

Document 6 Asset Management Implications of the Transportation Master Plan Part 1

This document provides additional information on how certain policies, actions and projects included in the Transportation Master Plan will have construction/acquisition, operation, maintenance and renewal cost implications for the City.

Policy 1-1 Design the transportation system to achieve GHG emission reduction targets.

Capital investment is required to retrofit existing infrastructure to meet travel demands, achieve GHG emission targets and encourage a modal shift from automobiles to other transportation modes. Strategies include investments in sustainable transportation infrastructure, increased transit service, and increased support for electric vehicles. This will be further explored as part of the TMP Capital Infrastructure Plan.

Policy 1-3 Mitigate the effects of extreme heat on transportation system users.

Strategies to mitigate heat-related risks include increasing the coverage of canopy trees and ‘built’ shade infrastructure in urban environments. Following guidance from the Official Plan, shade is to be included in the design of new and reconstructed streets and transit stops and stations wherever possible.

Recognizing that there is variability by project and by context, updating design guidelines and standards to incorporate shade trees into new and reconstructed transportation infrastructure will have implications and costs. Adding trees to the boulevard can increase capital costs by approximately \$65,000 per kilometre relative to a boulevard without trees; this is a very small percentage (approximately 1% or less) of the total cost of one kilometre of reconstructed surface transportation infrastructure. The City also incurs annual costs for the maintenance of trees, which vary depending on a number of factors such as the age, size, and species of the tree, and its location.

Action 1-7A: Develop design guidance for major transportation projects within or immediately adjacent to the Greenbelt and Natural Areas to reduce potential environmental impacts and respect the environmental, scenic, agricultural and/or heritage qualities of these areas.

Where new or expanded infrastructure is required, design enhancements such as wildlife crossings, wildlife fencing, and Low Impact Development (LID) stormwater features will be considered to mitigate potential environmental impacts. In addition to initial construction costs, these new assets will entail future maintenance and renewal costs. Lifecycle cost considerations for design enhancements to mitigate environmental impacts are as follows:

Capital and Future Renewal Costs	Operating/Maintenance Costs
Wildlife underpass Wildlife overpass Wildlife fencing LID stormwater features	Annual clean out

Action 5-3C: Complete the new Park-and-Ride Strategy for Ottawa, considering existing and future Park-and-Ride demand.

Park-and-Ride lots are a key factor that improve access to transit. The new strategy will include enhanced active transportation connections and features. Capital costs to build Park-and-Ride lots with the various amenities, as well as maintaining the assets, should be considered, as well as future renewal costs. Lifecycle cost considerations for enhanced active transportation features at Park-and-Ride lots are as follows:

Capital and Future Renewal Costs	Operating/Maintenance Costs
Benches Shelters Bicycle racks Covered bicycle racks Bicycle lockers New multi-use pathway	Shelter maintenance Multi-use pathway maintenance

Policy 6-1 Address Accessibility Barriers and Advance Universal Design.

All new and reconstructed infrastructure in the City of Ottawa is now designed and built to meet accessibility standards as specified in the City’s *Accessibility Design Standards*. These standards conform to the design standards and implementation processes outlined by Ontario’s AODA.

Improving accessibility includes reducing vertical barriers and incorporating additional features for people with different levels of ability. Examples include:

- Rebuilding bus stops to improve accessibility (e.g., accessible by sidewalk)
- Adding curb ramps and tactile walking surface indicators at intersections
- Altering signalized intersections to include accessible pedestrian signals (APS)

Lifecycle cost considerations for addressing accessibility barriers are as follows:

Capital and Future Renewal Costs	Operating/Maintenance Costs
Tactile Walking Surface Indicators Accessible pedestrian signals Sidewalks	Sidewalk maintenance

Policy 6-2: Improve and expand the pedestrian network and Policy 6-3: Address gaps in existing neighbourhoods through retrofits.

Consistent with the policy direction in the Official Plan, the TMP recommends improving and expanding the pedestrian network by providing sidewalks, multi-use pathways and paved shoulders.

The total capital cost to construct new pedestrian infrastructure can include materials and labour, architectural and engineering, City internal costs, site preparation, utility relocation, drainage, property acquisition and other miscellaneous costs such as permits and Public Art requirements. To support year-round use of the active transportation network, consideration should also be given to operating and maintenance costs. Infrastructure assets added to the City's inventory – such as new sidewalks – will also impose increased future renewal costs.

The TMP Part 1 also includes a proposed list of TMP Pedestrian Projects, consistent with Policy 6-3. These projects will add new sidewalks, multi-use pathways, street crossings and other pedestrian infrastructure. These projects will increase the size of the City's transportation asset portfolio, to accommodate growth and intensification, and to increase the proportion of trips made by sustainable modes of transportation. Without corresponding funding adjustments to account for changes in lifecycle costs, this has the potential to create pressure on the City's current infrastructure operating and capital budgets, including costs for construction/acquisition, operation, maintenance and renewal. The lifecycle costs of these projects will be assessed as part of the TMP Part 2, development of the Capital Infrastructure Plan.

Policy 6-5: Invest in neighbourhood “shortcuts”.

Multi-use pathway “shortcuts” will be identified within existing neighbourhoods to provide more direct pedestrian routes from residential streets to collector or arterial roads where services and amenities are found. This policy is relevant for existing neighbourhoods only, as new neighbourhoods will be designed for direct, barrier-free pedestrian access. A key priority is to provide shortcuts to rapid transit stations. These new pathways will involve capital costs for construction, future renewal costs, as well as operating/maintenance costs to support year-round use.

Action 6-7A: Review local, collector, major collector, and arterial road design guidelines to ensure that they support a high-quality pedestrian environment; in particular, local road cross-sections will be updated to include both a sidewalk and trees that provide shade for people walking or cycling.

Walkability can be improved by adding elements to the streetscape that contribute to the quality of the pedestrian environment, namely sidewalks or pathways and shade trees or structures. The lifecycle cost implications of sidewalks, pathways, trees and shade structures are discussed under Policy 6-2 and Action 1-3A.

Action 6-7B: Add lighting to new pathways as per the criteria above and identify existing pathways that should be prioritized for lighting at the time of renewal.

As per the TMP Part 1, pathway lighting should be provided on multi-use pathways in dense urban areas with high-to-medium volumes as well as on pathway segments that provide access to important evening and nighttime destinations.

Recognizing that there is variability by project and by context, adding lighting to new multi-use pathways where warranted based on TMP Policy 6-7 will have implications of incurring initial construction costs, future renewal costs, as well as future maintenance costs. Multi-use pathway lighting costs approximately \$400,000 to 500,000 per kilometre, increasing capital costs for a new multi-use pathway by approximately 30%. Operating and maintenance costs are in the order of \$5,000 per kilometre per year.

Policy 7-1: Provide safe, comfortable, direct and connected cycling facilities and routes, Policy 7-2: Improve and expand the cycling network and Policy 7-3: Retrofit by priority to improve connectivity.

According to Ottawa’s *Official Plan*, all road corridors in the Urban Area and Villages are designated to be part of the City’s ultimate cycling network. New cycling facilities should be designed to be accessible, catering to the needs of all categories of cyclists. As such, the City will seek opportunity to increase space for cycling, increase separation of cyclists from motor vehicles, and reduce vehicle speeds to diminish the level of traffic stress.

The total capital cost to construct new cycling infrastructure can include materials and labour, architectural and engineering, City internal costs, site preparation, utility relocation, drainage, property acquisition and other miscellaneous costs such as permits and Public Art requirements. To support year-round use of the active transportation network, consideration should also be given to operating and maintenance costs. Infrastructure assets added to the City’s inventory – such as new cycling facilities – will also impose increased future renewal costs. Lifecycle cost considerations for implementing new bike lanes and cycle tracks are as follows:

Capital and Future Renewal Costs	Operating/Maintenance Costs
Signed bike routes Bike lanes Cycle tracks	Regular maintenance (pavement repairs, sweeping, pavement markings, sign maintenance, etc.) Winter maintenance

The TMP Capital Infrastructure Plan will identify cycling “retrofit” projects that implement cycling infrastructure at priority locations. Examples of typical retrofit projects include:

- Restriping a roadway to add painted or buffered bike lanes
- Implementation of vehicular traffic calming or diversion measures to create neighbourhood bikeways (refer to Policy 9-9)
- Construction of new multi-use pathways through parks or greenspaces

- Modifications to or reconstruction of intersections to create “protected intersections” (refer to Policy 9-10)
- Construction of short segments of cycle track along existing roadways

Lifecycle considerations for implementing “retrofit” cycling facilities are as follows:

Capital and Future Renewal Costs	Operating/Maintenance Costs
Restriping roadway	Regular maintenance
Cycle track	Re-striping roadway
Multi-use pathway	Winter maintenance

The TMP Part 1 also includes the proposed list of TMP Cycling Projects, consistent with Policy 7-3, to add or upgrade cycling infrastructure in priority locations. These projects will increase the size of the City’s transportation asset portfolio, to accommodate growth and intensification, and to increase the proportion of trips made by sustainable modes of transportation. Without corresponding funding adjustments to account for changes in lifecycle costs, this has the potential to create pressure on the City’s current infrastructure operating and capital budgets, including costs for construction/acquisition, operation, maintenance and renewal. The lifecycle costs of these projects will be assessed as part of the TMP Part 2, development of the Capital Infrastructure Plan.

Policy 7-7: Deliver supportive maintenance and renewal.

This policy will have a direct impact on road renewal as it aims to support the maintenance and renewal of cycling facilities and pathways. To accomplish this, Action 7-7B proposes to “update the prioritization criteria for multi-use pathway renewal, including criteria for upgrading width and quality at the time of renewal.” Widening pathways at the time of renewal and/or upgrading them to allow winter maintenance will increase pathway renewal costs; the significance of these costs will be assessed as part of developing the criteria and then identifying the number of projects that will incur these costs.

Action 7-11C: Install automated counters as part of new or significantly rehabilitated active transportation structures.

Recognizing that there is variability by project and by context, installing automated counters as part of new or significantly rehabilitated structures with active transportation facilities will have cost implications. Capital costs are less than \$10,000 - a very small percentage of total project costs. Annual operation and maintenance costs for automated counters are minimal.

Policy 8-1: Invest in the Rapid Transit and Transit Priority Network (RTTP).

The TMP Capital Infrastructure Plan will identify the 2046 RTTP network to support the achievement of the City’s climate change targets and mobility achievements. The scope of rapid transit projects will

include active transportation facilities along rapid transit corridors, across rapid transit corridors, and between rapid transit corridors and the adjacent neighbourhoods. Cost implications related to the implementation of active transportation facilities are summarized as part of other policies and actions. Capital costs to build transit stations and access to transit stations with the various amenities as well as maintaining the assets should be considered as well as future renewal costs.

Policy 8-2: Prioritize transit improvements that meet riders’ needs and attract new riders.

Continued expansion of the RTTP network will be a critical element in the achievement of the City’s transit objectives. Both frequency and coverage are important objectives for an effective transit system. Policies and guidelines that provide parameters for transit network design include:

- System-wide revenue-cost ratio target
- Service coverage requirements for all-day and peak period service (i.e., the percentage of urban residents within an 800m or 400m walk of transit service)
- Service hours

Increased service coverage may result in the need for additional bus stops. Bus shelters must be maintained throughout the entire year to ensure that they remain accessible for all users. This includes snow removal, incidental maintenance, and scheduled maintenance. Lifecycle cost considerations for expanded transit service are as follows:

Capital and Future Renewal Costs	Operating/Maintenance Costs
Bus shelter pad	Regular maintenance
Enhanced bus shelter	Winter maintenance
Heated bus shelter	
Bus stop signage	

Policy 9-1: Implement “complete streets” to create streets for everyone and Policy 9-2: Advance “complete streets” design standards.

The City’s standard roadway cross-sections have evolved to incorporate Complete Streets principles. Although street platforms are generally narrower than conventional standards, this is offset by the implementation of separated cycle tracks. Various enhancements result in higher capital and renewal costs, and maintenance costs are also typically higher (i.e., more effort required for winter maintenance). Costs for new street construction vary from project to project, but the increase in capital costs are typically less than 5%, as shown in the table below comparing approximate costing for different street types. By contrast, upgrading existing streets to current Complete Streets standards varies widely and can be much more expensive, adding up to anywhere from 2% - 55% in additional capital costs.

Street Type	Lifecycle Cost	Conventional Street	Complete Street
Local	Capital / km	\$12 million	\$13 million

April 2023

	Maintenance / km	\$40k per year	\$60k per year
Collector	Capital / km	\$13 million	\$14 million
	Maintenance / km	\$50k per year	\$70k per year
Arterial	Capital / km	\$16 million	\$17 million
	Maintenance / km	\$70k per year	\$90k per year

Recent City of Ottawa initiatives include the *Protected Intersection Design Guide* and the draft *Roundabouts for Complete Streets Guidelines*. Potential emerging measures under consideration by the City include continuous sidewalks / cycle tracks, nearside bike signals, centreline hardening, Woonerven (low speed shared-space streets), and bicycle streets / boulevards. These new design standards can result in better streets, and they typically further increase capital, maintenance and renewal costs

Policy 9-4: Identify future road network needs.

The TMP Capital Infrastructure Plan will identify the needs and priorities for Ottawa’s road network to support travel demand to the 2046 horizon year. New roads will involve capital costs for construction, ongoing annual operating/maintenance costs, and future renewal costs. Specific lifecycle cost implications will be explored as part of the TMP Capital Infrastructure Plan.

Policy 9-9: Reduce operating speeds through changes in street design.

According to the Official Plan and recent Council direction, local residential streets shall be designed for a 30 km/h operating speed at the time of construction or reconstruction. “Access” streets should be designed for operating speeds of less than 50 km/h. For these streets, the design speed should align with the desired operating speed and posted speed limit. Reduction in speed can be accomplished through various traffic calming measures such as temporary/ seasonal calming, vertical deflection and horizontal deflection with each method having varied costs. Lifecycle cost considerations for traffic calming measures are as follows:

Capital Costs: Temporary Traffic Calming	Operating/Maintenance Costs
Removable bollards Pavement markings Temporary speed display boards	Bollard removal in winter Bollards reinstalled in spring
Capital Costs: Vertical Deflection	Operating/Maintenance Costs
Raised crossings Raised intersections Speed cushions Speed humps	Regular road maintenance
Capital Costs: Horizontal Deflection	Operating/Maintenance Costs
Chicanes Corner tightening Mini roundabouts Bulb outs Chokers Lane narrowings	Regular road maintenance

Policy 9-10: Implement protected intersections and other designs that can improve safety.

The City has recently developed the *Protected Intersection Design Guide* to assist in the design of protected intersections. Protected intersections will be the City’s preferred option when constructing or reconstructing signalized intersections where dedicated cycling facilities are warranted on at least one of the intersecting streets.

Protected intersections cost more than conventional intersections to construct, maintain, and renew. For instance, protected corners, which are a key feature of protected intersections, can cost up to 20% more to construct than conventional intersection corners, and are also more difficult to maintain through the winter.