departments, or the Ministry of Transportation. This category includes road shoulders (paved or unpaved), as well as trails within the road right-of-way, such as paved or unpaved trails. The department might assign its staff to maintenance tasks, or combine contracted services with municipal staff services. These services would be included within the maintenance and operating budget for each road segment.

Cooperation and coordination among departments and municipalities is necessary to ensure that the Trail meets maintenance objectives and is as safe as possible. This is especially important at transition areas (e.g. when traveling between on-road to off-road sections and between municipalities) which may be maintained by different departments.

To give trail managers an opportunity to experience first-hand and assess trail conditions and connections, the Trust coordinates periodic cycling tours of the Trail. Trail managers are encouraged to invite relevant department colleagues from planning, tourism, transportation and engineering, as well other local partners. The tours serve as field workshops giving trail managers opportunity to share upcoming plans, and review issues and concerns with the Trust and colleagues. During the 2006 Trail Managers Tour, over 70 trail managers and volunteers from the community and media participated. For many of the trail managers, this was the first time they cycled their part of the Trail from one end to the other. Most used the opportunity to travel from their community into the neighbouring communities to see how the trail's connections functioned.

Action:

1. Identify what agencies share in the maintenance of the Trail and their potential roles and responsibilities.

“Trail construction and maintenance builds and solidifies partnerships among community groups, businesses, property owners, local government, community residents and trail members.”¹

¹ Ontario Ministry of Health Promotion, 2005, p. 8.



2.3 EVALUATING NEEDS

An effective management system will record maintenance tasks, locations, and seasonal adjustments that are required to meet the Trail's maintenance objectives. This record includes an inventory and assessment of trail surfaces, rights-of-way, trail corridors, bridges and boardwalks, buffering, signage, parking, access points, amenities, drainage, neighbouring land uses, and so on. This "anatomy" of the trail, as well as issues identified by user group preferences, community issues, volunteers, and management needs, should be considered when assessing needs.

Trail user incompatibility is often cited as a user and maintenance concern. Trail users may include hikers, walkers, wheelchair users, joggers, cyclists, in-line skaters, skateboarders, scooter users, cross-country skiers, and potentially, equestrians in some rural municipalities. Owing to the variety and range of users, conflict may arise due to the different traveling speeds and trail width requirements of each user. Trail users should therefore be encouraged to share the trail so that conflict is minimized. Most trail corridors are capable of sustaining different kinds of users. The types of use and number of users should be reflected in the level of maintenance provided.

It is the responsibility of the trail manager to monitor physical changes in conditions on trail segments and provide a maintenance budget that reflects the expected level of degradation based on the numbers of different users.

Action:

1. Prepare an inventory that includes location, description, and condition of each segment or problem, as identified by all stakeholders.

2.4 ESTABLISHING A MONITORING SYSTEM

It is vital for municipalities to have a regular system for reporting on the trail's condition and its use. In this regard, trails must receive a thorough inspection/maintenance at least twice per year. These tasks should occur in the spring, prior to the anticipated peak season when high use is expected, and also the fall. Four or more inspections per year are recommended as an additional preventive measure (preferably once each season).

Trail inspections provide information on existing conditions, including all deficiencies regarding the trail surface, signage, amenities, and landscaping. They should also record the exact locations of any work required. Results from trail inspections and monitoring are recorded in a patrollers' log book (see sample in *Appendix J*) with seasonal checklists, which contain preprinted carbon forms listing all of the conditions to be inspected and reported on (first copy to trail manager, second copy to Maintenance Log Book). Trail managers can also schedule the work tasks and later assess the accuracy of their work estimates and contracts by comparing original checklists with the reparation work that was actually performed.

Excessive trail use, storm damage, vandalism, and environmental degradation can be either avoided, or corrected before further deterioration occurs.

User input and surveys are also valuable in predicting user demands, establishing priorities for trail implementation and amenities budgets, and for suggesting actions for preventive maintenance. Most municipalities post telephone numbers where users can report trail problems. However, it can be confusing for the public to determine which municipality, department or conservation authority is responsible for the problem. One way to mitigate the confusion is to encourage trail users to contact the Trust through the Waterfront Trail website. The address for the trail website is prominently displayed on the trailhead signs. Currently the Trust receives hundreds of inquiries and coordinates responses with municipalities and other community partners as necessary.

"A coordinated web-based approach could provide trail users with easily accessible information. It could also give stakeholders an enormously increased capacity to share and gain access to the information they need to play their part in managing Ontario's trail system." ¹

¹ Ontario Ministry of Health Promotion, 2005, p. 18.

In addition to responding to concerns, the Trust lists information about festivals, accommodations, attractions, and volunteer opportunities on the website. Itineraries for family day trips and week-end get-aways are available on the site as are a comprehensive set of detailed maps. Local partners are encouraged to use the Trail website to provide users with important local trail information such as temporary closures or detours due to construction.

Action:

1. Establish a regular monitoring system to carry out a systematic inspection and assessment of the trail's condition and signage.
2. Record all monitoring activities and results in a maintenance log book that lists trail issues and concerns to be reported upon.
3. Provide opportunity for trail users to share input regarding trail conditions, issues and concerns through user surveys and the Waterfront Trail website.

2.5 MAINTENANCE PLAN

A maintenance plan should be developed as soon as the trail is built, and from that point on, maintenance should be structured to optimize budgets and volunteer programs. To the trail manager, it often seems that sufficient funds are seldom available to perform all of the maintenance tasks that are needed or requested. Planning a maintenance program therefore becomes even more critical. Budgets revolve around defensible plans, and the better the plan, the better the chances that a request for maintenance funds will be given budget priority.

As noted in 2.3, maintenance plans hinge on being aware of and recording exactly what is going on in the field. Once a trail inventory has been prepared, the following process should be followed to develop a plan:

1. Analysis: based on issues and concerns as well as user survey results.
2. Approach: setting priorities and phasing, based on resources and frequency (e.g. routine, seasonal, annual).
3. Implementation: scheduling work contracts and activities.
4. Evaluation: assessment of successes and failures in maintenance techniques.

The resulting plan is used to determine financial and staffing requirements to complete the tasks. This data can also be used to determine equipment, tool, and vehicular requirements, as well as the potential for volunteer and service club involvement.

Action:

1. Complete an outline under each of the four items - analysis, approach, implementation and evaluation.
2. Prioritize this list based upon frequency (i.e. routine, seasonal, annual).
3. Develop a checklist using examples from the list of tasks in chapter 3.0 and the Appendices plus specific items identified by stakeholders.

2.6 MAINTENANCE EVALUATION

An annual review of maintenance log summaries, reports, and schedules is advisable, as a recommended minimum. If done more frequently, the review enables managers to detect and plan for remedial action.

The review process also provides for closer contact between trail managers, work crews, and volunteers. It takes the mystery out of maintenance so that concerns can be separated into definable tasks. Moreover, the workers can obtain feedback on what level of maintenance is expected.



Municipalities could be encouraged to establish an Annual Trail Review, which would assist the municipality in summarizing issues and priorities for maintaining and improving their portion of the Waterfront Trail. It would also assist in the overall promotion of the trail network. The review should include information on planning improvements and budgeting.

Most maintenance procedures have been developed through practical trial and error in the field, and the best techniques have evolved through innovation and experimentation. The sources included in the bibliography provide examples of some of the best approaches available.

Action:

1. Carry out annual review of trail work plan based on checklist data.
2. Prepare an annual trail report outline to “quickly” incorporate Maintenance Log Book (checklist) data.

2.7 LEVELS OF MAINTENANCE

Management priorities are determined through the process of understanding the linkage between trail needs, user groups, and management objectives. Out of this process should come policies to determine levels of maintenance. A general breakdown of maintenance levels follows:

1. Level 1: Maintenance which is aimed primarily at protecting the trail from serious deterioration and providing for user safety (e.g. removing storm damage, repairing wash-outs, maintaining bridges and warning signs).
2. Level 2: Maintenance aimed primarily at preserving the trail investment and environmental quality (e.g. patching asphalt and stonedust, repairing directional signage).

3. Level 3: Maintenance aimed at user comfort. Involves levels 1 and 2, as well as more tasks (e.g. repairing vandalized furniture and interpretive signage, landscape maintenance).

Action:

1. After listing all tasks by stakeholders, determine which level of maintenance.
2. Determine what each maintenance level’s criteria includes.

Table 2.1 provides a summary of recommended maintenance actions for the Waterfront Trail.

Table 2.1: Summary of Maintenance Actions

1. Identify what agencies share in the maintenance of the Trail, and their potential roles and responsibilities.
2. Prepare Trail inventory including location, description and condition of each segment/problem, as identified by all stakeholders.
3. Establish regular monitoring system to carry out systematic inspection and assessment of the trail's condition and signage.
4. Record all monitoring activities and results in maintenance log book listing trail issues and concerns to be reported on.
5. Provide opportunity for trail users to share input regarding trail conditions, issues and concerns through user surveys, the Waterfront Trail website.
6. Complete maintenance plan under the four said items: analysis (assess trail issues/concerns), approach (set priorities/phasing), implementation (set work schedule/activities) and evaluation (assess maintenance techniques).
7. Prioritize components of the maintenance plan based upon frequency (i.e. routine, seasonal, annual).
8. Develop maintenance checklist using examples from the list of tasks in chapter 3.0, the Appendices plus specific items identified by trail managers, stakeholders and users.
9. Carry out annual review of trail maintenance work plan based upon checklist data.
10. Prepare an annual trail report outline to "quickly" incorporate Maintenance Log Book (checklist) data.
11. After listing all tasks and items, determine which level of maintenance.
12. Determine what each maintenance level's criteria includes.



3.0 MAINTENANCE TASKS

Poor quality trails and other infrastructure can present a major risk to trail users. Diligence is required when managing any asset. Trail systems and their amenities should be inspected on a regular basis. These inspections will identify hazardous conditions as well as issues related to maintenance, repairs and events of vandalism.

In the spring, summer and fall months, priority consideration should be given to debris removal on arterial roads with bicycle route facilities and sidewalks. Trails should be inspected each spring prior to the anticipated peak season when high use is expected.

Currently the Waterfront Trail is not cleared in the winter months. However, the 2002 User survey shows that walkers and runners in particular use the Trail regularly during the winter. Trail managers and other related agencies should therefore consider providing winter maintenance services on the trail. Ideally, snow and ice should be regularly removed from the Trail system with a priority placed on primary routes and connections.

The following sections describe more detailed maintenance procedures for on-road and off-road trail systems that trail managers and other agencies should consider for maintaining existing and future facilities.

3.1 SURFACE TREATMENTS

The common trail surfaces are packed earth, wood chips, stonedust, asphalt, concrete pavers and boardwalks. Maintenance of a smooth transition joint between surface treatments is critical. Each surface requires specialized maintenance practices; the following is an outline of the different characteristics and the variable frequency of inspection and maintenance that is required.

Packed Earth

Packed earth is susceptible to erosion from overuse, so preventing these conditions is a constant concern. Water must be diverted off the trail surface by means of water bars and sloped surfaces. In natural or wilderness areas, trails may be closed and rerouted to allow for adjacent vegetation to regenerate. Slopes may be terraced against the affects of erosion with stairs and switchbacks. *Inspection/implementation should be done three times per year, usually spring, summer and fall.*

Wood Chips

Wood chips are susceptible to disintegration through time. The chips must be replenished approximately every two to three years, using the highest quality hardwood chips to reduce disintegration. The chips may also require raking as they shift off the trail in high use areas. Wood chips are most suited for trails in natural areas, and should not be used on slopes greater than eight per cent. *Inspection/implementation should be done once per year usually in the spring.*

Stonedust

Stonedust trails are adaptable to many situations. They are easily constructed by most contractors. They must be sloped to provide drainage, but can absorb some runoff. They can be stabilized with calcium chloride to prevent erosion and create a hardened surface. Stonedust should not be used on slopes greater than six per cent. Maintenance requirements are more frequent for stonedust trails than for asphalt trails. However, regrading requirements and filling potholes are generally less costly and complicated to perform. *Inspection/implementation should be done twice per year in the spring and fall.*

Asphalt

Asphalt trails are most suitable for intense high traffic areas. Asphalt has a life span of approximately eight to ten years. Asphalt





Trail connection at Murray Canal, Trenton is virtually unusable due to neglect
Source: Waterfront Regeneration Trust

must be applied and repaired by contractors only. It requires a sub-base of compacted granular 'A'. Asphalt trails must be cross-sloped a minimum of two per cent to allow for drainage. Asphalt should be used on all slopes greater than six per cent to prevent erosion. Drainage swales are required next to asphalt trails. *Inspection/implementation should be done once per year, especially for potholes in the spring.*

Concrete Pavers

Most commonly used in urban focal point areas, concrete pavers require installation by skilled contractors on underlying layers of stonedust and compacted granular 'A'. Pavers must be cross-sloped a minimum of two per cent to allow for drainage. While the pavers themselves are durable, they are susceptible to frost heaving and settlement therefore they may require occasional resetting. *Inspection/implementation should be done twice per year in the spring and fall.*

Boardwalks

Boardwalks are most suitable for wet areas and sensitive areas where they are needed to contain traffic. They should be constructed by a contractor above high water level on secure footings set below the frost line. The average life span of a wooden boardwalk is over 20 years. The life span of a boardwalk made of manmade materials (e.g. recycled wood and plastic) will be longer, but this has yet to be determined in the field. Vandalized, broken, rotting or otherwise-damaged handrails and decking should be replaced. Handrails should be securely attached and all fasteners tight. Repairs to footings should be undertaken by a contractor while repairs to decking may be undertaken by contractors, municipal staff or skilled volunteers. *Inspection/implementation should be done twice per year in the spring and fall.*

3.2 EROSION, SLOPES AND DRAINAGE

The combined effects of temperature and water are the most damaging influences on trails and associated amenities. Erosion prevention begins with good design. Improper drainage from trail surfaces, a lack of defined swales and ditches in the immediate area, clogged drainage inlets, and inappropriate shoreline protection increase the deterioration of trail surfaces and alignments.

Most damage occurs during seasons when the sub-grade is saturated with water. This occurs between November and May during which time heavy service vehicles should be kept off the trail. Frost heaving is often evident in the spring on trails and road surfaces.

Spring thaw, combined with heavy pedestrian and cyclist use, is also very damaging to unpaved trails and road shoulders. The combination of high groundwater and heavy user traffic quickly deteriorates the quality of loose surfaces and creates a quagmire. Reconstruction after the trail has dried out will require considerable effort and cost. Until the seasonal water table has subsided, it is best to avoid use through temporary trail closings. Users can be directed away from susceptible areas with temporary signage. Redesign and improvement of such trails will reduce ongoing future maintenance costs.

3.3 DEAD TREES

Trails should be regularly inspected for dead or dying trees which may pose a hazard to trail users. Crews are not always required to remove the entire tree or trunk from the site. Tree trunks and branches may be scattered throughout wooded or naturalized areas. This material is often home to wildlife, so it is ecologically advantageous not to remove it totally. This practice will provide a modest cost saving as well. In areas where there is maintained turf it will be necessary to dispose of limbs off-site.

Inspect for potentially hazardous trees, at least two times per year in the spring and fall. The common practice for marking such trees is to spray the trunk with red or orange fluorescent paint in the shape of an 'X'.

3.4 VEGETATION

Ideally, vegetation should be routinely cut back immediate to the trail since overgrown shrubs and low-hanging branches can obscure signs and pose a hazard to trail users. Adequate clearance and sight distances should be maintained at driveways and intersections so that trail users are visible to motorists. Installing root barriers during trail and sidewalk construction may assist in preventing premature break-up of the surfaces. It is recommended that maintenance of vegetation originating on private property be required through other local municipal by-laws.

3.5 MOWING AND NATURALIZATION

Cutting varies depending on the management objectives of the responsible department and local growing conditions. In most cases, the minimum requirement under local by-laws is two cuttings per year for the control of noxious weeds.

A mown edge is typically maintained on both sides of trails except through forested areas. The edge is cut more frequently to prevent the encroachment of plant material onto the trail surface or road shoulder, to retain sight distances, and to provide an operating safety margin. The mown edge is usually a minimum of 0.5 m wide, but can extend to approximately two metres.

In recent years it has become common practice to maintain open spaces in a natural state. Naturalization holds many benefits for trail managers and enhances the quality of the trail user's experience. Trail managers are encouraged to naturalize the trail

corridor to assist in regeneration of the greenway and promote species diversity. Less frequent mowing, moreover, will generate a significant cost saving, particularly in areas that are difficult to mow.

3.6 TRASH CANS AND LITTER REMOVAL

Trashcans should be emptied on a weekly basis. In terms of litter removal, perhaps one of the most distressing tasks in maintenance is collecting the increasing amount of litter in open spaces and along road sides. While the task of collecting litter is usually a municipal responsibility, in recent years, it has become common practice to encourage citizens groups to assist in litter control and vegetation management. "Adopt-A-Trail" programs are becoming popular activities involving community groups and corporate sponsors.

Litter is also actively controlled by the conscientious efforts of trail users: litter awareness is included in the "Codes of Ethics" of most hiking and cycling groups.

3.7 LEAF RAKING

The task of collecting fallen leaves where required in public areas is usually the responsibility of the municipality. For many trail users fallen leaves do not pose a hazard. However, to cyclists and in-line skaters, piles of wet leaves present a serious obstacle when encountered on trails or in roadway gutters as it is difficult for them to stop on leaves and falls can occur. Pedestrians and those requiring mobility aides may also have a difficult time maintaining their footing on slippery leaf covered surfaces. Leaves also camouflage pot holes, debris and drainage inlets.

It is recommended that excessive fallen leaves be removed from the traveled portion of trails and roads as soon as possible to



Vegetation should be routinely cut back
Source: Simon Wilson



Leaf Debris on Roadway
Source: Dan Burden





Leaf Debris in Cycling Lane
Source: Dan Burden

prevent accidents. Local programs and policies of leaf recycling can provide direction in this endeavour.

3.8 VANDALISM

One of the best deterrents to vandalism is quality design, both in product selection and trail design. When vandalism occurs, it should be promptly repaired. This sends out the message that vandalism will not be accepted, thus discouraging further damage.

Regular use of the trail by the general public, police on bicycles and volunteer patrollers will deter vandalism. Lighting that has been carefully designed and placed may also reduce vandalism. Since vandalism is often associated with unwanted motorized vehicle access, this can be restricted by the placement of bollards, gates and fencing. Objects that are frequent targets of vandalism should be redesigned to prevent repeated incidents.

Finally, vandals who are prosecuted should be encouraged by court order to attend community service events that are aimed at trail maintenance.

3.9 WILDLIFE

Maintaining a healthy co-existence between wildlife and the trail involves management of natural habitats and the regulation of human activities. It is a popular activity for people to feed wildlife that they encounter in urban open space situations. Wildlife viewing stations could be investigated in order to fulfill this need for close contact with wildlife.

Informal and unofficial trails through natural areas should be discouraged, as they can become overused and quickly assist in degrading the environment and wildlife habitats.

3.9.1 Problems with Nuisance Bird Populations

The large seasonal populations of Giant Canada Geese along the Lake Ontario waterfront (and to a certain extent ducks, gulls and pigeons) interfere with trail users' enjoyment and cause public health concerns.

In populated areas, the geese are attracted to grassy areas close to water. Waterfront and urban parks have become favourite year-round habitats. The large numbers of geese devastate vegetation and cover public open spaces with droppings. Geese can be very aggressive, especially when defending their nests. Food scraps left for birds can be unsightly and attract undesirable rodents.

In populated areas, the geese have few natural predators and food is abundant. The result is a wildlife population out of balance.

Consequently, use and enjoyment of waterfront parks is being compromised. Picnicking on the grass, sitting on the shoreline and walking on trails can become unpleasant. As well, water quality suffers when droppings are washed into lakes, ponds and rivers. The cost of cleaning up these problems can be substantial.

Methods of Controlling Pervasive Bird Populations Habitat

Changing the habitat that attracts geese and other problem wildlife can encourage them to move on. If park areas are naturalized by letting tall grass and shrubs grow wild, geese will feel less safe because they can not see approaching predators. Where large numbers of geese are causing serious problems, it may be necessary to fence and cover naturalizing areas so that vegetation can establish.

Population Management

In some extreme cases, culling of bird populations may be considered. Breeding can be artificially managed to reduce egg hatching. It is important to remember however, that geese are a protected species and that these actions require permits, and are not necessarily recommended.

Deterrents

Deterrents, which are tricks to make geese feel unsafe, can encourage them to move to new territory. Examples include noise makers, scarecrows, inflatable alligators and free-roaming dogs. These deterrents, however, may simply relocate the problem from one local area to another.

Information

Information can educate the public about the problems caused by feeding geese.

1. The sugar, salt and chemicals in bread are unhealthy for birds.
2. Birds can get a respiratory infection from mold on decaying bread.
3. Feeding geese discourages them from pursuing their natural migratory patterns.
4. Birds that don't migrate because of this temporary feeding may freeze as the winter progresses.

For more information refer to *A Strategy for the Management of Canada Geese in an Urban Environment*, prepared by Gartner-Lee for the Waterfront Regeneration Trust (1997).

3.10 SIGNAGE

Signs should be inspected a minimum of once per year, normally in the spring, by the municipality or proponent that installed the signs. This task should be monitored with the assistance of a signage schedule and maintenance record. Missing or damaged signs should be promptly replaced to maintain continuity of the Trail signage system. For guidelines on signage maintenance and costs, consult the Waterfront Trail Signage Guidelines.

In 2006 the Waterfront Regeneration Trust organized the first-ever trail-wide signage audit of the Trail. Through the audit, volunteers reported deficiencies in signage to the Trust. Using volunteers proved to be an excellent way to test the clarity of local signage. Trail managers may know the route too well to really understand where signage is inadequate. Recommendations based on the audit were passed on to municipal partners. As a result, partners installed over 300 new signs to improve wayfinding. The Trust will conduct these audits regularly to help maintain adequate, clear signage in the future. A full account and description of the 2006 Signage Audit has been created by Nikki Rendle and David Arcus and is available as *Appendix M*.

3.11 SNOW CLEARING

It is clear that Trail users are active year round though their numbers are typically reduced during winter months. Nevertheless, measures should be taken to ensure that in the winter, the Waterfront Trail can remain a viable form of recreation and transportation alternative, especially as the trail system is expanded.

In order to encourage year-round use of the Waterfront Trail, winter maintenance services may be an effective strategy. It is up to local trail managers to decide what sections of the Waterfront Trail are to be cleared. Consideration should be given to off-road trail sections since many of the roadways are cleared through municipal services.

In recent interviews conducted for the Guelph Trail Master Plan (2005) with over a dozen municipal representatives in southern Ontario, it was revealed that only a few municipalities perform winter trail maintenance. Of those interviewed, it was reported that winter maintenance occurs only on some of the trails with a focus on plowing asphalt trails in high traffic areas and which connect to key facilities such as schools and main pedestrian/bicycle commuter routes. In addition, it was reported that the cost to perform winter



Snow Clearing on Roadway
Source: Dan Burden

In the 2002 Waterfront Trail User Survey, 58% of the respondents indicated that they use the Trail during the winter months.



maintenance on trails averages approximately \$350/km/winter which is close to that of winter sidewalk maintenance.¹

As the Waterfront Trail system is expanded, it is recommended that roads that are designated (i.e. signed) as Waterfront Trail receive priority for snow clearing and removal, particularly roadways that are recognized as providing key connections or links within the Trail network. This means that paved shoulders or bike lanes on these roads be cleared of snow to accommodate cyclists. Similarly, segments of the off-road trail system that are recognized as providing key connections or links should receive snow clearance to accommodate trail users. Trail managers may also consider installing signs to indicate trail segments that are cleared of snow.

3.12 RELEVANT REGULATIONS

Any maintenance plans must conform to local municipal policies, bylaws and statutes. Examples of this may relate to weed control and pesticide use, naturalization goals, etc. Trail managers should determine if their maintenance plans conform to local bylaws, policies and statutes.

3.13 SUMMARY OF TASKS

Maintenance of trail associated amenities is extremely varied in scope. Tasks can include service items, such as benches, picnic tables and drinking fountains, or landscape items, such as pruning trees, beach cleaning, and litter control.

Most open space amenities will be maintained by municipal parks and/or works departments.

Road-related services, such as lane markings, sweeping, and snow plowing will be provided by municipal transportation and/or

works departments within a municipality, and by the Ministry of Transportation on provincial highways.

It is recommended that local trail managers prepare a list of applicable tasks and, a local cost listing for each item identified. The following outlines the various tasks for on and off-road trail maintenance services.

Open Space Maintenance Tasks

Plant Material	Possible Tasks
Grass	water, weed, cut
Deciduous trees and Shrubs	water, prune, rake leaves
Coniferous trees	water, insect control, prune

Items	Possible Tasks
Wood chips	stockpile, replenish, spread, rake
Stoned ust	stockpile, replenish, spread, rake, compact
Asphalt	remove, reapply
Concrete pavers	remove, realign
Line painting	measure, apply, touch ups
Signs	straighten, replace, repair, repaint
Culverts	repair, replace, clean
Edging	tighten, replace
Boardwalk	repair or replace deck and handrail, straighten, tighten
Wood bridge	repair foundation, tighten slats and handrail
Steel bridge	stress test, repair slats, repaint

¹ Stantec Consulting Limited, 2005.

Open Space Maintenance Tasks (continued)

Amenities	Possible Tasks
Bicycle Racks	straighten, tighten bolts, repaint
Benches and picnic tables	replace slats, repaint
Steps	clean, tighten handrail, repair tread
Catch basins	clean, realign grate, raise, lower
Curbs	repair concrete
Stone walls	repaint, clean
Metal fences	straighten, repaint
Wood fences	replace slats, straighten, repaint, restain
Shoreline revetment	realign stones, beach feeding
Lighting	replace bulbs, straighten, repaint
Drinking fountain	clean, adjust valve, winterize
Litter bins	empty, clean, replace slats, repaint
Sweeping	collect, disposal of leaves, sand and other debris
Beach cleaning	rake, collect, dispose of debris
Vandalism	replace, repair, repaint
Winter snow clearing	plow, shovel, remove
Winter sanding	stockpile, spread

Road Related Maintenance Tasks

Road Classification	Possible Tasks
Rural gravel shoulders	regrade, repair asphalt edge
Asphalt shoulders	repaint lines, sweep, repair asphalt
Shared Road Lanes	repaint lines, clean gutter, asphalt repair
Trail within right-of-way	repair asphalt, control vegetation
Exclusive cycling lane	paint lines, clean gutter, sweep, repair asphalt, realign catch basin, signage
Sidewalks	clean gutter, repair asphalt, signage

Roadway Provisions	Possible Tasks
Signs	tighten, straighten, replace, repaint
Permanent pavement markings	replace, repaint
Bridge structures	clean gutter, signage, repair barrier
Railway crossings	repair asphalt edge, sweep, signs, repair rubber
Winter snow clearing	plow, sand, remove banks
Road sweeping and cleaning	collect and dispose of sand, rubber tires, leaves, carcasses and other debris
Rough mowing	mow shoulder for safety
Herbicide	treat for noxious weeds



4.0 CONCLUSION

Maintenance involves a practical application of the information techniques and programs outlined in this report.

In most cases, municipalities or conservation authorities are responsible for maintaining the Waterfront Trail. The Waterfront Regeneration Trust and agencies with primary maintenance responsibilities may wish to enlist the assistance of private corporations, community groups and volunteers through cooperative partnerships to address primary maintenance responsibilities.

The role of a trail manager will require creativity in order to combine these techniques and programs into stewardship programs which reflect the needs of each section of trail. These stewardship programs must strike a balance between the needs of user groups, landowners and the environment.



5.0 MAINTENANCE GUIDELINES - BIBLIOGRAPHY

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