

## 5.0 Pathway and Trail Design Guidelines

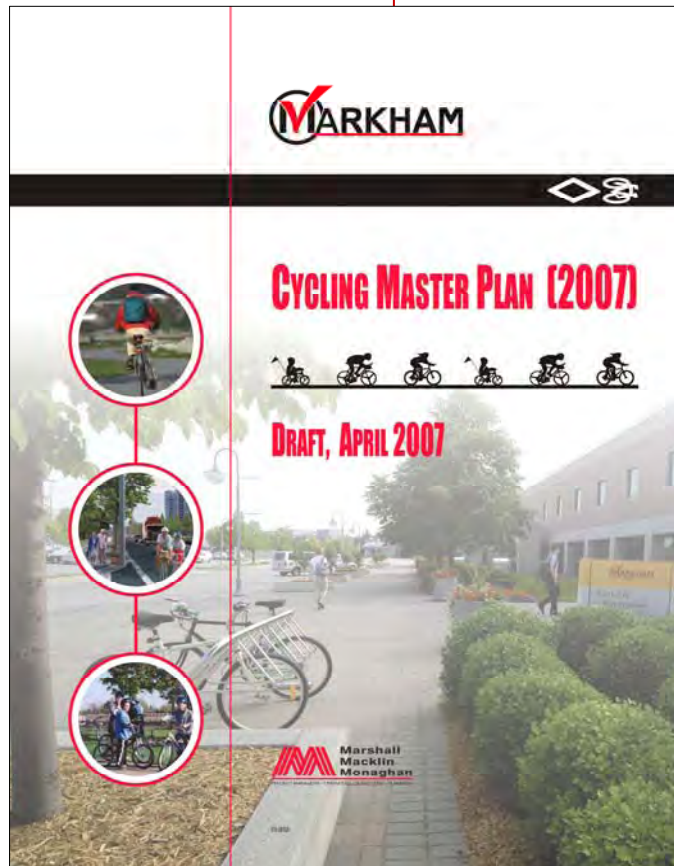
The following section outlines the pathway and trail facilities which will make up the Master Plan Network. These guidelines are not intended as detailed solutions to specific problem areas, nor are they standards, that must be applied in all situations.

A site specific design exercise involving a detailed site inventory and site review, as well as consideration of the likely user volume, would be necessary to arrive at final decisions for any section of the pathway and trail system, and adjustments to the guidelines may be required.

Additional guidelines with detailed information regarding technical information such as design speed, vertical and horizontal alignment, stopping distances, and user requirements, can be found in the Town of Markham’s *Cycling Master Plan: Planning and Design Guidelines*, also prepared by MMM Group Ltd. Some critical guidelines are repeated in this document as they are key aspects of the pathways and trails system.

*“These guidelines are not meant to be inclusive of all design considerations and standards. Rather, they are a carefully selected set of currently accepted design practices in North America and should be treated as a reference to be consulted during the development and construction of the pathways and trails network”.*

*This document should be read with the Cycling Master Plan prepared by the Town*



### 5.1 Type I: Primary Multi-Use Town Wide Pathways

Primary Multi-use Town Wide Pathways are the highest level of off road pathways that serve as town-wide linkages. They are major off road commuting routes, and special scenic or highly experiential routes with high expected use, and are typically located in utility and transportation corridors. Some pathways within parks that are part of the Town Wide system could be constructed to this guideline if possible. It is expected that they will be multi-use, with a variety of users, including cyclists, pedestrians, rollerbladers, and other wheeled users.



Type I Pathways:

- Minimum Width: 3.0 m
- Clear Zone on Edges: 0.3 m minimum, 0.6 m preferred
- Maximum Width: None, based on site specific requirements and anticipated user volume
- Clearing Height: 3.0 m
- Surface Type: Asphalt, other hard surface pavement could be considered for certain high profile locations.
- Amenities / Maintenance: Should be plowed in winter providing maintenance policies can be met; may be lighted.



*Primary Multi-Use Town Wide Pathways should be wide enough to accommodate a variety of users at the same time.*

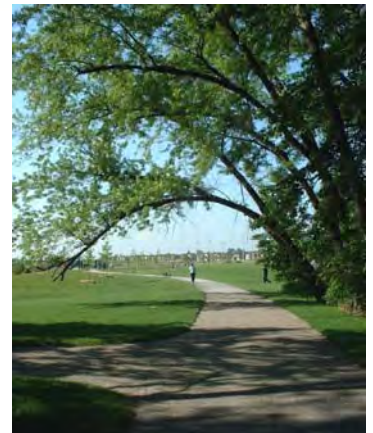
## 5.2 Type II: Secondary Town Wide Pathways

Secondary Town Wide Pathways are off road connections from the Type I trails to neighbourhoods, and other destinations in the Town. It is expected that they will be multi-use, with a variety of users, including cyclists, pedestrians, rollerbladers, and other wheeled users.



### Type II Pathways

Minimum Width:	3.0 m
Clear Zone on Edges:	0.3 m minimum, 0.5 m preferred
Maximum Width:	4.0 m
Clearing Height:	3.0 m
Surface Type:	Generally paved, may be gravel on a site specific basis.
Amenities / Maintenance:	May be maintained in winter on a site specific basis, depending on linkages and destinations, lighting on a site specific / user need basis.



*Secondary pathways should be asphalt or another hard surface.*

### 5.3 Type III: Park Pathways

Park Pathways are interior park paths which are ancillary to the continuous Town Wide system.



← 2.0m minimum to 2.4m maximum →

*Type III Pathways:*

Minimum Width:	2.0 m
Clear Zone on Edges:	0.3 m
Maximum Width:	2.4 m
Clearing Height:	2.4 m
Surface Type:	Varies per park type and use
Amenities / Maintenance:	Per park maintenance policies



*Park Pathway will be narrower than the standard 3.0m width as utilized elsewhere in the trail system.*

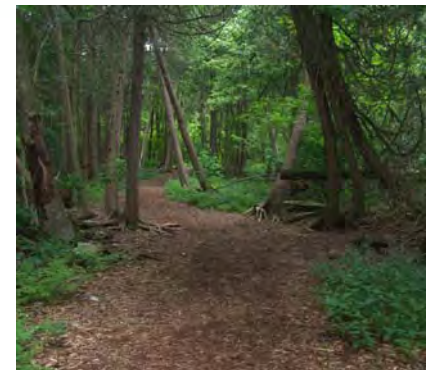
### 5.4 Type IV: Trails

Trails include smaller, local routes through more sensitive natural areas or other areas where wider pathways are not desired or would impact vegetation.



***Type IV Trails:***

- Minimum Width: 1.0 m
- Clear Zone on Edges: 0.25 m
- Maximum Width: 1.5 m
- Clearing Height: 2.0 m
- Surface Type: Generally unpaved: granular, mulch or dirt; paved only in special circumstances for erosion control or by user request.
- Amenities / Maintenance: No winter maintenance or lighting.



*Trails go through more sensitive natural area should be mulch surface where possible.*

### 5.5 Type V: Informal Trails

Informal trails are very small, local, informal routes through more sensitive natural areas or other areas where wider pathways are not desired or would impact vegetation. They are not part of the Town wide system and are ancillary to the Town Wide system.



*Type V Trail:*

Minimum Width:	Vary, worn trails
Clear Zone on Edges:	Not applicable
Maximum Width:	Not applicable
Clearing Height:	Not applicable
Surface Type:	Worn dirt, mulch or worn in grass
Amenities / Maintenance:	No winter maintenance or lighting



*Surfacing is less formal in areas where user traffic will be minimal and/or seasonally specific.*

### 5.6 Type VI: Alternate Routes

Alternate Routes are typical existing or proposed municipal sidewalks used as connecting routes between parks and open spaces as an alternate to off road pathways and trails, or in areas without off road open space routes. They include walkway connections between residential or other properties. Signage and streetscape amenities may be used to enhance and reinforce the routes as part of the Town-Wide system. Amenities may include: street furnishings, enhanced ornamental lighting, special pavement, and wider sidewalks. In some instances, no sidewalk may be present, and due to the low volume nature of a local residential street, the connection may be made along the shoulder of the road.



*Streetscape enhancements may include special paving and lighting*



### 5.7 Rails with Trails

When an active or abandoned rail lines has a wide enough right-of-way, it may safely accommodate a multi-use pathway while taking into consideration existing rail operations. This can also work in reverse: should abandoned rail lines that currently host multi-use pathways be needed in the future for rail operations, it is possible to reinstall the rail infrastructure without losing the use of the multi-use pathway. Pathways and trails may be considered on active or under-utilized rail corridors such as railway lines used by freight and passenger trains. Trails adjacent to rail corridors should be physically separated from the trail facility. This could be accomplished through the provision of a planted berm where sufficient right-of-way exists. In locations with constrained rights-of-way, a fence would be suitable to separate the two facilities. If the opportunity arose for Rail with Trail the Town of Markham would pursue the opportunity with the assistance of further study. An example of a trail adjacent to a rail corridor is illustrated in **Figure 5.1**



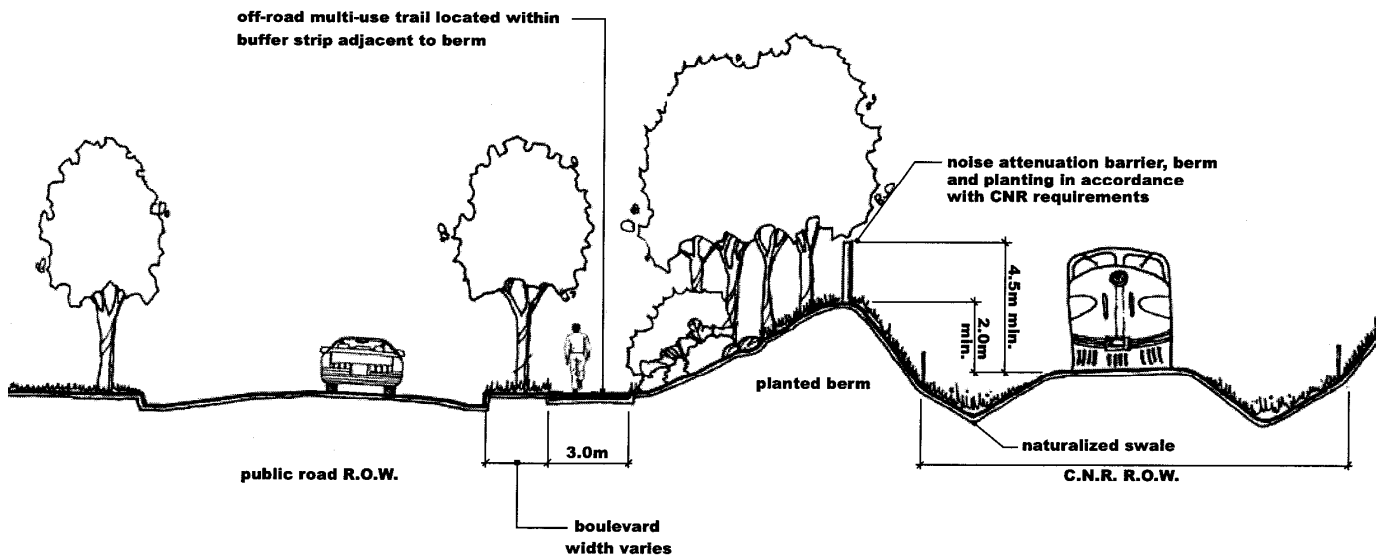
Rail with Trail in Hamilton, Ontario.



Existing rail corridor in Markham

Figure 5.1: Typical cross section of a cycling facility adjacent to a rail corridor separated by a planted berm

Source: Stantec Consulting Ltd. Public Open Space Plan, Town of Whitchurch-Stouffville, Functional Servicing Study, Southeast Quadrant OPA 101 Secondary Plan, May 2002.





## 5.8 Rest and Staging Areas

Rest areas should be provided along off-road and rural pathways and trails systems. Areas where users will tend to stop, such as interpretative stations, lookouts, restaurants, museums and other attractions/ services, are logical locations for rest areas. Ideally, there should be a rest area every 5 kilometres on a recreational trail.

Typical furnishings to be considered include benches or tables, washrooms, drinking fountains, trashcans, information signing complete with mapping, plus bicycle parking facilities. Options for recyclables and green bins should also be available at staging areas. Additional services may include an air pump, shelter and telephones.

Staging areas should be incorporated into key gateways and park areas. This will provide for access to the pathway and trail system. Potential amenities at staging areas may include picnic facilities and automobile parking. The number of parking spaces required should be determined on a site-specific basis, and should account for factors such as supply and demand of automobile parking elsewhere throughout the network.

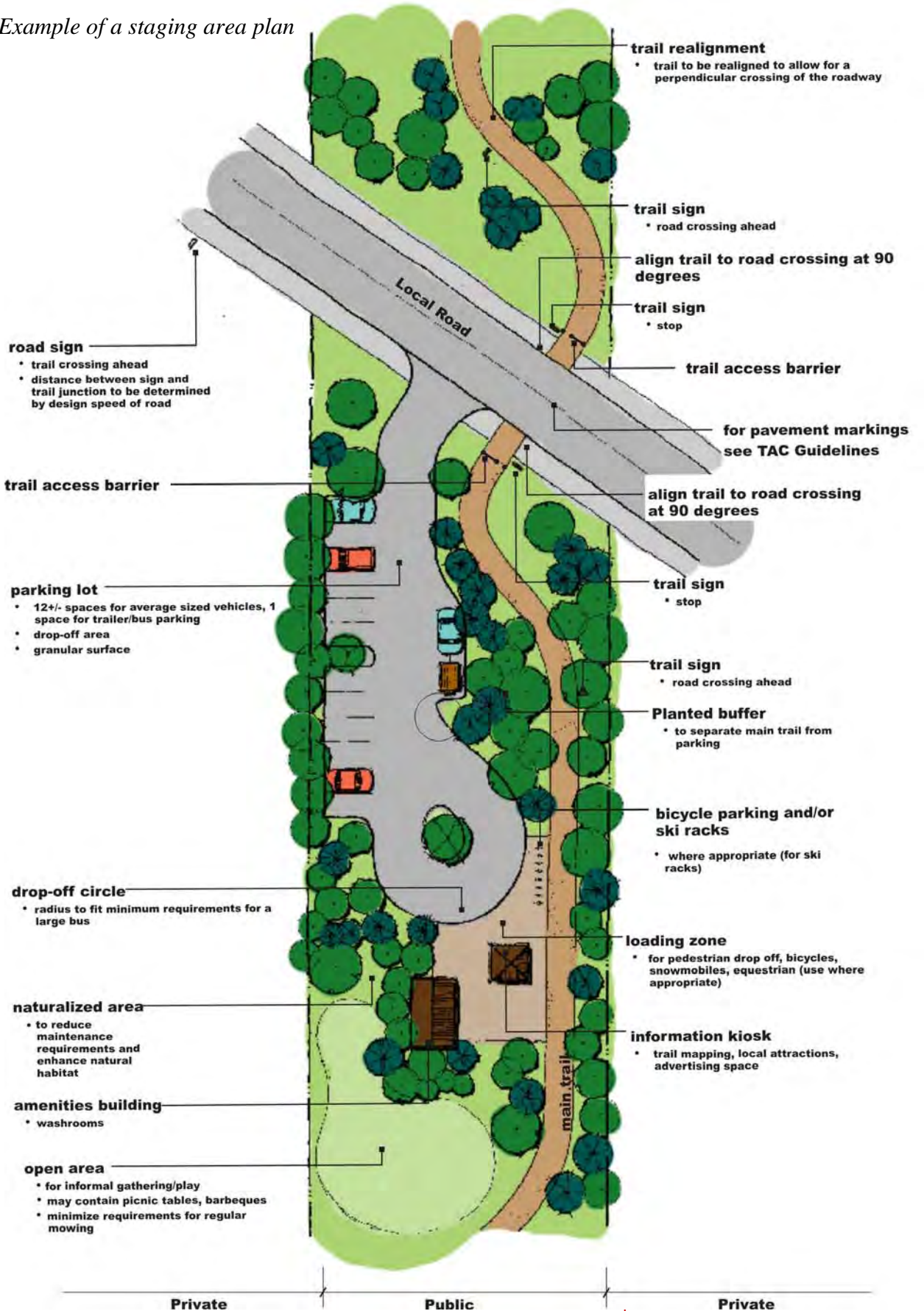
Potential Staging Areas are identified in the Master Plan Network **Map 4**.

An example of a staging area is shown in **Figure 5.2**



*Examples of Staging Areas*

Figure 5.2 Example of a staging area plan



## **5.9 Furnishings**

Users of the pathways and trail network will require support facilities such as benches, lighting and bicycle parking. These facilities are crucial if the network is to serve both recreational and utilitarian trips. They should be available at staging areas, as well as at major destinations throughout the Town.

### **5.9.1 Benches**

In an urban setting, wide paved areas and curb extensions provide opportunities for placing benches outside of the traffic stream. Rest areas such as benches are recommended to be provided at a minimum rate of one per 500m, appropriately located at destinations or bus stops, along highly used multi-use and pedestrian trails.

### **5.9.2 Bollards**

Bollards should be placed to prevent vehicular access and to separate the pathway or trail from conflicting land uses.

### **5.9.3 Garbage Receptacles**

Garbage receptacles are recommended along highly used multi-use and pedestrian facilities at appropriate locations determined in consultation with the Community Services Department. They should not be located directly beside benches due to odour and insects. Green bins and recyclables should also be considered when providing trash receptacles.

### **5.9.4 Tree Grates**

Metal or pre-cast concrete tree grates should be provided in areas of the central business district and areas of high-volume pedestrian traffic.

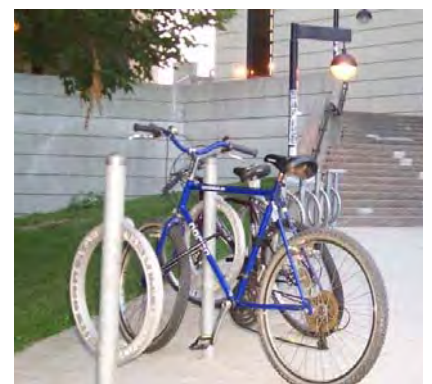
### **5.9.5 Bicycle Parking**

The availability of convenient, secure bicycle parking is important to cyclists. Bicycle parking should be provided at all destination locations such as libraries, schools, galleries, parks, etc. Safe and secure bicycle parking offers these benefits:

- Inexpensively and efficiently increases a building's parking capacity;
- Effectively serves those who use bicycles as a mode of transportation;
- Deters the use of street furnishings for bicycle storage;
- Promotes environmental awareness;
- Encourages bicycle use; and
- Can be a promotional item for businesses.



*Bicycle Locker, Toronto, Ontario*



*Example of Post and Ring Bicycle Rack*

The need for bicycle parking ranges from temporary short term lock-ups, to storage in a bicycle locker that affords weather, theft and vandalism protection, gear storage space, and 24-hour personal access. A cyclist's specific needs are determined by several factors:

- Type of trip being made: whether or not the bicycle will be left unattended all day or for a few minutes;
- Weather conditions: covered bicycle parking is of more importance during inclement weather conditions, especially in the winter;
- Value of the bicycle: the more a cyclist has invested in their bicycle, the more value they will place in theft protection; and
- Security of the area: determined by the cyclists' perception of how prone a given area is to bicycle theft. This is fairly subjective, and is predicated on the cyclist's experience with bicycle theft.
- Good bicycle parking facilities are secure, plentiful, easily accessible, and adjacent to destinations and covered.

The design of bicycle parking units varies widely. Generally, units can be divided into different categories based on the level of security they provide.

- High security units enclose the entire bicycle inside a lockable "cabinet". Ranging in price from \$1000.00 to \$2500.00 per unit (2007 dollars), these facilities are likely only appropriate in locations where cyclists might be leaving their bicycles for extended periods of time and normally are associated with a user fee. One example of where this application could be considered is at GO Stations. Another method of providing high security parking is to allow cyclists to lock their bikes to low security units within a locked compound. This is especially effective for large employers since it provides a large number of parking spaces at a relatively low cost.
- Medium-high security units allow the bicycle and wheels to be locked together without having to remove "quick release" wheels.
- Medium security units require "quick release" wheels to be removed and locked along with the frame of the bike.



*Example of a high profile Bicycle Rack*



*Example of an artistic bicycle parking facility*

The best medium-security units prevent the bike from falling over. A good example is a post and ring style unit. Low-security units range in price from \$250.00 to \$1000.00 each, depending on style and capacity. Preferred units are easy to use without written or pictorial instructions, and support the frame of the bike, not the wheel alone. They also allow one wheel to be locked with the bike and/or two bikes to be locked together.

Low profile racks that only support the bicycle by the front wheel are not recommended. These “wheel bender” style racks can result in damage to rims and other components caused by the bicycle falling over.

When siting parking facilities, cyclist comfort and security (for both the cyclist and his/her property) should be considered. Some recommended locations for installation include:

- Near main doorways of well-used entrances to buildings;
- Along surveillance corridors, or areas that pedestrians frequently travel or across from windows;
- In well-lit areas;
- Under canopies or roof overhangs;
- On flat surfaces; and
- In accessible areas from the perspective of bicycle manoeuvring and ease of connection to the rack.

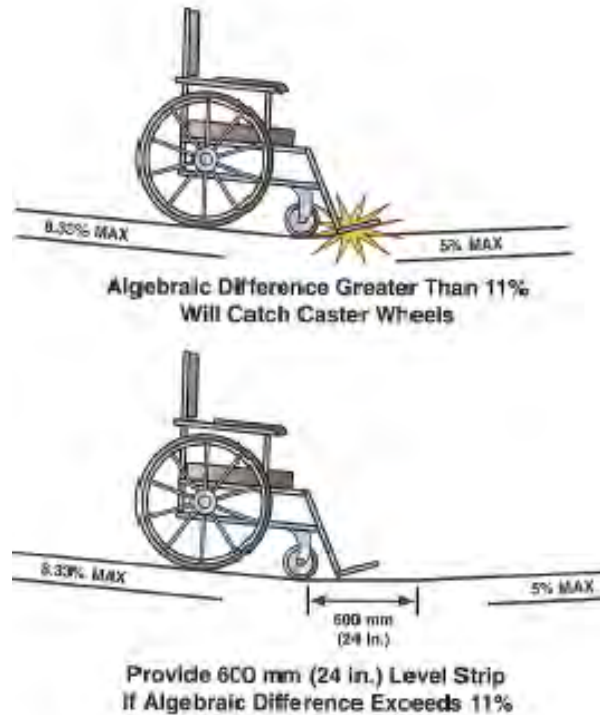
### 5.10 Accessibility for Users with Disabilities

The Ontario Disabilities Act states that “The people of Ontario support the right of persons of all ages with disabilities to enjoy equal opportunity and to participate fully in the life of the province” (ODA, 2001). Bill 118 (AODA) and Bill 125 (ODA) recognize the need to provide for accessibility standards, improve opportunities and facilitate the removal of barriers in order to enable persons with disabilities to fully participate in the life of the province.

Pathways and trails can be universally designed to meet the needs of all types of users and accommodate a full range of abilities; however, not every portion of trail can be adapted or is desired to accommodate each individual user. Though it is certainly desirable to have every trail within the system completely accessible to all levels, users both require and desire different trail experiences. Some trails may present major obstacles to adaptation, while others may be designed with the intent to present a rugged experience for a particular user group. Overall, the entire trail system should incorporate a high level of accessibility into existing and future trails, enabling the majority of trails to be enjoyed by all users at all levels.

When attempting to make the pathway or trail "accessible", we generally refer to design standards suitable for use by those with mobility aids such as wheelchairs. If a pathway or trail can achieve conditions suitable for mobility aid use, it can generally accommodate a wide range of physically challenged users, including the elderly. Several levels of trails may become interwoven into the fabric of the trail system; however, as accessible trails carry the most inclusively, the majority of trails within the system should be accessible.

Figure 5.3 Counter Slope Conditions. (AASHTO, 2004)



*“The purpose of the Accessibility for Ontarians with Disabilities Act is to improve opportunities for persons with disabilities and to provide for their involvement in the identification, removal and prevention of barriers to their full participation in the life of the province: (Bill 125, from [www.odacommittee.net](http://www.odacommittee.net) )*

Hard surfaced multi-use pathways and walkways, such as those constructed with asphalt or concrete, can be designed to most effectively meet accessibility needs. Hiking trails; however, typically provide a natural, more rugged experience and are harder to adapt and maintain as an accessible route.

It is desirable for the level of accessibility to increase when in proximity to destination point or along arterial routes. The level of accessibility should be based on the intended use of a trail and be conscientious of landscape sensitivities (i.e. environmental, heritage, etc), regarding the physical characteristics of the trail design. The following are some general guidelines that can be applied to walking trails and multi-use pathways to bring them up to a level of accessibility suitable for mobility aid use.

### **5.10.1 Grade**

Grades should generally range under 5%, with the ideal situation providing for no grades greater than 2% - 3% in order to accommodate a wide range of users. Cross slopes are recommended to be no greater than 2%. A cross slope of 2% is what you would see on municipal sidewalks. A grade greater than 5% is acceptable but only for short distances, preferably less than 9 metres. Long climbs between 5% and 8% should be broken up with level areas measuring at least 1.5 m in length providing the opportunity for the user to stop and rest, and / or manoeuvre within the trail or pathway. Trails with grades that exceed 8% may be unsuitable for some users.

Entrances to a pathway or trail facility should have a smooth transition in grade. This can include curb transitions such as curb ramps and curb cuts. The length needed for a curb transition is dependent of the change in elevation. It is generally recommended that curb transitions cover a minimum length of 1.5 m to enable a comfortable transfer between the elevation changes. At the top of the curb transition, it is suggested that a level landing with a minimum recommended depth of 1.065 m (1.5 m preferred) be provided to enable for manoeuvring space. In addition, it is recommended that the counter slope of the gutter, the point where the ramp encounters the lower grade, should be no greater than 5%. The juncture between the gutter and the adjacent curb ramp should be flush, and the algebraic difference in slope should not exceed 11%

### **5.10.2 Width**

Optimally, accessible routes should measure 1.5 metres wide. Pathways or trails measuring less than 1.5 metres across should be widened to 1.85 metres at least every 60 metres to enable passing. Generally, 1.2 metres is the minimum recommended width for two-way pedestrian traffic while 1.5 metres is the preferred width. As mentioned, 1.85 metres is the width

required for two people using a mobility aid such as wheelchairs to pass one another however, the recommended width is 3.0 metres and upwards.

### **5.10.3 Travel Surface**

The surface treatment should be firm, smooth, and stable. Asphalt paving is ideal although wooden boardwalks are also acceptable. When installed correctly, asphalt surfacing will maintain effectiveness for 10-15 years without having to be repaired or replaced. Elevation changes along accessible routes (caused by changes in materials, the warping of wooden boards, curb cuts, etc.) should measure no more than 13 mm and are best avoided altogether. Similarly, gaps in the surface of the pathway or trail, such as the spaces between wooden decking or the holes found in metal grates, should never measure more than 13 mm across and these gaps should be arranged to run perpendicularly to the movement of traffic along the route. The surface of all travel areas (e.g. walks, ramps, stairs, boardwalks, rest areas) should be well drained and free of water trapping depressions.

### **5.10.4 Pathway and Trail Edges**

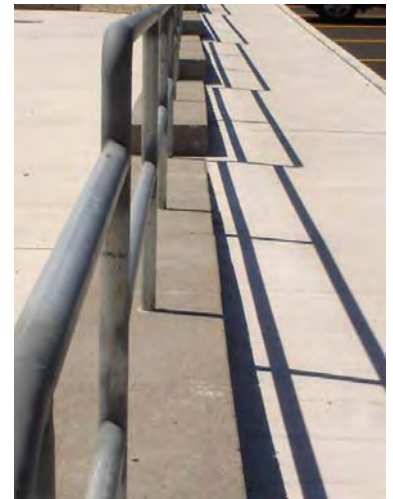
Edges with adjacent drops should be adequately protected by a minimum 50 mm high curb, a protective wall, railing or guard, depending upon the need defined by the specific situation. This should be carefully considered to minimize hazards to all users, not just those with disabilities. Where there exist steeply sloped areas adjacent to the edge, a distinct boundary edge is also recommended such as a curb or retaining wall. To assist the visually impaired, contrasting colours or materials should be used at edges to clearly delineate the pathway edge.

### **5.10.5 Handrails or Guards**

Handrails or guards should be a maximum of 50 mm wide, easy to grip and mounted at a height ranging between 856 mm to 965 mm above the travel surface. It is recommended that handrails or guards be smooth and continuous in order to avoid breaking the handhold.

### **5.10.6 Bollards, Gates and Barriers**

Vertical barriers are used to limit or control access in order to protect the user or the natural environment. Though they may be installed for safety reasons, they may discourage or disrupt usage in places where users are allowed. Where appropriate, flexibility can be integrated into the design and installation of barriers in order to provide for reasonable access. In the case of bollards, it is possible to install collapsible or removable bollards in order to allow access for service or emergency vehicles. Where appropriate, such bollards may be considered in lieu of permanent barriers. Gates or fences with openings also allow access. Examples include offset



*Handrails are an important accessibility tool that can assist users and prevent unnecessary injury.*



and self-closing swinging gates or P-gates (typically used by the Town of Markham). When considering the type of barrier to be installed, thought should be given to all users including those employing mobility aides such as wheelchairs. Full accessibility may not always be plausible, as the setting or context of the location (i.e. Heritage site) may delegate the type of barrier, however wherever possible should be employed.

### **5.10.7 Amenities**

All accessible amenities and facilities need to be connected by accessible routes. For instance, accessible parking and lookout areas should be linked to an accessible portion of the route at the closest possible location. Rest areas are desired to be located no further than 60 metres from accessible parking and should be equipped with a number of seating structures and picnic tables suitable for mobility aid users, an accessible source of drinking water, and accessible washrooms. Amenities in particular are not required in order to have an accessible trail; however, if provided they should meet accessibility standards.

The following other amenities should be linked with accessible routes:

- play areas
- garbage receptacles, including recycling and green bin alternatives
- bridges and boardwalks
- telephones
- benches

### **5.10.8 Loop Trails**

When considering accessible routes, priority should be given to shorter loop trails at a neighbourhood and local level. These will allow those with physical challenges to take advantage of portions of the system. These users may be less able to use long linear systems. Loop trails at the local level or within the urban areas, should be made accessible to serve the widest variety of users.

Though it may not be feasible or practical to implement accessible design throughout the entirety of the pathways and trails network, opportunities should be explored and appropriate facilities provided where possible. For further information pertaining to making facilities accessible to people with a variety of physical challenges refer to the ***Town of Markham Accessibility Design Guidelines***. Information is also available from the Ministry of Ontario Health Promotion and Ontario Trails Council regarding accessible trail design, layout and construction, and related aspects and issues. Additional detailed information can also be found in the ***Ontario Building Code - Exterior Ramps***.



*Signage which highlights accessible routes should be displayed prominently to allow for way finding along the accessible parts of the network. Example above of signage used by ADAAG Trail Accessibility Guideline compliant trails.*

[www.access-board.gov](http://www.access-board.gov)



*Photograph: Interpretive Sign at  
Tannery Pond Boardwalk*