

8

MAINTENANCE AND OPERATIONS



Current standards, general considerations and best practices for year-round maintenance of the CWATS network.

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CHAPTER 8 | MAINTENANCE AND OPERATIONS

Maintenance is imperative to supporting high-quality routes and facilities, and encouraging and promoting comfortable, safe and convenient use of an active transportation network all year-round. The maintenance of active transportation facilities can help leverage capital investments, mitigate a user's exposure to risk, minimize potential conflict between users, mitigate liability exposure for the County, local municipalities and ERCA, and maximize the lifespan of the facility.

The CWATS Master Plan Update is meant to be a guide not only for planning, design and implementation, but also for the on-going operations and maintenance of routes and facilities that form part of the CWATS network. As the CWATS network continues to expand, maintenance practices and level of service standards should be reviewed and modified when necessary to address new facilities, available resources and the public's expectations. It is important that resources, time and funding from the County, local municipalities, ERCA and other partners responsible for the implementation of CWATS, be allocated for the operation and maintenance of active transportation routes and facilities.

The following sections are intended to be used as a reference as the CWATS Master Plan Update is implemented and to provide key insights and best practices for the County of Essex, its local municipalities and ERCA regarding maintenance and operations of CWATS routes and facilities.



8.1 Building upon the recommendations from the 2012 CWATS Master Plan

Following the completion and adoption of the 2012 CWATS Master Plan, over 500 kilometres of the CWATS network has been implemented as of Summer 2022. Since 2012, a number of guidelines and standards have been established and / or amended to provide guidance on best practices for maintenance of on and off-road facilities. This includes updates to the Ontario Provincial Reg. 366/18: Minimum Maintenance Standards (MMS) for Municipal Highways (updated in 2018), the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (updated in 2017) and Ontario Traffic Manual (OTM) Book 18: Cycling Facilities (developed in 2013 and updated in 2021).

In addition to new and updated guidelines, the County's demographic profile including factors such as population, income and mobility patterns has changed since the original CWATS Master Plan was adopted. Changes to guidelines, standards and demographic trends highlight the importance of updating the 2012 plan by building upon what was originally recommended and identifying potential new recommendations based on the current and future needs of the County and its local municipalities as well as maintenance best practices. The information contained in this chapter is not intended to “reinvent the wheel”. It is meant to provide an overview of key information, current standards and best practices to help shape maintenance recommendations (new and old) that can guide next steps for the CWATS network.

8.2 General Maintenance Considerations

There is no “one-size fits all approach” to maintenance and operations. As the CWATS network continues to expand, maintenance practices should adapt to reflect new routes, equipment and expectations for safe and comfortable facilities. The information contained in the following sections is intended to be used as a reference as the CWATS network continues to be implemented over time.

8.2.1 Who Does What?

Like with many other matters, maintenance and operations of the CWATS network will require on-going coordination between County staff and its local municipal partners. Guidelines outlining who is exactly responsible is important to support efforts to ensure all active transportation facilities are maintained to a state of repair that is appropriate and consistent throughout the network. Establishing a charter is one way to clearly define the roles and responsibilities of each level of government in maintaining the physical maintenance of infrastructure.

There is no universal precedent within Ontario on who does what. Upper and lower tiers municipalities in Ontario typically establish protocols and/or agreements for AT infrastructure maintenance. Similar to road maintenance, most municipalities simply assign responsibility for on-road and off -road AT facility maintenance based on the jurisdiction that “owns” the roadway or corridor. The underlying principle being that primary liability is linked to the owner. This is mostly the case across

the County of Essex today, where the maintenance of paved shoulders, bike lanes and other on-road cycling infrastructure is the County’s responsibility on County roads, and the local municipality’s on local roads. For off-road facilities, AT / Trail facilities are typically the responsibility of the local municipality or a conservation authority (e.g. ERCA). Although the Ontario Municipal Act requires local municipalities to maintain all sidewalks under their jurisdiction, it is not entirely clear whether this legally applies to multi-use pathways however most municipalities typically assume that if a multi-use pathway is implemented in place of a sidewalk, that the local municipality is typically responsible for its construction and maintenance.

Through discussions between the County and local municipalities, a hierarchy (as shown in **Figure 110**) was devised and is recommended for CWATS to more clearly define roles and responsibilities related to active transportation facility maintenance. It is based upon practices by other comparable upper and lower tier municipalities. Exceptions to this approach may be assumed through specific agreements between the County and local municipalities and / or ERCA.

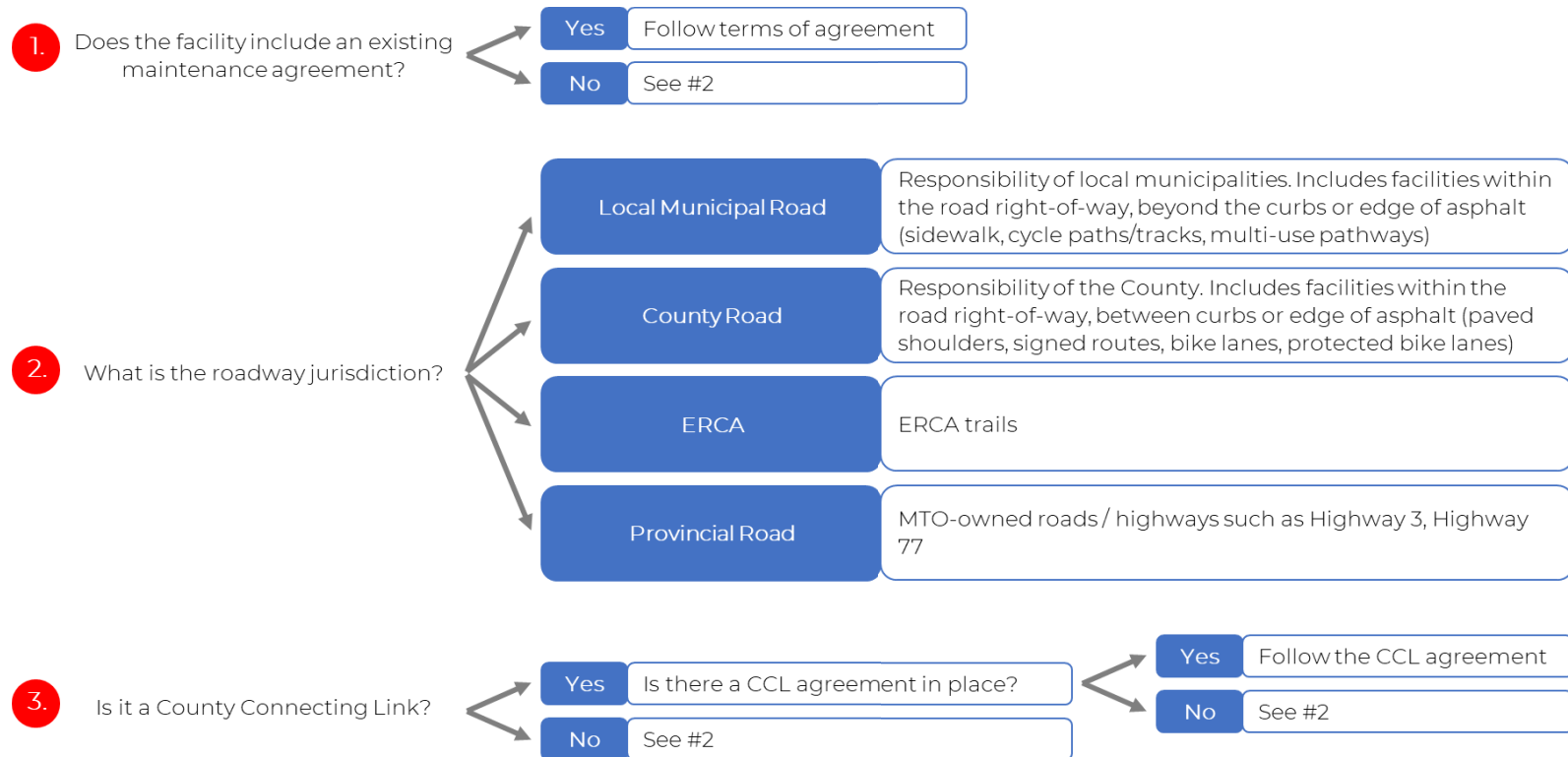


Figure 110: Flowchart of Maintenance Roles and Responsibilities

8.2.2 Provincial Minimum Maintenance Standards

The Province of Ontario established the Minimum Maintenance Standards (MMS) for Municipal Highways to set out minimum standards for repairs of roadways under municipal jurisdiction. The MMS outlines standards for various elements of road maintenance and operations including the frequency of road inspections, weather monitoring, ice formation on roadways, snow accumulation, and sidewalk trip edges.

Under the MMS, municipal roads are classified based on their average annual daily traffic (AADT) and posted speed limits – based on these road classifications, there are designated minimum levels of repair and inspection. **Table 19** outlines these roadway classifications based on AADT and posted speed limits.

Table 19: Road Classifications based on the Minimum Maintenance Standards

AADT	91 - 100 km/h	81 - 90 km/h	71 - 80 km/h	61 - 70 km/h	51 - 60 km/h	41 - 50 km/h	1 - 40 km/h
53,000 or more	1	1	1	1	1	1	1
23,000 - 52,999	1	1	1	2	2	2	2
15,000 - 22,999	1	1	2	2	2	3	3
12,000 - 14,999	1	1	2	2	2	3	3
10,000 - 11,999	1	1	2	2	3	3	3
8,000 - 9,999	1	1	2	3	3	3	3
6,000 - 7,999	1	2	2	3	3	4	4
5,000 - 5,999	1	2	2	3	3	4	4
4,000 - 4,999	1	2	3	3	3	4	4
3,000 - 3,999	1	2	3	3	3	4	4
2,000 - 2,999	1	2	3	3	4	5	5
1,000 - 1,999	1	3	3	3	4	5	5
500 - 999	1	3	4	4	4	5	5
200 - 499	1	3	4	4	5	5	6
50 - 199	1	3	4	5	5	6	6
0 - 49	1	3	6	6	6	6	6

In 2018, the MMS were amended and introduced provisions for the maintenance of walking and cycling facilities, specifically:

- Winter maintenance standards for **bicycle lanes**;
- Winter maintenance standards including patrol obligations for sidewalks;
- The ability for municipalities to declare a significant weather event with implications for winter maintenance on roadways, bicycle lanes and sidewalks during the duration of the event; and
- Inspection standards for areas adjacent to sidewalks.

The MMS defines “bicycle lanes” as:

- i. A portion of the roadway that has been designated by pavement markings or signage for the preferential or exclusive use of cyclists; or
- ii. A portion of a roadway that has been designated for the exclusive use of cyclists by signage and a physical or marked buffer.

This does not include in-boulevard multi-use pathways. If a multi-use pathway commonly functions as a pedestrian facility, then it is recommended that a municipality’s sidewalk maintenance level of service standard should apply.

Table 20 outlines the MMS level of service for snow accumulation in bicycle lanes based on the roadway class. After snow accumulation has ended, snow is to be reduced to a depth less than or equal to that shown in **Table 20**, to provide a minimum horizontal operating space of 1.0 metres for cyclists.

Table 20: MMS for Snow Accumulation on Bike Lanes

Road class	Depth	Removal time for snow on roadways	Removal time for snow on bike lanes
1	2.5 cm	4 hours	8 hours
2	5 cm	6 hours	12 hours
3	8 cm	12 hours	24 hours
4	8 cm	16 hours	24 hours
5	10 cm	24 hours	24 hours

WHAT DOES THIS MEAN?

- i. After becoming aware of snow accumulation on a bicycle lane is greater than the depth set out in **Table 20**, to deploy resources as soon as practicable to address the snow accumulation; and
- ii. After the snow accumulation has ended, to address the snow accumulation so as to reduce the snow to a depth less than or equal to the depth set out in **Table 20** to this section to provide a minimum bicycle lane width of the lesser of 1 metre or the actual bicycle lane width.

As per the updated MMS, municipalities may declare the beginning or end of a significant weather event as per the definition provided in the regulation:

Significant weather event

An approaching or occurring weather hazard with the potential to pose a significant danger to users of the highways within a municipality, such as high winds.

Weather hazard

Weather hazards determined by Environment Canada as meeting the criteria for the issuance of an alert under its Public Weather Alerting Program.

The MMS states that a municipality may declare a significant weather event by one or more of the following ways:

1. By posting a notice on the municipality’s website;
2. By making an announcement on a social media platform, such as Facebook or Twitter;
3. By sending a press release or similar communication to internet, newspaper, radio or television media;
4. By notification through the municipality’s police service; and
5. By any other notification method required in a municipal by-law.

Lastly, the MMS outlines the following standards for snow accumulation and ice formation on **sidewalks**:

Table 21: MMS for Snow Accumulation and Ice Formation on Sidewalks

Snow Clearing	Ice Prevention	Ice Treatment
<ul style="list-style-type: none"> - Reduce snow to a depth of 8 cm or less within 48 hours. - Maintain a minimum sidewalk width of 1 metre. 	<ul style="list-style-type: none"> - If practicable, prevent ice formation (or improve traction) within 48 hours starting from the time the municipality determines the appropriate time to deploy resources. 	<ul style="list-style-type: none"> - Treat the icy sidewalk within 48 hours, and an icy sidewalk is deemed to be in a state of repair for 48 hours after it has been treated.

The MMS defines “sidewalks” as:

- The part of the highway specifically set aside or commonly understood to be for pedestrian use, typically consisting of a paved surface but does not include crosswalks, medians, boulevards, shoulders or any part of the sidewalk where cleared snow has been deposited.

In locations where an in-boulevard multi-use pathway is existing and functions as a pedestrian connection, many municipalities apply the sidewalk maintenance standards for the in-boulevard multi-use pathway.

PAVED SHOULDERS

Although paved shoulders are not “bicycle lanes” as defined in the MMS, on roads signed as a bicycle route and where a paved shoulder is provided to accommodate cycling, an all-season winter maintenance strategy should be developed. This can be integrated with the County’s rural road maintenance strategy for maintenance, road repairs and snow clearing. A significant portion of the CWATS network that is located on County roads includes paved shoulders. CWATS routes located on municipal roads have designated cycling infrastructure including bike lanes, cycle tracks and in-boulevard multi-use pathways.

8.2.3 Existing Maintenance Practices in Essex County

The County adheres where feasible to the Province's Minimum Maintenance Standards for Municipal Highways to guide year-round maintenance of roads and active transportation facilities that are located within the road right-of-way. As per its current Paved Shoulders Policy, all paved shoulders along County roadways within the CWATS network are maintained to the same standard as the roadway.

The County is responsible for maintaining ~716 linear kilometres of roadway including:

662.8 km
County roads

53.2 km
County-connecting links

Figure 111 illustrates all County-owned roads and County-connecting links within Essex County. Under current agreements, maintenance for facilities on County Connecting Links remains the responsibility of the municipality which holds jurisdiction. It is recognized that the terms and status of County-connecting links including ownership, maintenance roles and criteria for these links, could change due to recommendations in the County's Road Rationalization Study and/or future County policy changes.

The County also has a Salt Management Plan ([here](#)) that outlines winter maintenance services and the use of road salt. The plan establishes time-oriented objectives and provides an overview of new technologies that could be considered for integration into the County's winter maintenance practices. The Salt Management Plan also emphasizes the importance of establishing service standard levels for various active transportation facility types to support year-round maintenance of the CWATS network, ensure user safety and minimize the County's exposure to liability and risk.

The Salt Management Plan is organized into ten (10) topics, that each outline best management practices, performance measures, targets, and environmental considerations. The 10 topics covered in the Salt Management Plan include:

1. Winter Maintenance Policies
2. Equipment Upgrading, Calibration and Washing
3. Equipment Maintenance
4. Materials
5. Storm Response
6. Winter Patrol
7. Snow and Ice Control Training
8. Technology Review
9. Communications
10. Environmentally Sensitive / Vulnerable Areas

County-connecting links

These roads are owned by and are under the jurisdiction of the local municipality. The County has entered into a maintenance agreement to provide limited and focused services on behalf of the local municipality.

Under the County Connecting Link agreements, the County is responsible for specific and limited maintenance activities based on a 7.0m pavement wide representing two through travel lanes.



662.8 km County-owned roads

53.2 km County-connecting links

Figure 111: County of Essex Road Jurisdiction











8.2.4 Asset Management

Active transportation infrastructure is an asset for the County and its partners. Asset management can help to address growth, improvements and maintenance of the CWATS network, while achieving the desired standards for level of service. Asset management also seeks the most cost-effective way to establish desired levels of service while optimizing resources. Components of an asset management strategy can include:

- Work with maintenance staff during the planning and design stages to ensure they have the equipment and resources available to maintain new CWATS routes.
- Maintain a GIS inventory to track active transportation infrastructure and other elements like bollards, bridges, pavement markings, parking, signs, etc.
- Develop maintenance level of service standards for items such as pavement, signage, markings and winter and non-winter maintenance activities.
- Schedule routine inspection and maintenance activities to meet level of service standards.
- Develop an asset management plan to include capital and operating lifecycle costs based on service levels.
- Maintain a database of actual costs of facilities to help with budgeting for future projects.
- Set and adjust asset management plans and budgets as necessary to meet targets.

Table 22 outlines asset management strategies and typical service life for various elements of an AT network.

Table 22: Asset Management Strategies for AT Infrastructure

Image	Type	Useful life	Strategies
	Asphalt pathway	25 years	<ul style="list-style-type: none"> - Minor repairs - Resurfacing - Rehabilitation - Full-depth replacement
	Concrete pathway	50 years	<ul style="list-style-type: none"> - Minor repairs - Replace deteriorating segments - Full replacement
	Bridge (AT or motor vehicle)	25 to 75 years	<ul style="list-style-type: none"> - Bridge repairs - Minor rehabilitation - Full replacement
	Culvert	25 to 50 years	<ul style="list-style-type: none"> - Culvert repair - Minor rehabilitation - Full replacement
	Painted Line Markings	1 year	<ul style="list-style-type: none"> - Refresh annually
	Durable Line Marking and Symbols	2 to 7 years	<ul style="list-style-type: none"> - Refresh annually or depending on wear
	Signage	20 years	<ul style="list-style-type: none"> - Depends on type, weather conditions, amount of wear
	Delineators (bollards, curbs, planters, etc.)	Until damaged	<ul style="list-style-type: none"> - Replace damaged or faded signs

On-going maintenance of CWATS routes and facilities can help leverage capital investments, encourage year-round use of the network, support user comfort and safety, and increase the overall lifespan of infrastructure. It is recommended that year-round maintenance practices be considered for the CWATS network including:



SWEEPING



PAVEMENT MARKINGS + SIGNAGE



SNOW CLEARANCE + ICE CONTROL



SURFACE REPAIRS



VEGETATION MANAGEMENT



DRAINAGE IMPROVEMENTS

As the CWATS network continues to be implemented, it is recommended that maintenance practices and the level of service be adapted to address new facilities, expectations of the public and give consideration to Provincial minimum standards. The following sections provide an overview of typical maintenance practices for AT infrastructure during non-winter and winter seasons.

8.3 Non-Winter Maintenance

There are a number of maintenance practices that can be applied during non-winter months to help improve a user's sense of comfort and safety, and to help maintain the overall lifecycle of the infrastructure. Listed below is a detailed overview of key maintenance activities during non-winter months and the suggested level of service for the criteria.



Sweeping

A range of debris may accumulate on surfaces used by active transportation users including gravel, garbage, glass, sand and wet leaves. Cyclists and pedestrians are more affected by surface conditions than other roadway users and / or vehicles and are more prone to harm as a result of unexpected objects in their line of travel.

Considerations for sweeping could include:

- Clear active transportation facilities of debris (such as bike lanes) using mechanical sweepers
- Bike lanes also may require more frequent sweeping than roadways because the weight and speed of motor vehicles tend to push debris into the bike lane (and against the curb).
- Clear sand and other debris at the beginning of the spring season when there is no more frost to prevent damage the facility.
- Avoid sweeping debris from the roadway onto pathways and sidewalks (and vice versa).
- Install garbage receptacles along facilities with high volumes of pedestrians.



Surface Discontinuities

Surface discontinuities such as bumps or depressions within the surface can be a hazard to cyclists, pedestrians and other users engaged in active forms of recreation and travel. Surface discontinuities typically require that the offending materials be broken out and reset.

Any work undertaken to address surface discontinuities should be carefully addressed to avoid potential impacts or the development of new defects within the existing pavement. Where possible, it is recommended that any work be scheduled in conjunction with future planned capital projects to maximize efficiencies, cost-savings and disruptions areas surrounding the construction. As such the entire pavement area can be refreshed either at the same time as the remedial works, or shortly after temporary works, and before new defects can form.



Signage + Pavement Markings

Cyclists, pedestrians and other active transportation users rely on signage for guidance and direction. Signage allows users to find their way through a network of different routes and facilities, and a missing or ineffective sign, can cause a user to lose their way.

Currently, the County monitors the status of current signage and services all replacements, as required to maintain proper visibility. Consistent with standards and guidelines outlined in OTM Book 18 and the TAC Geometric Design Guide for Canadian Roads, regulatory signage should be installed on all active transportation routes including on and off-road facilities. As such, regulatory signage should receive priority for maintenance and repair because these signs indicate the rules of the road.

Signage can become discoloured and lose reflectivity, and is sometimes subject to theft, damage and vandalism. Signage should be part of regular roadway inspection to ensure they are kept in good condition. Signage should be replaced if it is discoloured, damaged or has lost reflectivity.

On-going maintenance of regulatory signage is specifically important in the winter when pavement markings may be obstructed by snow and road users rely on signage.



Cracking

There are three (3) main types of cracking:



Longitudinal cracks run parallel to the centreline of the pavement caused by a poorly constructed joint, shrinking asphalt layer, reflection crack of an underlying layer or segregation due to improper paver operation.



Transverse cracks run across a pavement, perpendicular to the direction of the road, often caused by thermal expansion or a reflection crack of an underlying layer.



Alligator cracks form a pattern that looks like reptile scales caused by problems beneath the asphalt in the underlying layers.

Repairs to cracks can:

- Eliminate or minimize the intrusion of water into the pavement structure, reducing the occurrence of freeze-thaw.
- Prevent the loss of aggregate from the edges of the cracks.
- Reduce the rate at which the pavement deteriorates, preventing premature failure of the pavement structure.



Potholes

Potholes are formed when there is inadequate drainage of water resulting in standing water that works its way into the road surface through cracks. As water enters, the road surface weakens and due to the weight of passing vehicles, the road surface can become progressively worse and road surface material can erode in spots (i.e. potholes).

Though the likelihood of potholes forming in bike lanes is reduced since bicycles are much lighter than motor vehicles, potholes can be hazardous in locations where cyclists share the same road with other vehicles. Potholes could have several impacts to cyclists and their bikes including bent rims, punctured tires, loss of control, and potential falling into the path of motorized traffic.

Considerations for addressing potholes include:

- As part of roadway inspections, specific consideration should be given to potholes in bicycle facilities, including paved shoulders and motor vehicle lanes used by cyclists.
- Use temporary hazard markers to identify potholes and warn cyclists.
- Repair potholes in accordance with the timelines outlined by the road authority (e.g. County, Local) or at the earliest opportunity.
- Check the integrity of repairs during roadway inspection until full resurfacing can be undertaken.



Surface Drop-off at Shoulders

Pavement drop-offs occur when the vertical distance between the pavement surface and the adjacent materials (i.e. granular shoulder) is too great. This can be hazardous to cyclists using the shoulder, since they can lose control and fall, possibly into the travelled lane. In addition, edge drop will make it difficult for cyclists to re-enter a bike lane since the side of the tire will impact the vertical edge of the pavement, potentially causing the cyclist to fall.

Considerations for addressing surface drop-offs include:

- As part of roadway inspections, inspect all paved shoulders for edge drop-offs.
- As part of future road reconstruction / resurfacing projects, ensure that the gravel adjacent to the paved shoulder is well compacted and flush with the surface of the asphalt.



Vegetation Management

Trees, shrubs and other vegetation can add value like shade and aesthetics to active transportation facilities. However, they also present maintenance challenges. Roots may cause surfaces to break up, fallen leaves may block drainage grates and foliage may reduce visibility. Protruding branches can catch passing cyclists and reduce the effective width of the facility. The prevalence of vegetation along multi-use paths makes maintenance on those routes particularly important.

On a routine basis, it is suggested that maintenance crews remove or cut back any shrubbery, long grass, brush or vegetation encroaching on the facility or blocking signage, signal heads or sightlines. Low-hanging branches extending over facilities should have a clearance of 2.6 metres as well, based off guidance provided within OTM Book 18. Inspections should be completed, and preventative measures taken to ensure that vegetation does not obscure road signs. Any encroachment should be cleared at the earliest opportunity. Removal of obstructions at roadway intersections and trail crossings should also be prioritized.

In addition to these maintenance practices, consideration should be given to maintaining active transportation infrastructure during winter months where feasibility and budgets permit to support year-round use of the CWATS network and to enhance active transportation as a viable transportation mode. The following section outlines various maintenance practices that could be considered during winter months.



Drainage Improvements

Water formation can lead to slippery conditions and an accelerated freeze-thaw process that can cause the pavement surface to break down. Standing water can also obscure debris and surface defects that may damage bikes or cause cyclists to lose control.

Water can also pond due to inadequate cross-slopes. The drainage of adjacent traffic lanes should be reviewed at the same time as that for the cycling facility. This can provide cost-efficiencies and minimize any splashing into the bike facility that may occur from standing water in the roadway.

Considerations for addressing drainage include:

- Clean drainage facilities including catch basin grates, gutters and culverts.
- Adjust the maintenance frequency based on need, the season and the amount of vegetation near the bicycle facility.

8.4 Winter Maintenance

In recent years, many municipalities in Ontario have expanded maintenance services on their active transportation routes for year-round use, by outlining clear and achievable winter maintenance standards. These standards often reflect the guidance that have been set out by the Province of Ontario in the Minimum Maintenance Standards (MMS) for Municipal Highways, which include provisions for winter maintenance on bicycle facilities and sidewalks.

Table 23 provides an overview of key maintenance activities and suggested service levels that are consistent with the 2018 amendments to the MMS for Municipal Highways.

Table 23 : Service Levels for Winter Activities

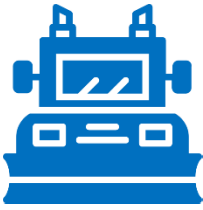
Activity	Prioritized Bicycle Facility (equivalent to MMS Class 1 Road)	Other Bicycle Facilities
Snow Clearing	Maintain to the same standard as adjacent road. Bare pavement within 8 hours of the end of snow event or by 7 a.m. on a weekday.	Maintain to 2.5 cm within 24 hours
Ice Treatment	Treat within 3 hours or by 7 a.m. on a weekday.	Treat within 16 hours
Ice Prevention	Proactive anti-icing approach applied prior to storm event.	Optional

Table adapted from the OTM Book 18 Update.

The following section provides additional information and consideration for addressing snow clearing, ice treatment and ice prevention on active transportation routes.



*Figure 112: Snow along an on off-road trail in Leamington
Source: WSP Canada*



Plowing

Most on-road facilities, such as paved shoulder and bike lanes, are plowed simultaneously with the rest of the roadway. Separated bike lanes are plowed separately from the main road and are less likely to get covered in slush from car traffic, but they are sometimes covered in windrows from passing road or sidewalk plows. Separated bike lanes typically utilize smaller plows to remove snow from one-way facilities; two-way facilities are often maintained with a combination of plows and small trucks with salting machines



De-icing

Both dry salt and pre-wetted salt are often used on bike lanes to help prevent snow and ice from sticking to the surface and to keep the pathway clear of snow and ice. It is important to note that bicycles with exposed gears are especially susceptible to corrosion caused by roadway salt. Also, due to narrow tires and reduced weight, bicycles may not crush salt as effectively as motor vehicles and other solutions should be applied to help support the safety for all road users.



Snow and Ice Control

On-street cycling facilities that are often used for commuting purposes in urban areas are typically cleared before and more frequently than lesser used facilities in significant weather events. For example, in the City of Hamilton bike facilities are cleared as per the priority ranking of the street they are on, thus the service level for cyclists is equal to the roadway service level. A proactive anti-icing approach can be applied prior to a storm event, usually resulting in less de-icing and snow clearing required. Some jurisdictions have tried utilizing a brine solution since it has a quicker reaction time and less material is required. However, it can be more corrosive to bicycle components and harmful to the environment. A broom can also be used for a final pass on a bike lane. Sweepers are effective at clearing to bare pavement for the final 2 cm, especially when combined with a brining solution.



Winter maintenance on off-road trails

Off-road trails typically have different maintenance considerations during winter months compared to on-road facilities. Not all municipalities or conservation authorities maintain trails during winter months. Several municipalities in Ontario have identified a winter network where key portions of off-road trails are maintained. Maintenance for trails during winter can include clearing pathways and paved trails when the snow accumulates past a certain amount and / or after a particular amount of time has passed following a snow event. For example, the City of Edmonton clears the River Valley Trails when snow reaches at least 2.5 cm or 1 inch and operations staff begin clearing paved trails within the River Valley within 48 hours of snowfall event.

Specialty Equipment

Not all active transportation facilities are designed using the same materials and dimensions. Many municipalities in Ontario have a fleet of smaller, specialized snow-clearing vehicles to be utilized on different types of active transportation facilities. For example, Montreal uses the Blue Gryb Rotating Icebreaker to break up ice along bike lanes and sidewalks and then a plow follows to clear the ice and snow from the lane to help cyclists, pedestrians, and mobility devices freely move through the network. The following photos provide examples of the different types of equipment that are being used by other jurisdictions to maintain active transportation facilities in the winter.



SIDEWALK PLOW CLEARING A VERTICALLY SEPARATED CYCLE TRACK
Location: City of Toronto



BLUE GRYB ROTATING ICEBREAKER CRUSHING ICE ON A SIDEWALK
Location: City of Montreal



WINTER MAINTENANCE VEHICLE WITH BRUSH ATTACHMENT
Location: City of Hamilton

Figure 113: Sample of Speciality Equipment for Winter Maintenance
Source: Adapted from OTM Book 18 Update

8.5 Cost Considerations

To support year-round use of the CWATS network, additional consideration should be given for enhanced summer and winter maintenance of active transportation infrastructure. It is recommended that the County and its partners use the information contained in this chapter regarding general maintenance considerations, non-winter maintenance practices, winter maintenance practices and lessons learned from other jurisdictions, to help establish a level of service (LOS) standard for summer and winter maintenance of CWATS routes and facilities.

Enhanced maintenance of the CWATS network could include repairs to potholes, shoulder drop-offs, pavement cracks and line markings, replacement of route signage as well as the removal or sweeping of debris. **Table 24** summarizes typical annual maintenance costs for components of an active transportation network:

Table 24: Maintenance Typical Unit Prices and Assumptions

Item	Unit Price	Assumptions
Painted Line Markings	\$2.5 / m	Unit price is for a single 100 mm wide painted line marking, therefore assume - \$5 / m for both sides of the road. Maintenance cost assumes that painted line markings are fully replaced / renewed on an annual basis.
Cold Plastic Line Markings	\$5 / m	Unit price is for a single 100 mm wide cold plastic line marking, therefore \$10 / m for both sides of the road. Maintenance cost assumes that plastic line markings are replaced every 5 years (or 20% annually). See calculations below: - \$5 / m x 20% = \$1 / m

Mild winters in the County...

Essex County is located in the most southern part of Canada resulting in mild winter conditions. The County has one of the lowest averages for yearly snowfall compared to other municipalities in Ontario and Canada.

It is recognized that winter maintenance practices for active transportation infrastructure will differ from other municipalities highlighted in section 8.5 (specifically those with severe winter conditions) to reflect seasonal conditions and to meet the needs of the County and its local municipalities.

Item	Unit Price	Assumptions
Painted Stencils	\$50 each	Assumes stencils are placed every 75m as per OTM Book 18, therefore 26 stencils / kilometre on both sides of the road (13 signs on each side of the road). Maintenance cost assumes 30% of painted stencils will need to be replaced / renewed on an annual basis. This equates to \$400 per year. See calculations below: <ul style="list-style-type: none"> - \$50 x 26 = \$1,300 - \$1,300 x 30% = \$400
Cold Plastic Stencils	\$275 each	Assumes stencils are placed every 75m as per OTM Book 18. 26 signs in 1 kilometre on both sides of the road (13 signs on each side of the road). Maintenance cost assumes 30% of painted stencils will need to be placed / renewed on an annual basis. This equates to \$2,200 per year. See calculations below: <ul style="list-style-type: none"> - \$275 x 26 = \$7,150 - \$7,150 x 30% = \$2,200
Route Signs	\$200 each	Assumes 26 signs per kilometre (13 on both sides of the road / route). Maintenance cost assumes 5% of all signs will need to be replaced annually. This equates to \$260 annually. See calculations below: <ul style="list-style-type: none"> - \$200 x 26 = \$5,200 - \$5,200 x 5% = \$260
Sweeping Costs	\$2,400 to \$4,000 / km	Assumes sweeping frequency of 6 times a year per road km (uni-directional, one side of the road).

Annual maintenance costs for on and off-road active transportation routes will vary depending on a number of factors including:

- Level of service standard adopted and whether the maintenance of a facility can be incorporated into the County's and / or local municipal (depending on route jurisdiction) maintenance budget / program for roads or trails;
- Type of facility (the cost to maintain an on-road facility is expected to be incorporated into the overall road maintenance budget except for additional sweeping that may occur 1-2 times per year); and
- Context and location of the route.

Though price ranges for on and off-road facilities have been identified, an absolute dollar value for maintenance costs has not been calculated. It is recommended that the budget for maintenance grow incrementally along with the incremental growth and expansion of the CWATS network. As each new CWATS network segment is added, the impact to operations and respective budgets should be reviewed and updated as necessary by the County, local municipal staff and ERCA.



Figure 114: Road construction along County Road 50 in Oxley (implementation of paved shoulders along CWATS network)
Source: WSP Canada

8.6 Proposed CWATS Maintenance Strategies for Winter and Non-Winter

Building upon the information and best practices outlined in this chapter, the following maintenance strategies for the CWATS network have been developed for by the County, its local municipalities and ERCA.

WINTER MAINTENANCE STRATEGY

- i. It is recommended that along rural cross-sections roads that have paved shoulders and that form part of the CWATS network, that the paved shoulder be cleared of snow at the same time the road is being cleared / plowed. The snow along a paved shoulder should be cleared and pushed adjacent to or onto the gravel shoulder.
- ii. It is recommended that the County use their current fleet of equipment / vehicles to clear snow on paved shoulders that form part of the CWATS located on County Roads. Should the snow on paved shoulders not be fully cleared on the first pass, it is recommended that a second pass be done to clear all snow when feasible.
- iii. Along on-road bike lanes and cycle tracks, the County and local municipalities should adopt the Province's Minimum Maintenance Standards (O. Reg. 366/18) and make every effort to adhere to the guidelines for "bicycle lanes".
- iv. It is the current understanding that ERCA does not maintain their off-road trails in the winter, nor is this being recommended in the Master Plan Update. However, consideration could be given to maintain specific sections of hard-surfaced off-road trails that are located in urban areas to benefit users within local municipalities.

NON-WINTER MAINTENANCE STRATEGY

- i. It is recommended when feasible that routes along urban-cross section roads that form part of the CWATS network, be swept to remove debris from the facility. Bike lanes and cycle tracks on the CWATS network could require more frequent sweeping than roadways because debris easily collects against the roadway curb.
- ii. Refresh pavement markings and replace signage in the Spring as these are more likely to discolor, fade and be damaged during winter months. Assume that 20% of pavement markings and 5% of regulatory signage along CWATS routes will need to be replaced on an annual basis.
- iii. As part of roadway patrols, undertake annual inspections at the beginning of Spring to identify areas where maintenance and repairs are needed such as surface discontinuities and repairs to cracks, potholes and shoulder drop-offs.

- iv. It is recommended that local municipalities and ERCA undertake routine vegetation management along off-road trails (e.g. remove or cut back shrubbery, brush and vegetation that is encroaching on the facility or blocking sightlines, signage and / or signal heads).

ASSET MANAGEMENT CONSIDERATIONS

The following considerations are intended to build upon the County’s 2017 Assessment Management Plan (AMP) to ensure the CWATS network is integrated into all categories of the plan including level of service standards, key performance indicators, an asset management renewal strategy and the financial strategy. The following table outlines various considerations for asset management of the CWATS network, and how these could be integrated / help inform different sections of the County’s Asset Management Plan.

Table 25: Asset Management considerations and applicable sections from the County's 2017 AMP

Asset Management Considerations	Applicable section from the 2017 AMP ¹							
	4	5	6	7	8	9	10	
Maintain a digital / GIS database to keep inventory of active transportation infrastructure and other features such as bridges, pavement markings, pre-cast curbs, signs, etc.	✓	✓	✓				✓	
Meet with maintenance staff at the initial stages of a project to ensure they have the equipment and resources available to maintain a new facility.			✓					
Develop level of service standards for the various facility types as well as winter and non-winter maintenance activities.				✓	✓		✓	
Integrate CWATS into the County’s current assessment management strategies specific to condition assessment, life-cycle analysis framework, growth and demand, project prioritization and risk management.					✓		✓	
Maintain a database (and historical records) of actual capital, maintenance and operating costs of facilities to help inform future budgeting processes.						✓		

1. The 2017 Asset Management Plan sections include:

Section 4 - Data and Methodology

Section 5 - Aggregate Indicators

Section 6 - State of Local Infrastructure

Section 7 - Levels of Service

Section 8 - Asset Management Strategies

Section 9 - Financial Strategy

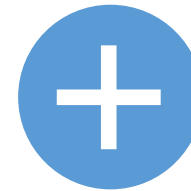
Section 10 - Infrastructure Report Card

8.7 Refining the CWATS Maintenance Recommendations

To enhance maintenance of the existing and proposed CWATS network, recommendations have been established to help inform how the County, its local municipalities and ERCA can collectively maintain and operate active transportation infrastructure within Essex County. This chapter provides key insights into current standards and best practices regarding maintenance of on and off-road active transportation routes. These recommendations build upon those that were recommended in the 2012 CWATS Master Plan as well as information and best practices discussed in this chapter. To distinguish this sourcing, all recommendations feature one of two symbols:






Previously recommended in the 2012 Plan (re-confirmed and to be implemented as part of the 2023 Update)



New recommendation in the 2023 Update

A full summary of the recommendations in this plan, including the previously proposed recommendations that have been implemented, is provided in **Technical Appendix A**.

Table 26: Summary of Policy Recommendations

- 
8.1 The County / local municipalities should consider that additional snow storage space be designed into the road cross section in their next review of respective road rights-of-way and design guidelines / standards.
- 
8.2 The County in partnership with its local municipalities and ERCA, should consider using and / or adapting the maintenance strategies identified in the Master Plan Update for winter and non-winter maintenance practices of the CWATS network. Guidelines stated within the Minimum Maintenance Standards (MMS) for Municipal Highways should be applied where applicable
- 
8.3 The County in partnership with its local municipalities and ERCA should identify specific maintenance and operation practices for specific facility types such including designated and separated facility that form part of the CWATS network. As new facilities are implemented, considerations should be given to whether the current maintenance practices address them appropriately.

 8.4

The County should review and consider developing a standardized method of reporting, documenting and addressing concerns related to CWATS maintenance and operation. The County should explore both online and manual reporting mechanisms.

Regular and appropriate maintenance is key to supporting an active transportation network. It can help protect capital investments from the County, local municipalities and ERCA by maintaining the lifespan of the infrastructure and encourage active transportation use year-round. It is recommended that the County review the maintenance standards and consider the various strategies to manage their active transportation network and consider on-going maintenance costs when implementing capital projects.