City of Peterborough Transportation Master Plan
Chapter 4 – Infrastructure Improvement Recommendations and Policy Initiatives

MOVE PTBO

Draft – March 2022

peterborough

wsp

Figures

Tables

Executive Summary

In November of 2021, a recommended Transportation Strategy to guide the completion of the Transportation Master Plan was approved by City Council, which includes an aggressive mixture of policies, service enhancements and new infrastructure investments to maximize the potential shift in trip making to more sustainable travel modes compared to today. By 2051 the vision for transportation in the City will result in 25% of all trips completed by walking or cycling, 10% of all trips will use an enhanced transit system, and auto travel will be reduced to 65% of all trips. This aggressive shift in travel patterns, combined with infrastructure to support enhanced walking and cycling, has resulted in a more strategic approach to identifying supporting road network improvement needs.

Throughout the TMP project concurrent work has been completed on a series of separate feeder studies, including the Transit Review and Long Term Growth Strategy, the Cycling Master Plan, and the Eastside Transportation Study. The recommendations from each of these feeder studies have been incorporated into the Transportation Master Plan.

The Phase 4 report of the Transportation Master Plan compiles the recommended road network projects with the recommendations from the Eastside Transportation Study and the Cycling Master Plan to present an overall infrastructure plan to guide the City to 2051.

The road network projects would be supported by transit priority measures to make transit more attractive to riders and by expansion of the cycling network, combined with increased investment in cycling programs that would encourage more people to use this form of transportation for daily trips. All of the infrastructure improvements are supported in turn by policy initiatives to help with the implementation of the vision of the TMP and to help make the infrastructure investments more effective.

- **Road Network Improvements**: Vehicle and transit travel data were extracted from the strategic TransCAD model and incorporated into a city-wide mesoscopic Aimsun model to undertake a more detailed analysis of road links and intersections to be considered for improvements. Road network improvements were grouped into several categories, including:
- **Road reconstruction to support growth areas**: these roads would be “urbanized” to provide a curb and gutter and other major services where required. Improvements to the active transportation system, such as sidewalks and cycling facilities, would be added at the same time. Intersection along the urbanized corridor also would be improved at the same time to add missing infrastructure such as AODA-compliant crossings, sidewalk connections, cycling infrastructure, and turning lanes for vehicles;
- **Protection of future corridors and road realignments**: these projects are to accommodate future growth by protecting land that will be needed for multi-modal travel and by realigning or upgrading road segments to improve safety, improve operations, or improve capacity ;
- **Intersection improvements for safety and capacity improvements**: a common theme throughout the consultation undertaken during the TMP is the need for road safety improvements. Intersections have been identified city-wide for such improvements that would address operational or safety issues, and incorporate AODA-compliant crossings, sidewalks, cycling infrastructure, and turning lanes for vehicles. Some of these improvement would also increase the capacity of intersections, through such measures as additional turning lanes;
- **Centre turning lanes**: adding centre turning lanes improves road safety by reducing the likelihood of rear end and sideswipe collisions. These centre turn lanes also add capacity by reducing the friction of vehicles slowing down to turn and causing a queue for through traffic;

- **Strategic road widenings**: Strategic road widenings have been identified on Parkhill Road, Water Street, Nassau Mills Road, Television Road, and Ashburnham Drive.
- **Protecting for future new river crossing**: a long-term solution identified to protect for a new potential crossing of the Otonabee River between Sherbrooke Street and Maria Street, combined with an extension of Maria Street to Television Road to provide a continuous east-west arterial road across the City. This crossing should be protected so that nothing precludes its future construction, should it be determined to be necessary; and
- **Special study areas**: The TMP identified four 'Special Study Areas' that will require more detailed study and additional focused engagement with residents and other stakeholder groups including the County of Peterborough, adjacent Townships, and the Ministry of Transportation before specific improvement recommendations can be identified.

The proposed road network improvements are illustrated on **Figure 1**. The improvements have been summarized in **Table 1**.

Figure 1: Proposed Road Network Improvements (to the year 2051)

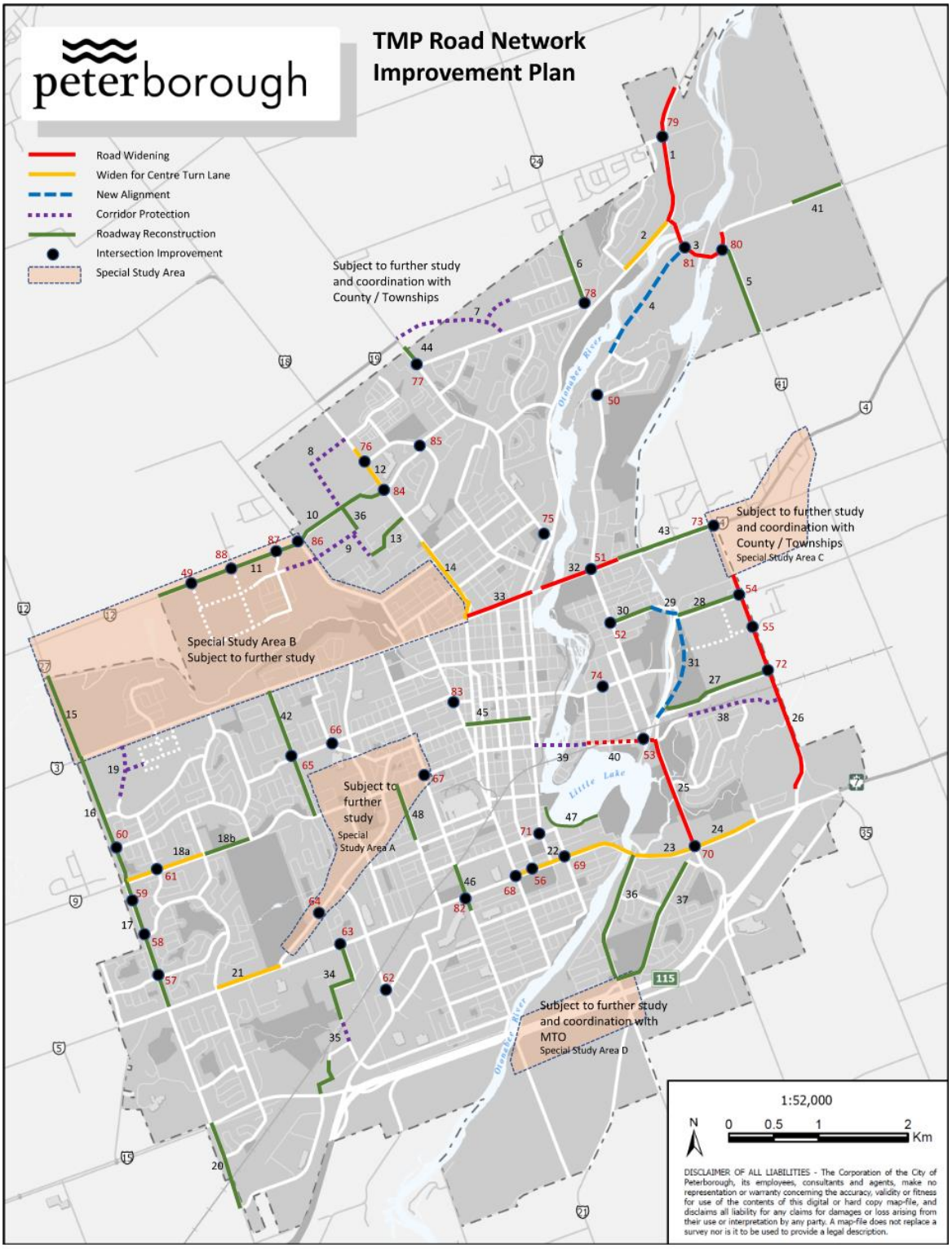


Table 1: Road Network Improvements (to year 2051)

#	Street	Limits	Improvement
1	Water Street	Nassau Mills Rd to North City Limit	Widen to 4 lanes
2	Water Street	University Heights Blvd to Nassau Mills Rd	Widen to 5 lanes
3	Nassau Mills Rd	Water Street to Pioneer Rd	Widen to 4 lanes (including Bridges)
4	Armour Rd	Cunningham Blvd to Nassau Mills Rd	New 2 Lane Road Realignment
5	University Rd	Nassau Mills Rd to City Limit	Reconstruction to Urban Standard - Arterial
6	Carnegie Ave	Cumberland Ave to City Limit	Reconstruction to Urban Standard - Arterial
7	Future Roads	Cumberland Ave to Hilliard St	Corridor Protection - New Arterial / Collector
8	Future Roads	Towerhill Rd to Chemong Rd	Corridor Protection - New Collector
9	Future Roads	West of Fairbairn St to Hillview Dr / Hillside St	Corridor Protection - New Collector
10	Towerhill Rd	Fairbairn St to Chemong Rd	Reconstruction to Urban Standard - Arterial
11	Lily Lake Rd	Fairbairn St to City Limit	Reconstruction to Urban Standard - Arterial
12	Chemong Rd	Towerhill Rd to Broadway Blvd	Widen to 5 lanes
13	Simons Ave / Hillside St	Chemong Road to New Collector Rd	Reconstruction to Urban Standard - Collector Rd
14	Chemong Rd	Parkhill Rd to North of Sunset Blvd	Widen to 5 lanes
15	Ackison Rd	Parkhill Rd to City Limit	Reconstruction to Urban Standard - Arterial
16	Brealey Dr	Sherbrooke St to Parkhill Rd	Reconstruction to Urban Standard - Arterial
17	Brealey Dr	Lansdowne St W to Sherbrooke St	Reconstruction to Urban Standard - Arterial
18	Sherbrooke St	Glenforest Blvd to West City Limit	a) Widen to 3 lanes b) Reconstruction to Urban Standard - Arterial
19	Nornabell Ave Extension	Ireland Dr to Parkhill Rd	Corridor Protection - New Collector
20	Brealey Dr	Sir Sandford Fleming Dr to City Limit	Reconstruction to Urban Standard - Arterial
21	Lansdowne St W	Spillsbury Dr to Clonsilla Ave	Widen to 5 lanes
22	Lansdowne St W	Park St to George	Widen to 5 lanes
23	Lansdowne St E	a) George St to Otonabee river b) River Rd to Ashburnham Dr	Widen to 5 lanes
24	Lansdowne St E	Ashburnham Dr to Willowcreek Plaza	Widen to 5 lanes
25	Ashburnham Dr	Lansdowne St to Maria St	Widen to 5 lanes

#	Street	Limits	Improvement
26	Television Rd	Lansdowne St to South of Parkhill Rd	Widen to 4 lanes
27	Maniece Ave	Ashburnham Dr to Television Rd	Reconstruction to Urban Standard - Collector Rd
28	Old Norwood Rd	Ashburnham Dr to Television Rd	Reconstruction to Urban Standard - Collector Rd
29	McFarlane St	New 2 Lane Bridge Across Canal	New 2 Lane Road Realignment
30	McFarlane St	Armour Rd to Canal	Reconstruction to Urban Standard - Collector Rd
31	Ashburnham Dr	Maria St to Old Norwood Rd / McFarlane St	New 2 Lane Road Realignment
32	Parkhill Rd	Water Street to East of Leahy's Lane	Widen to 4 lanes
33	Parkhill Rd	Chemong Rd to Otonabee River	Widen to 4 lanes
34	Webber / Rye St	CP Rail to Lansdowne St W	Reconstruction to Urban Standard - Collector Rd
35	Harper Rd Rail Crossing	Fisher Dr to N of CP Rail Corridor	New 2 Lane Road Realignment
36	River Rd South	Otonabee Dr to Lansdowne St	Reconstruction to Urban Standard - Arterial
37	Otonabee Dr	River Rd S to Lansdowne St	Reconstruction to Urban Standard - Collector Rd
38	Maria St	Walker Ave to Television Rd	Corridor Protection - New 2 lane Arterial
39	Sherbrooke St	George St to Maria St	Corridor Protection - New 4 lane Arterial (Bridge Crossing)
40	Maria St	Otonabee River to Ashburnham Dr	Widen to 4 lanes (including new CP Bridge and New Canal Crossing)
41	Pioneer Rd	CleanTech Commons to 9th Line	Reconstruction to Urban Standard - Arterial
42	Wallis Dr	Sherbrooke St to Parkhill Rd	Reconstruction to Urban Standard - Arterial
43	Parkhill Rd	Leahy's Lane to east of Television Rd	Reconstruction to Urban Standard - Arterial
44	Hilliard St	Cumberland to City Limit	Reconstruction to Urban Standard - Arterial
45	Charlotte St	Park St to Water St	Reconstruction to Urban Standard - Arterial
46	Monaghan Road	Romaine St To Edison Ave	Reconstruction to enhance safety
47	Crescent Street	Perry St to Haggart St	Reconstruction to Urban Standard one-way street
48	High Street	Sherbrooke St to Chamberlain St	Reconstruction to Urban Standard

#	Street	Cross Street	Improvement
Intersection Improvement Projects			
49	Lily Lake Road	Street C (Dolman Street)	Install Left / Right Turn lanes / Future Signals when Warranted
50	Armour Road	Francis Stewart Blvd	Install Signals
51	Armour Road	Parkhill Road	Install N/S Left Turn; SB Right Turn; E-W Left Turn Lanes
52	Armour Road	McFarlane Street	Install SB Left Turn + Signals
53	Armour Road	Maria Street	Install Signals - Interconnect to Swing Bridge and Ashburnham Dr
54	Television Road	Old Norwood Road	Instsall NB/SB Left Turn Lanes + Signals
55	Television Road	Paul Rexe Blvd	Install Signals + West Approach
56	Lansdowne Street	Aylmer Street	Install Signals and Left Turn Lanes
57	Brealy Drive	Cherryhill Blvd	Install Signals + Left Turn Lanes
58	Brealy Drive	Kawartha Heights Blvd	Install Signals + Left Turn Lanes
59	Brealy Drive	Hewitt Drive	Install Signals + Left Turn Lanes
60	Brealey Dr	Glenforest Blvd	Install Signals + Left Turn Lanes
61	Sherbrooke St	Denure Drive	Install E-W Left Turn Lanes / Pemanent Signals
62	Parkway	Kingsway	Install Signals / remove channelized right turn
63	Lansdowne	Webber Avenue	Upgrade turn lanes N/S
64	Webber Avenue	Clonsilla Avenue	Provide E-W Left Turn Lanes + Signals
65	Wallis Drive	Weller Street	Provide Signals and Left Turn Lanes
66	Weller Street	Hospital Drive	Realignment of Weller Street
67	Sherbrooke Street	Monaghan Road	Improve Turning Radius / Provide Left Turn Lanes
68	Lansdowne Street	Park Street	Realign N/S approach to improve sight lines
69	Lansdowne Street	Lock Street	Provide E-W Left Turn Lanes
70	Lansdowne Street	Ashburnham Drive	Realign - Provide 4 Lanes N/S through intersection, New SB RT Lane
71	George Street	Romaine Street	Provide Signals and Enhanced Trail Crossing
72	Television Road	Maniece Ave	NB Left Turn Lane
73	Television Road	Parkhill Road	Urbanize and Provide Signals (or Roundabout)
74	Hunter Street	Mark Street	Traffic Signals

#	Street	Cross Street	Improvement
75	George Street	Hilliard Street	Traffic Signals and Enhanced Trail Crossing
76	Chemong Road	Milroy Drive North	SB Left Turn Lane
77	Hillard Street	Cumberland Avenue	Install Signals
78	Cumberland Avenue	Carnegie Avenue / Water Street	Reconfigure intersection, signals (or Roundabout)
79	Water Street	Woodland Blvd	Install Left Turn Lanes and Traffic Signals
80	Nassau Mills Road	University Road	Install Turn Lanes / Traffic Signals / realignment
81	Nassau Mills Road	Armour Road	Install Turn Lanes / Traffic Signals / realignment
82	Monaghan Road	Lansdowne Place Entrance	Install Signals + Enhanced Trail Crossing
83	Hunter Street	Park Street	Right-turn channelization (slip lanes) reconstruction to eliminate the channelization
84	Chemong Road	Towerhill Road	Widen E-W approaches to 5 lanes
85	Towerhill Road	Millroy Drive	Install Signals / Enhanced Crossings
86	Towerhill Road	Fairbairn Street	Install Signals and Turn Lanes (consider roundabout)
87	Lily Lake Road	Street A (York Drive)	Install Left / Right Turn lanes / Future Signals when Warranted
88	Lily Lake Road	Street B (Heideman Street)	Install Left / Right Turn lanes / Future Signals when Warranted

Transit Priority Measures

The approved Transportation Strategy is based on increasing the frequency and reliability of transit services to build and attract new ridership. Transit priority treatments allow transit vehicles to bypass congestion in general traffic lanes, increasing reliability and bus speed relative to automobiles. Transit priority improvements can be considered on transit routes where there is high ridership and also unstable traffic operations, such as slow travel speeds and reduced reliability for on-time arrival of transit vehicles. Transit priority measures can include simply re-timing traffic signals to benefit transit, giving signal priority to transit vehicles at intersections, and/or providing localized road improvements to benefit transit such as intersection bus by-pass lanes.

Six corridors were identified in the city for potential transit signal priority measures, these are listed in **Table 2**.

Table 2: Potential Transit Signal Priority Corridors

Corridor	Extents
Water Street – George Street	Nassau Mills to Simcoe St
Parkhill Rd	Monaghan to Armour
Sherbrooke St	Aylmer to Goodfellow
Lansdowne St	George to Brealey
Hilliard St	Marina to Water
Marina Blvd	Hilliard to Water

Some locations experience high to very high delay and have numerous buses with hundreds of passengers using the buses during peak hours. These locations, outlined in **Table 3**, are potential locations for localized transit priority measures such as bus-only lanes at intersections and should be further reviewed during road reconstruction projects to confirm feasibility and the extent of required improvements.

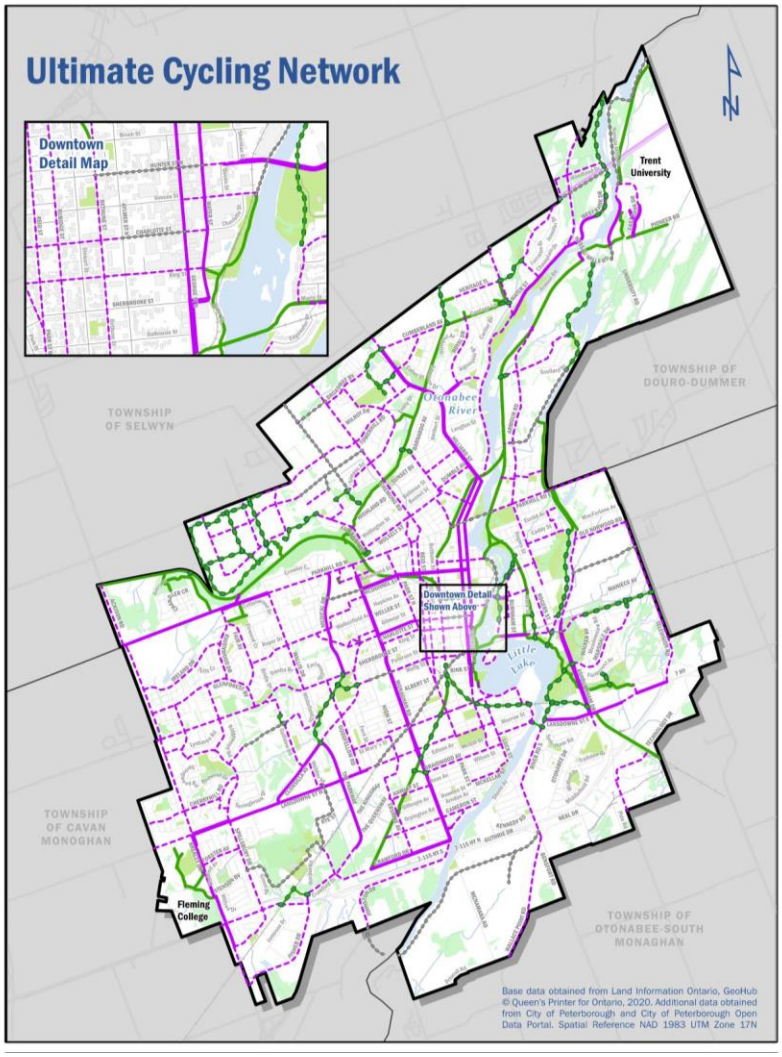
Table 3: Locations Identified for Potential Localized Transit Priority Measures

Corridor	Extents
Nassau Mills Rd / Water St	Through Intersection to Trent Campus Entrance
Southbound Water St-George St	Hilliard St to Parkhill Rd
Northbound Water Street	Dublin St to Parkhill Rd
Armour Rd / Parkhill Road	At the intersection

Cycling Network

The City has prepared a Cycling Master Plan concurrent with the development of the TMP. The CMP's ultimate network, shown in **Figure 2**, was incorporated into the analysis of the future travel patterns in the city. The proposed Ultimate Cycling Network is designed to add 80 km of new city funded cycling infrastructure, in line with the Accelerate scenario from the CMP, plus an additional 80 km of potential new cycling facilities were identified that would reach the Spark Scenario targets.

Figure 2: Ultimate Cycling Network (from Cycling Master Plan)



Sidewalk Network

The recommended Transportation Strategy includes an aggressive investment in the sidewalk network to fill in gaps in the network in the downtown and along corridors designated for intensification of land uses. The sidewalk network would be extended to connect to new growth areas. These new growth areas would be fully serviced with sidewalks on both sides of all new roads. The sidewalk network improvements would also address any missing links that connect to transit stops. Any new intersections would be constructed as accessible intersections with appropriate sidewalk treatments. Additionally, when improvements or reconstruction of roadways are being undertaken the City would use these opportunities to also construct missing sidewalk links and accessible infrastructure.

Supportive Policy Initiatives

A number of key policy initiatives will be required to support the approved Transportation Strategy. Supportive policy initiatives have been developed for:

1. Complete Streets
2. Goods Movement
3. Road Safety Plan
4. Parking
5. Transit Fare Discount Program
6. Emerging Transportation Technology
7. Cycling

Complete Streets

Complete streets embodies the idea that the road network will be designed, constructed, operated, and maintained with all users in mind and with all modes of transportation in mind. Not every street has to be "complete" as not all streets serve the same function. For instance, transit does not travel on every street in the city. However, there needs to be an interconnected network of facilities so that people can travel across the city by whatever mode they choose. The Complete Streets policy direction in the TMP is based on the following principles:

- New streets will be designed with the intended users in mind and will include:
  - Sidewalks on both sides of the street
  - Cycling facilities on collector or arterial roads
  - Transit amenities if transit service is expected to be provided
  - Consider truck design requirements on Goods Movement Corridors
  - Context sensitive design approach to incorporate other needs unique to areas (Downtown On-Street Parking)
- City should update current design standards to incorporate Complete Streets approaches
- The road classification system should be modified to better reflect user needs and Complete Streets design considerations
- Road improvements and rehabilitation projects should look for opportunities to incorporate Complete Streets design treatments and add any missing infrastructure where possible

Goods Movement

The approach to goods movement is to create a goods movement-supportive network that enables efficient and safe movement of goods while addressing ongoing concerns with truck traffic. The primary objective of the goods movement network is to provide guidance for the design and operation of key roadways that provide a goods movement role. In addition, a defined goods movement network can assist with routing trucks to appropriate streets yet still allow for local deliveries and recognize the need for curbside management. The draft policy initiatives emerging for goods movement include:

- Conduct truck-focused reviews of network to establish priority routes for the City of Peterborough
- Identify Category of Goods Movement Routes:
  - Example: Primary, Regional, Local
- Identify key connections with County roads and Provincial highways
- Based on the road classification system, corridors will be designed to serve their best and highest function as goods movement corridors, ensuring the efficiency and safety of the overall street network

Road Safety Plan

A desire to do more for road safety has been a constant message heard throughout the consultation on the TMP. The City has been developing a Road Safety Plan that includes a mix of education, enforcement, and engineering measures that are expected to reduce serious injuries and fatalities on the City's roads by approximately 50% over the next 20 years. The Road Safety Plan adopts a safe systems approach for the design of new infrastructure and includes five key areas of emphasis, including:

1. Safe school zones
2. Safe neighbourhoods
3. Safety for vulnerable users
4. Safe corridors
5. Safe intersections

Parking

Managing the supply and the cost of parking have been two ways identified to help shift the way people travel in the city. In addition to increasing the cost of parking, expanding where payment is required for parking is also a way to encourage a shift to non-auto modes of travel.
A number of parking policy initiatives have been identified:

- Monthly parking at City-owned parking facilities should be more expensive than a monthly bus pass to help encourage people to use other travel modes.
- The City should work with private parking operators to ensure that their monthly rates are also more expensive than a bus pass.
- Other City facilities should be considered for paid parking. City Hall is a candidate, as payment for parking begins one block south.
- Where parking rates are increasing, other investments should be considered to support more sustainable travel options, such as enhanced transit amenities and increasing the supply of secure bike parking.
- Parking requirements for new developments should be reviewed as part of upcoming zoning by-law update to determine ways to limit supply. Related to this, the City could expand the use of cash-in-lieu of parking in new developments beyond the downtown.
- Over time, other areas outside the downtown should be considered for paid parking. This could include new City controlled lots or other measures such as charging fees for an on-street permit parking program, which may reduce the number of vehicles people own and shift some trips to more sustainable travel modes.

Transit Fare Discount Program

A transit fare discount program is recommended as a way to make taking transit more equitable and a way to increase ridership. The City already has a pilot program in place for free transit rides for those 12 years old and younger. This could be expanded to include all youth 18 years old and younger to encourage the next generation to choose transit. The City should also consider a discounted fare for low income residents to enhance equity of travel options and encourage new ridership.

Emerging Transportation Technology

Technology is playing a role today in how people travel and is expected to continue to play a role in the future. The TMP seeks to leverage technology to help meet the objectives of the TMP to encourage a modal shift and address climate change, in particular. The City can do this by encouraging low emission vehicles and have the charging infrastructure in place for low emission vehicles. Technology can help manage truck movements and deliveries and can help people find available parking to reduce circulating looking for parking . Technology must be leveraged to be part of the solution to achieve the goals and objectives of the TMP.

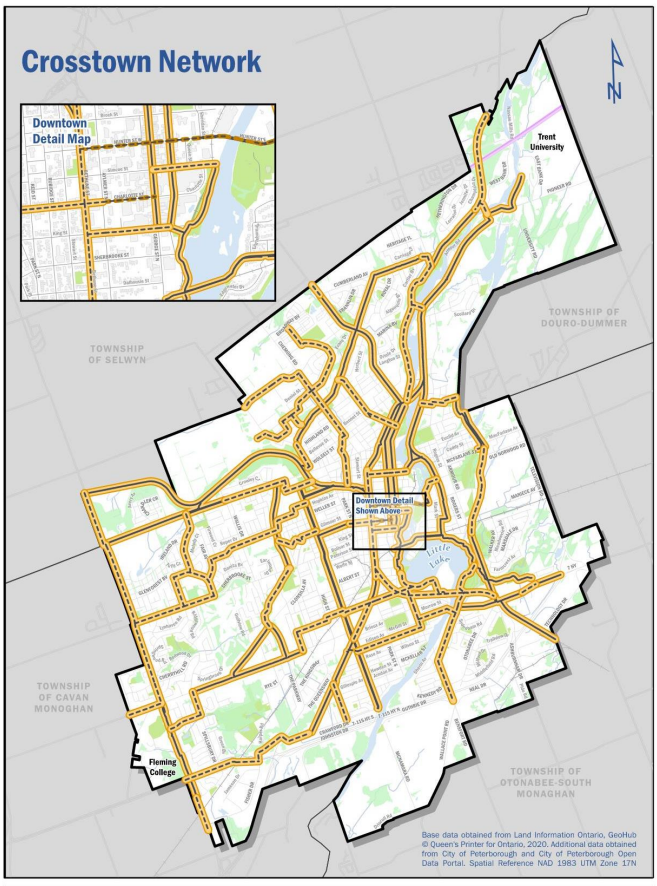
Cycling Policy Initiatives

The City's Cycling Master Plan includes 23 recommendations across five thematic areas that include:

1. Create an irresistible network
2. Encourage all-season riding
3. Pursue design excellence
4. Build a cycling culture
5. Go for gold

One of the key recommendations is construction of the cycling Crosstown Network, depicted in **Figure 3**. Approximately 80% of the Crosstown network is recommended to be constructed to support users of all ages and abilities.

Figure 3: Cycling Crosstown Network (from Cycling Master Plan)



Costing and Implementation Schedule

The road network projects were grouped into short- (generally the next ten years), medium- (generally 10 to 20 years) and long-term (generally beyond 20 years to 2051, and in some cases beyond the year 2051) horizon years and indicative costs were identified. Some costs were developed in other more detailed studies or from the City's current capital budget forecast and others have been developed using typical costs for similar projects, since design has not been completed as part of the TMP. . The costs per timeframe are summarized in **Table 4**

Table 4: Summary of Road Network Costs of Construction

Timeframe	Cost (2022$)
Short-term (generally next ten years)	$160,500,000
Medium-term (generally 10 to 20 years)	$170,900,000
Long-term (generally 20 years to the year 2051)	$352,300,000
Total (by the year 2051)	$683,700,000

Most of the projects identified in the TMP will still need to proceed through additional planning and design stages, where additional public consultation will be undertaken, specific design details will be confirmed, alternative designs will be assessed, and cost estimates will be refined. Costs and timing for cycling improvements are included in the Cycling Master Plan and these costs would also be refined as projects move into the design and implementation phase. Transit improvement costs (identified in Chapter 3) are handled through the capital and operating budget and would be considered through the annual budget process.

1 Introduction to Infrastructure Improvement Needs

With the selection of the recommended Transportation Strategy, the next step in the development of the transportation master plan shifts to identifying the specific infrastructure that would be needed to meet the vision of that strategy, as well as the supportive policies that will help implement the strategy.

This chapter begins with a description of the analyses undertaken to arrive at the road network improvements and provides a brief description of these improvements. The preferred strategy includes a considerable investment in the transit network, discussed previously in Chapter 3, which is focussed on increasing service frequency to attract new ridership. This investment is supported by several transit priority measures, which are described following the road network improvements. Concurrent with the development of the overall TMP, the City has been developing a Cycling Master Plan. The infrastructure, policy, and program recommendations from the Cycling Master Plan have been incorporated into the TMP and are highlighted after the discussion on transit. There have been several comments throughout the public consultation for the TMP about the sidewalk network and the preferred strategy includes an aggressive investment in the City sidewalk network. Identifying specific sidewalk projects will come through separate planning and design projects, and will use the City's Sidewalk Strategic Plan to help prioritize missing sidewalk connects for construction. This investment is highlighted to round out the multi-modal infrastructure investments recommended in the TMP.

These investments will need policy directives to be more successful and assist with implementation. Policy directives are provided for:

- Transportation demand management
- Complete Streets
- Goods movement
- Parking management
- Road safety
- Transit fare discount program
- Emerging transportation technology
- Cycling

Consultation events were held with stakeholders and the public as part of the development of the infrastructure improvement needs and policy directives. A summary of the events and the feedback received is provided.

The road infrastructure recommendations are recommended to be implemented over a 30-year time horizon. The recommendations have been grouped into short-, medium-, and long-term timeframes and a high-level cost estimate has been provided. The implementation for cycling and transit recommendations are included in other City reports.

All together, the infrastructure and policies presented in this chapter make up the plan to implement the preferred transportation strategy and provide the blueprint to truly transform the way people travel in the city over the next 30 years.

2 Multi-Modal Infrastructure Recommendations

This chapter outlines the infrastructure recommendations for the recommended Transportation Strategy. Road network, transit priority measures, cycling, and walking infrastructure all are addressed. Road network improvements are recommended to improve safety, provide additional capacity, or both. Transit priority measures have been identified to enhance the transit network and encourage greater ridership, which will help the City meet its climate change mitigation objectives. Cycling improvements from the Cycling Master Plan and a renewed policy direction for sidewalk improvements also are discussed as the City seeks to encourage more sustainable travel modes and provide the necessary infrastructure to support these modes. Recommendations are made in order to comply with the Council priority of giving travellers more opportunities to choose travel methods that do not rely on a single occupant vehicle.

2.1 Road Network Improvements

The travel demand forecast data from the city-wide strategic transportation modelling that was conducted in the development and analysis of the strategies for the TMP was extracted for the recommended Transportation Strategy to conduct a more detailed analysis. The city-wide strategic model estimates the number of trips to and from different parts of a region (including Peterborough County, recognizing that traffic within the city is not solely city-based but includes traffic from parts of the county and beyond), travel patterns, mode shares, and auto and transit volumes based on a wide variety of inputs including land use. The analysis of the recommended Transportation Strategy within the strategic model indicated that even with significant increases in the use of transit, walking, and cycling modes of travel there will still be a need for road improvements to support future growth. The detailed analysis has enabled the identification of specific projects to recommend for the future road network.

A microsimulation modelling and evaluation approach using Aimsun Software has been carried out to identify future network deficiencies and to suggest road network and intersection improvement requirements to address safety and capacity concerns. The Aimsun-based microscopic simulation model was developed to assess transportation network improvements – road widening, intersection improvements such as signalization, addition of left-turning and right-turning lanes, modification for signal controls – required for future demand conditions.

2.1.1 Microsimulation Model Coverage Area

The microsimulation model mainly covers the land within the city limits and extends beyond into Peterborough County to include a couple of residential areas located at the City's boundary. Highway 115 (and its interchanges) from Airport Road to Highway 7 is also included in the model to capture the alternative route choice between highways and municipal roadways. The City boundary and microsimulation model coverage area are presented in Figure 4, as highlighted in yellow color and blue lines, respectively.

Figure 4: Microsimulation Model Coverage Area

The model was developed to include the City's entire arterial and collector network, as identified in the City's Official Plan (2019) – Schedule B. The roadway network was coded with different functional types and planning capacities. The City's existing transit network was also incorporated into the model, including bus stops, transit lines/routes, and transit schedules during a typical weekday.

2.1.2 Road Network Analysis

The traffic demands were extracted from the City's travel demand forecasting model (TransCAD model) for weekday midday and afternoon peak hour conditions and calibrated to the observed 2019/2020 conditions within the Aimsun model. Existing turning movement counts (TMCs) and midblock automated traffic recorder (ATR) counts were used to ensure base year travel demands matched observed counts, which was conducted using the demand adjustment module available in Aimsun software.

For the City's Transportation Master Plan evaluations, the future horizon year of 2051 has been considered. To assess the impact on the functionality and service levels of Peterborough's road network with future demands, the existing microsimulation model was updated to future conditions, based on the future 2051 population and employment projections. Future scenarios were modelled for the 3-hour PM peak period for the 2051 conditions.

Various future scenarios were considered to study future network deficiencies and other network improvement requirements. A Do-Nothing scenario – which will reflect the current conditions of the roadway with future 2051 demand – was considered as the Baseline Scenario to compare other alternative network improvement scenarios.

The following steps were undertaken to arrive at the recommended road network improvements:

1. Analyze the 2051 "do nothing" scenario with the forecast population and employment and no road network improvements and identify deficiencies;
2. Include the already planned City projects into the model and review results for remaining deficiencies;
3. Attempt to address remaining challenges with intersection improvements for safety and capacity; and
4. Undertake strategic road widening to provide safety and capacity enhancements.

For the intersection improvements and road widening, consideration was given to opportunities and controls such as:

Road widening in the form of increased number of through lanes

Road widening in the form of addition of two-way left-turn (TWLT) lanes

Adding left-turning/right-turning lanes

Providing new traffic signals or adjustments to existing traffic signal timing and phasing

2.1.3 Green House Gas Emission (GHG)

Additional simulation runs were conducted to evaluate the Green House Gas Emissions (GHG) for the future 2051 Scenarios. **Table 5** provides the GHG Emission for the 2051 Do Nothing Scenario and 2051 Preferred Scenario with all suggested improvements. There is 55% reduction of GHG emissions for the Scenario with suggested improvements. This emission reduction due to road network improvements are reductions in addition to the GHG reduction achieved through mode shift and change in travel behavior. It should be noted that these were based on the traffic volumes simulated using the existing fleet of vehicles in Ontario. The federal government has mandated that all new vehicle sales in Canada be 100% electric vehicles by the year 2035. Considering a 10-year average vehicle age, by the TMP horizon year of 2051, the vehicle fleet in Canada could be almost all electric vehicles. As low emission vehicles become more and more prevalent and electric vehicles are mandated, vehicle emissions are expected to reduce more than what is shown in this report. This reduction in GHG emissions is forecast even as population increases 50% and employment increases 30%. Compared to Do-Nothing Scenario, the Preferred Scenario with all the improvements is expected to reduce the GHG emissions more than 50% (considering normalized volumes).

Table 5: Green House Gas Emission (GHG) – Comparison of Future 2051 Scenarios – 3-hour PM Peak Period Simulation

Statistic		2051 Do-nothing Scenario	2051 Preferred Scenario
	Units	Value	Value
IEM Emission - CO2 – (Normalized)	kg	434,000	196,000
Percentage reduction of GHD Emissions (for 3-hour PM peak period)			55%

2.1.4 Future 2051 Recommended Network

The road network improvements recommended for implementation to the 2051 planning horizon are shown on **Figure 5** and are listed in **Table 6**. Road network improvements were grouped into several categories, including:

- **Road Network Improvements**: Vehicle and transit travel data were extracted from the strategic TransCAD model and incorporated into a city-wide mesoscopic Aimsun model to undertake a more detailed analysis of road links and intersections to be considered for improvements. Road network improvements were grouped into several categories, including:
- **Road reconstruction to support growth areas**: these roads would be “urbanized” to provide a curb and gutter and other major services where required. Improvements to the active transportation system, such as sidewalks and cycling facilities, would be added at the same time. Intersection along the urbanized corridor also would be improved at the same time to add missing infrastructure such as AODA-compliant crossings, sidewalk connections, cycling infrastructure, and turning lanes for vehicles;
- **Protection of future corridors and road realignments**: these projects are to accommodate future growth by protecting land that will be needed for multi-modal travel and by realigning or upgrading road segments to improve safety, improve operations, or improve capacity ;
- **Intersection improvements for safety and capacity improvements**: a common theme throughout the consultation undertaken during the TMP is the need for road safety improvements. Intersections have been identified city-wide for such improvements that would address operational or safety issues, and incorporate AODA-compliant crossings, sidewalks, cycling infrastructure, and turning lanes for vehicles. Some of these improvement would also increase the capacity of intersections, through such measures as additional turning lanes;
- **Centre turning lanes**: adding centre turning lanes improves road safety by reducing the likelihood of rear end and sideswipe collisions. These centre turn lanes also add capacity by reducing the friction of vehicles slowing down to turn and causing a queue for through traffic;
- **Strategic road widenings**: Strategic road widenings have been identified on Parkhill Road, Water Street, Nassau Mills Road, Television Road, and Ashburnham Drive.
- **Protecting for future new river crossing**: a long-term solution identified to protect for a new potential crossing of the Otonabee River between Sherbrooke Street and Maria Street, combined with an extension of Maria Street to Television Road to provide a continuous east-west arterial road across the City. This crossing should be protected so that nothing precludes its future construction, should it be determined to be necessary; and
- **Special study areas**: The TMP identified four ‘Special Study Areas’ that will require more detailed study and additional focused engagement with residents and other stakeholder groups including the County of Peterborough, adjacent Townships, and the Ministry of Transportation before specific improvement recommendations can be identified.

Figure 5: Road Network Improvements to Support Growth by 2051

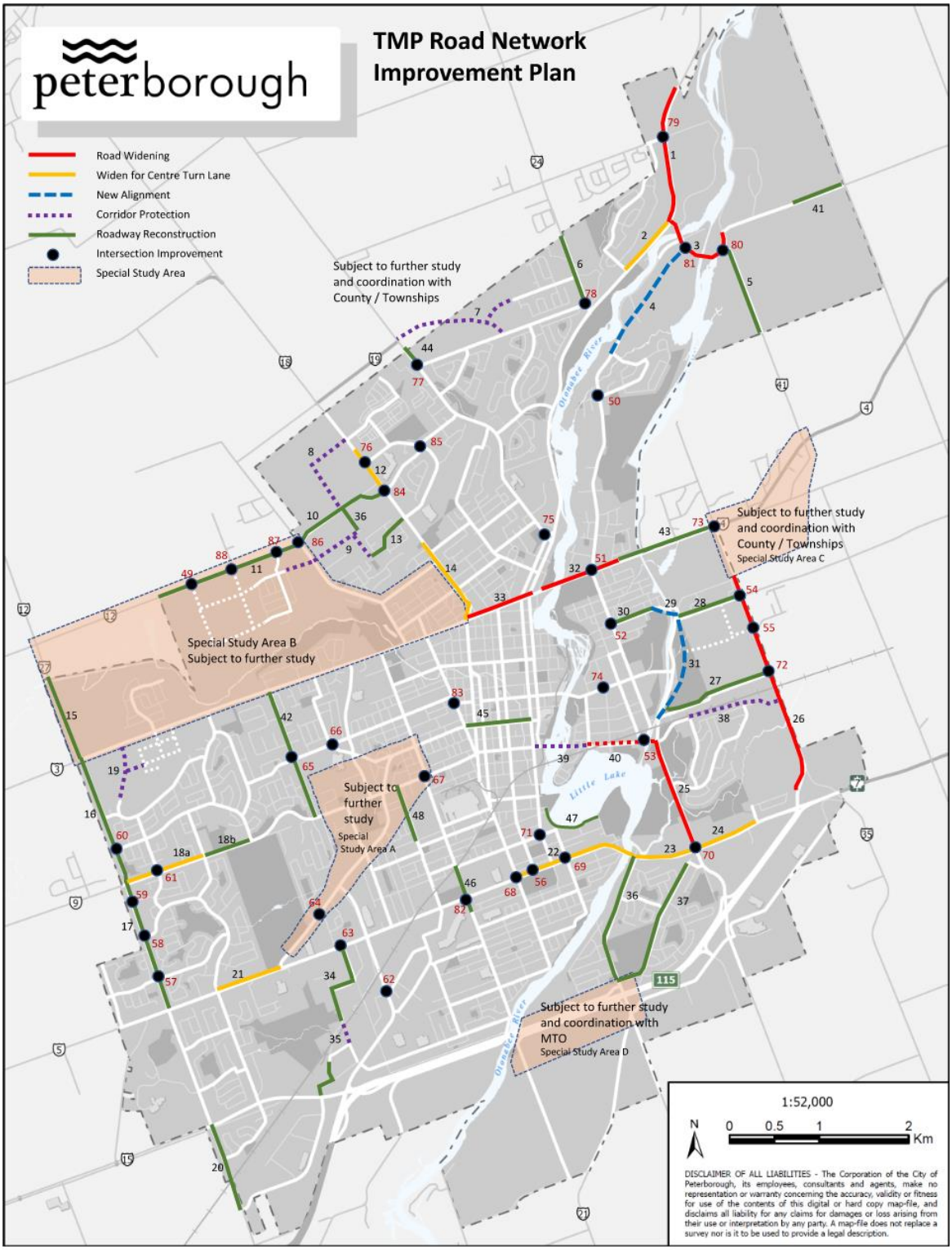


Table 6: Future Road Network (2051) Improvements – Detailed List

#	Street	Limits	Improvement
1	Water Street	Nassau Mills Rd to North City Limit	Widen to 4 lanes
2	Water Street	University Heights Blvd to Nassau Mills Rd	Widen to 5 lanes
3	Nassau Mills Rd	Water Street to Pioneer Rd	Widen to 4 lanes (including Bridges)
4	Armour Rd	Cunningham Blvd to Nassau Mills Rd	New 2 Lane Road Realignment
5	University Rd	Nassau Mills Rd to City Limit	Reconstruction to Urban Standard - Arterial
6	Carnegie Ave	Cumberland Ave to City Limit	Reconstruction to Urban Standard - Arterial
7	Future Roads	Cumberland Ave to Hilliard St	Corridor Protection - New Arterial / Collector
8	Future Roads	Towerhill Rd to Chemong Rd	Corridor Protection - New Collector
9	Future Roads	West of Fairbairn St to Hillview Dr / Hillside St	Corridor Protection - New Collector
10	Towerhill Rd	Fairbairn St to Chemong Rd	Reconstruction to Urban Standard - Arterial
11	Lily Lake Rd	Fairbairn St to City Limit	Reconstruction to Urban Standard - Arterial
12	Chemong Rd	Towerhill Rd to Broadway Blvd	Widen to 5 lanes
13	Simons Ave / Hillside St	Chemong Road to New Collector Rd	Reconstruction to Urban Standard - Collector Rd
14	Chemong Rd	Parkhill Rd to North of Sunset Blvd	Widen to 5 lanes
15	Ackison Rd	Parkhill Rd to City Limit	Reconstruction to Urban Standard - Arterial
16	Brealey Dr	Sherbrooke St to Parkhill Rd	Reconstruction to Urban Standard - Arterial
17	Brealey Dr	Lansdowne St W to Sherbrooke St	Reconstruction to Urban Standard - Arterial
18	Sherbrooke St	Glenforest Blvd to West City Limit	a) Widen to 3 lanes b) Reconstruction to Urban Standard - Arterial
19	Nornabell Ave Extension	Ireland Dr to Parkhill Rd	Corridor Protection - New Collector
20	Brealey Dr	Sir Sandford Fleming Dr to City Limit	Reconstruction to Urban Standard - Arterial
21	Lansdowne St W	Spillsbury Dr to Clonsilla Ave	Widen to 5 lanes
22	Lansdowne St W	Park St to George	Widen to 5 lanes
23	Lansdowne St E	a) George St to Otonabee river b) River Rd to Ashburnham Dr	Widen to 5 lanes
24	Lansdowne St E	Ashburnham Dr to Willowcreek Plaza	Widen to 5 lanes
25	Ashburnham Dr	Lansdowne St to Maria St	Widen to 5 lanes

#	Street	Limits	Improvement
26	Television Rd	Lansdowne St to South of Parkhill Rd	Widen to 4 lanes
27	Maniece Ave	Ashburnham Dr to Television Rd	Reconstruction to Urban Standard - Collector Rd
28	Old Norwood Rd	Ashburnham Dr to Television Rd	Reconstruction to Urban Standard - Collector Rd
29	McFarlane St	New 2 Lane Bridge Across Canal	New 2 Lane Road Realignment
30	McFarlane St	Armour Rd to Canal	Reconstruction to Urban Standard - Collector Rd
31	Ashburnham Dr	Maria St to Old Norwood Rd / McFarlane St	New 2 Lane Road Realignment
32	Parkhill Rd	Water Street to East of Leahy's Lane	Widen to 4 lanes
33	Parkhill Rd	Chemong Rd to Otonabee River	Widen to 4 lanes
34	Webber / Rye St	CP Rail to Lansdowne St W	Reconstruction to Urban Standard - Collector Rd
35	Harper Rd Rail Crossing	Fisher Dr to N of CP Rail Corridor	New 2 Lane Road Realignment
36	River Rd South	Otonabee Dr to Lansdowne St	Reconstruction to Urban Standard - Arterial
37	Otonabee Dr	River Rd S to Lansdowne St	Reconstruction to Urban Standard - Collector Rd
38	Maria St	Walker Ave to Television Rd	Corridor Protection - New 2 lane Arterial
39	Sherbrooke St	George St to Maria St	Corridor Protection - New 4 lane Arterial (Bridge Crossing)
40	Maria St	Otonabee River to Ashburnham Dr	Widen to 4 lanes (including new CP Bridge and New Canal Crossing)
41	Pioneer Rd	CleanTech Commons to 9th Line	Reconstruction to Urban Standard - Arterial
42	Wallis Dr	Sherbrooke St to Parkhill Rd	Reconstruction to Urban Standard - Arterial
43	Parkhill Rd	Leahy's Lane to east of Television Rd	Reconstruction to Urban Standard - Arterial
44	Hilliard St	Cumberland to City Limit	Reconstruction to Urban Standard - Arterial
45	Charlotte St	Park St to Water St	Reconstruction to Urban Standard - Arterial
46	Monaghan Road	Romaine St To Edison Ave	Reconstruction to enhance safety
47	Crescent Street	Perry St to Haggart St	Reconstruction to Urban Standard one-way street
48	High Street	Sherbrooke St to Chamberlain St	Reconstruction to Urban Standard

#	Street	Cross Street	Improvement
Intersection Improvement Projects			
49	Lily Lake Road	Street C (Dolman Street)	Install Left / Right Turn lanes / Future Signals when Warranted
50	Armour Road	Francis Stewart Blvd	Install Signals
51	Armour Road	Parkhill Road	Install N/S Left Turn; SB Right Turn; E-W Left Turn Lanes
52	Armour Road	McFarlane Street	Install SB Left Turn + Signals
53	Armour Road	Maria Street	Install Signals - Interconnect to Swing Bridge and Ashburnham Dr
54	Television Road	Old Norwood Road	Instsall NB/SB Left Turn Lanes + Signals
55	Television Road	Paul Rexe Blvd	Install Signals + West Approach
56	Lansdowne Street	Aylmer Street	Install Signals and Left Turn Lanes
57	Brealy Drive	Cherryhill Blvd	Install Signals + Left Turn Lanes
58	Brealy Drive	Kawartha Heights Blvd	Install Signals + Left Turn Lanes
59	Brealy Drive	Hewitt Drive	Install Signals + Left Turn Lanes
60	Brealey Dr	Glenforest Blvd	Install Signals + Left Turn Lanes
61	Sherbrooke St	Denure Drive	Install E-W Left Turn Lanes / Pemanent Signals
62	Parkway	Kingsway	Install Signals / remove channelized right turn
63	Lansdowne	Webber Avenue	Upgrade turn lanes N/S
64	Webber Avenue	Clonsilla Avenue	Provide E-W Left Turn Lanes + Signals
65	Wallis Drive	Weller Street	Provide Signals and Left Turn Lanes
66	Weller Street	Hospital Drive	Realignment of Weller Street
67	Sherbrooke Street	Monaghan Road	Improve Turning Radius / Provide Left Turn Lanes
68	Lansdowne Street	Park Street	Realign N/S approach to improve sight lines
69	Lansdowne Street	Lock Street	Provide E-W Left Turn Lanes
70	Lansdowne Street	Ashburnham Drive	Realign - Provide 4 Lanes N/S through intersection, New SB RT Lane
71	George Street	Romaine Street	Provide Signals and Enhanced Trail Crossing
72	Television Road	Maniece Ave	NB Left Turn Lane
73	Television Road	Parkhill Road	Urbanize and Provide Signals (or Roundabout)
74	Hunter Street	Mark Street	Traffic Signals
75	George Street	Hilliard Street	Traffic Signals and Enhanced Trail Crossing

#	Street	Cross Street	Improvement
76	Chemong Road	Milroy Drive North	SB Left Turn Lane
77	Hillard Street	Cumberland Avenue	Install Signals
78	Cumberland Avenue	Carnegie Avenue / Water Street	Reconfigure intersection, signals (or Roundabout)
79	Water Street	Woodland Blvd	Install Left Turn Lanes and Traffic Signals
80	Nassau Mills Road	University Road	Install Turn Lanes / Traffic Signals / realignment
81	Nassau Mills Road	Armour Road	Install Turn Lanes / Traffic Signals / realignment
82	Monaghan Road	Lansdowne Place Entrance	Install Signals + Enhanced Trail Crossing
83	Hunter Street	Park Street	Right-turn channelization (slip lanes) reconstruction to eliminate the channelization
84	Chemong Road	Towerhill Road	Widen E-W approaches to 5 lanes
85	Towerhill Road	Millroy Drive	Install Signals / Enhanced Crossings
86	Towerhill Road	Fairbairn Street	Install Signals and Turn Lanes (consider roundabout)
87	Lily Lake Road	Street A (York Drive)	Install Left / Right Turn lanes / Future Signals when Warranted
88	Lily Lake Road	Street B (Heideman Street)	Install Left / Right Turn lanes / Future Signals when Warranted

2.2 Transit Priority Measures

The approved Transportation Strategy is based on increasing the frequency and reliability of transit services to build and attract new ridership. Transit priority treatments allow transit vehicles to bypass congestion in general traffic lanes, increasing reliability and bus speed relative to automobiles. Transit priority improvements can be considered on transit routes where there is high ridership and also unstable traffic operations, such as slow travel speeds and reduced reliability for on-time arrival of transit vehicles. Transit priority measures can include simply re-timing traffic signals to benefit transit, giving signal priority to transit vehicles at intersections, and/or providing localized road improvements to benefit transit such as intersection bus by-pass lanes.

2.2.1 Context for Transit Priority

In 2051, to the mode share target in the approved Transportation Strategy calls for 10% of trips within Peterborough to be taken on the bus, up from 6% currently. To encourage this shift in behaviour a significant investment in transit will be required, increasing service hours by 71% compared to current

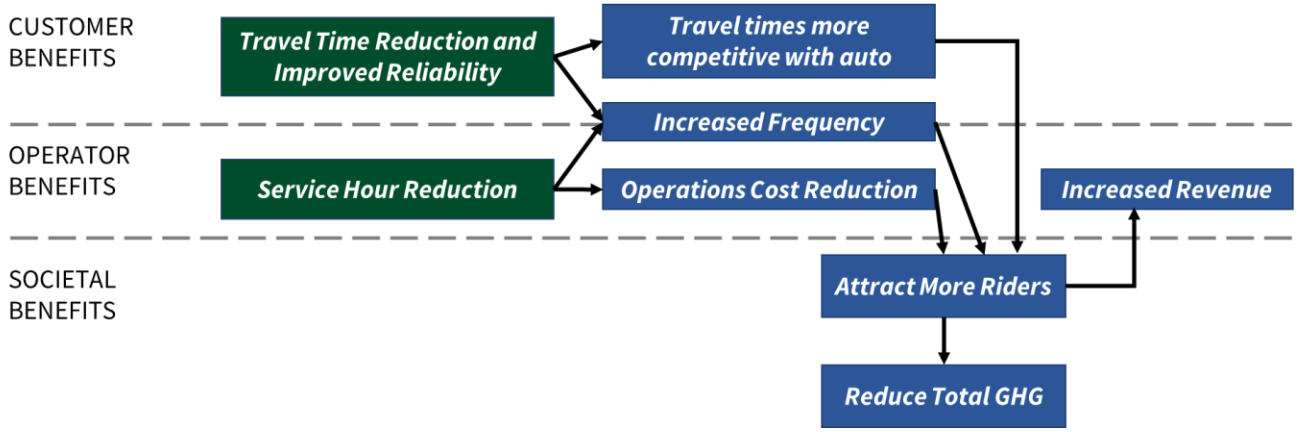
levels and purchasing new vehicles to provide these service hours. Service improvements will result in 10 to15-minute frequencies on many corridors with very high frequency of service along the Water Street corridor with a bus every 5 to 10 minutes during peak periods. These frequencies mean that customers will not need to consult a schedule prior to riding.

Through heavy investments in transit service, the approved Transportation Strategy will provide an attractive transit network where transit is a 'preferred' mode of travel between major origins and destinations. Ultimately, an attractive transit system requires more than just increased service hours. An attractive system *takes a customer-centred approach,* putting the service experience of the transit rider at the core of its business. Elements of an attractive system typically include:

- All-day service, 365 days a year
- High frequency service
- The ability to travel anywhere in Peterborough
- More direct routing
- A comfortable and safe ride
- High quality passenger amenities
- Ease of access to and from the bus stops on safe, secure, convenient, and consistently ploughed sidewalks and bike facilities
- Transit travel speeds that are competitive with auto between primary origins and destinations

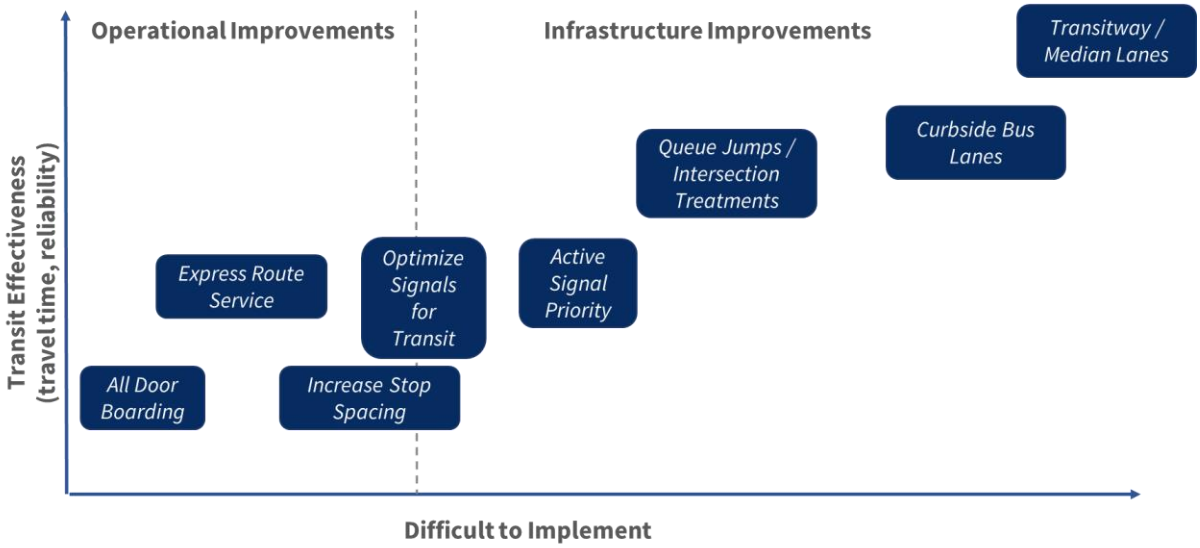
Transit priority treatments allow transit vehicles to bypass congestion in general purpose traffic lanes, increasing reliability and bus speed relative to the private automobile. As displayed in **Figure 6**, by reducing travel time and improving reliability, transit priority treatments can result in meaningful benefits to the customer as well as the operator. From a customer perspective, reduced travel times and improved reliability make transit a more attractive choice for travel. From an operator perspective, faster route speeds can allow for operations cost reductions or improvements to transit frequency. Altogether, these benefits can help attract additional riders, increasing revenues for Peterborough Transit, and take private vehicles off the road, moving the City closer to its mode share and GHG emission reduction goals.

Figure 6: Transit Priority Benefits



Transit speed can be prioritized through a range of operational and infrastructure improvements which vary in degrees of effectiveness and difficulty of implementation, as displayed in **Figure 7**. Operational improvements such as all door boarding (facilitated by off-board fare payment) and increasing transit stop spacing can be implemented relatively easily and will reduce dwell time at bus stops. Passive transit signal prioritization involves retiming signals to match typical transit operating speeds, providing buses with the ability to ride a 'green wave' along a corridor. Active signal priority allows signals to detect buses in the corridor and actively alter signal phasing in real time to support bus movement. Infrastructure improvements that reserve roadway lanes for buses only, such as queue jumpers, curbside bus lanes, or median transit lanes, are often more difficult to implement and require the reallocation of existing general purpose facilities or the expansion of pavement.

Figure 7: Transit Priority Menu



2.2.2 Transit Priority Considerations

Transit priority measures seek to improve travel speed and reliability for people on the bus. Transit priority measures are most beneficial where:

- Transit ridership is relatively high; AND
- Traffic conditions are currently or projected to be slow and/or unreliable

Both conditions are required to justify transit priority improvements.

The high-level thresholds shown in **Table 7** have been used to identify suitable corridors and intersections for transit priority treatments in Peterborough.

Table 7: Thresholds for Transit Priority Treatments

Transit Priority Stage	2051 Peak Hour Ridership	Performance Delay	Corridor Treatment
0	< 50 passengers per hour	Moderate OR Low	No transit priority treatments necessary
1	50 – 100 passengers per hour	Moderate OR High	Passive transit priority (retime signals for transit)
2	> 100 passengers per hour	Moderate OR High	Transit signal priority
3	> 200 passengers per hour	Very High	Intersection treatments / localized bus lanes

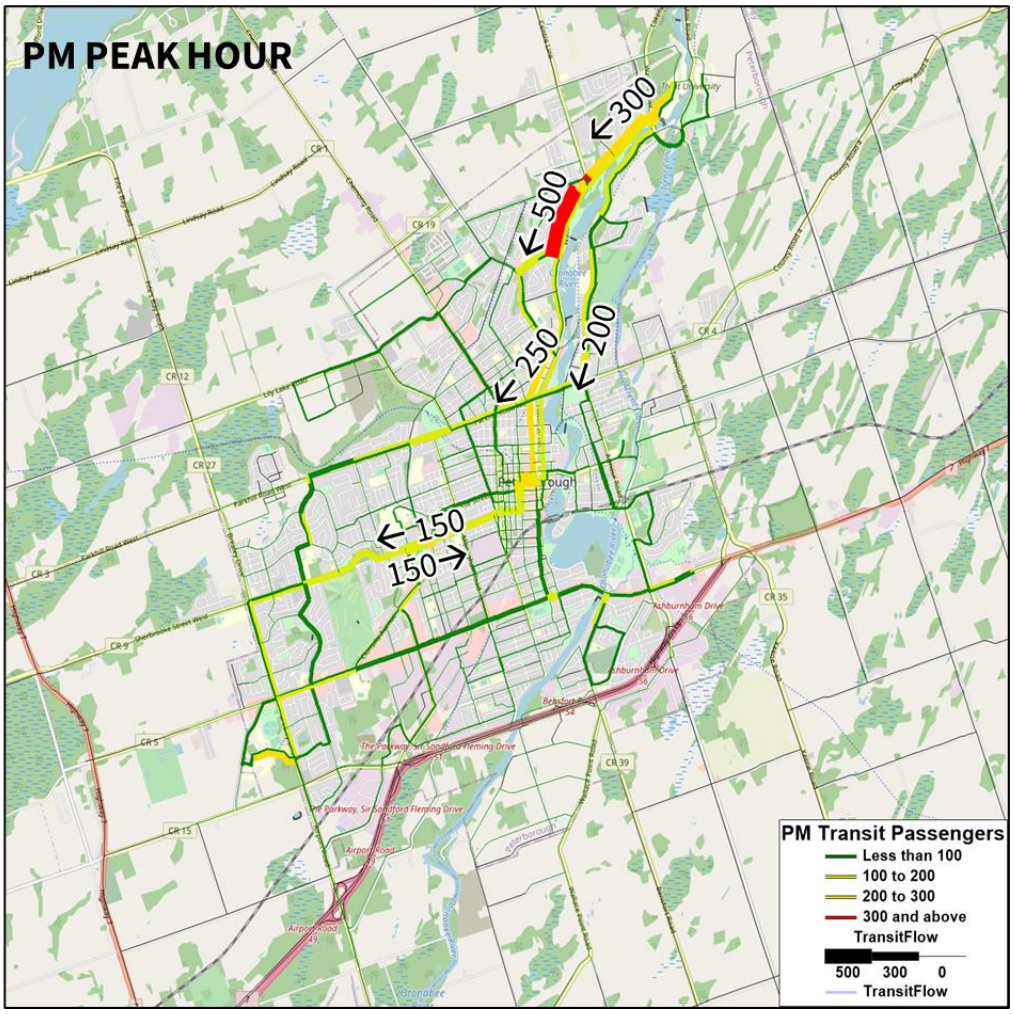
2.2.3 Corridor Ridership

Transit usage for Peterborough's approved 2051 transit network was modeled in the PM peak hour to identify locations where heavy usage is forecasted. Over 30% of the anticipated 2,500 daily transit trips occurring during the PM peak hour are projected to begin at Trent University or Fleming College, with a further 15% projected to originate in Downtown Peterborough. This sharp concentration of trip origins results in a clearly defined priority transit network along north-south corridors travelling between Downtown and Trent University, and to a lesser extent along east-west corridors extending west from Downtown. Specifically:

- 2051 PM peak hour transit travel is expected to be highest along the Water Street corridor between Trent University and Downtown, with passenger volumes ranging between 200 to 500 passengers per hour per direction
- Over 200 passengers per hour are projected along southbound Armour Road
- The Sherbrooke Street corridor is projected to accommodate up to 150 passengers per hour per direction

Transit passenger volumes for the 2051 p.m. peak hour are shown on **Figure 8**.

Figure 8: PM Peak Hour Transit Passenger Volumes (2051)

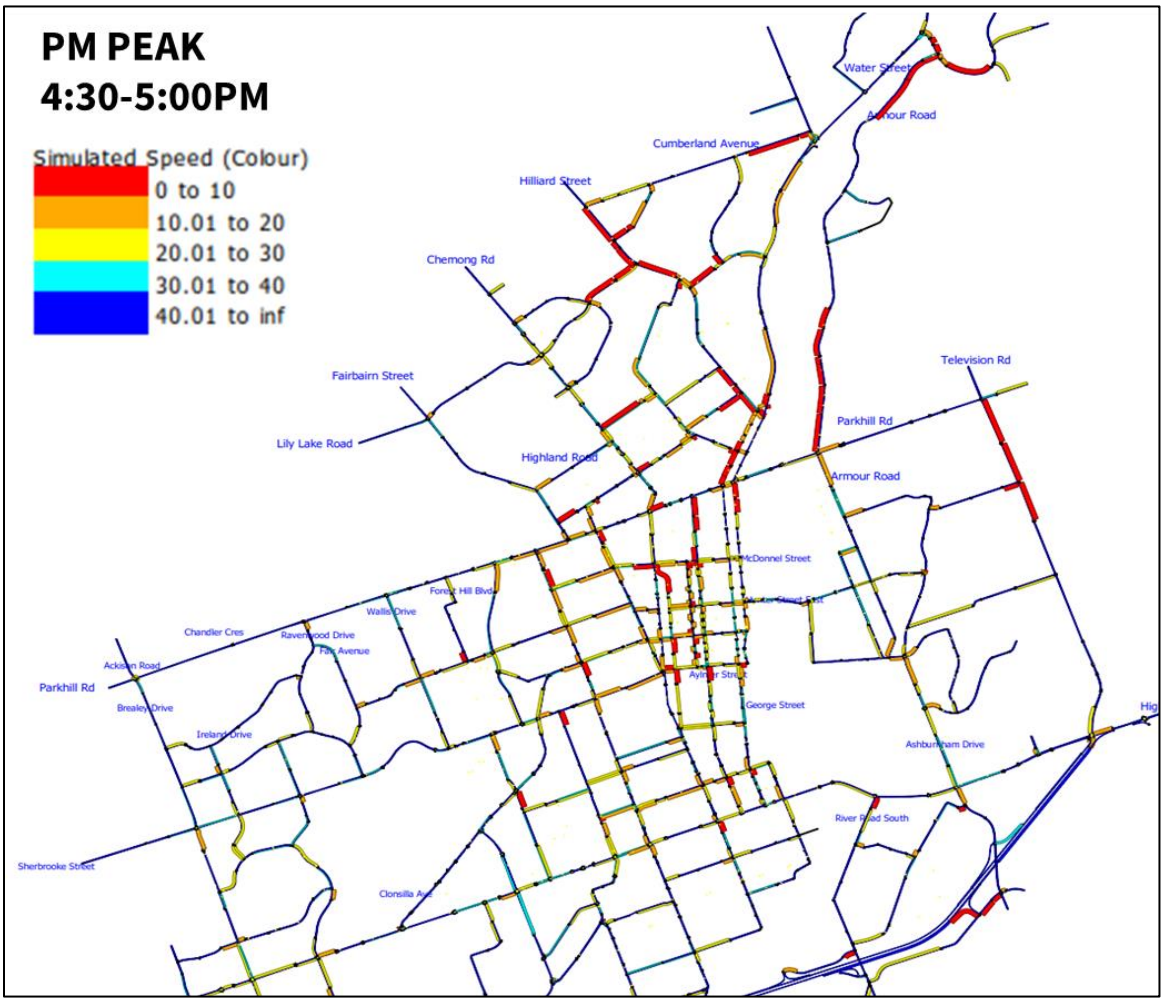


2.2.4 Performance Hot Spots

The Aimsun model used to inform the TMP's *Road Network Improvements* in *Section 2.1* was used to identify performance hot spots on the high frequency transit network in the 2051 PM peak hour. As shown in**, Figure 9** slower travel speeds are simulated along several primary transit corridors, resulting in potential impacts to transit performance and reliability. Specifically, future performance issues are anticipated:

- Along Water Street between Trent University and Downtown
- Along the Nassau Mills Road / Water Street signal, which serves the primary bus route between Downtown and Trent University
- Along eastbound Sherbrooke Street near Monaghan Road
- Along Parkhill Road between Monaghan Road and Armour Road
- Along southbound Armour Road caused by congestion at the Parkhill Road signal
- Along approaches to the Downtown central bus terminal

Figure 9: 2051 PM Peak Period Corridor Operations (Aimsun Model)



2.2.5 *Transit Priority Recommendations*

Transit Signal Priority improvements are recommended along transit corridors that serve more than 100 passengers in the peak direction during the peak hour. In select hot spot locations, Transit Signal Priority alone will not be sufficient in improving transit performance, and additional infrastructure improvements may be required to prioritize transit.

Transit Signal Priority Improvements

Based on the results of the analysis, ***transit signal priority*** is being recommended along six corridors as noted in **Table 8**.

Table 8: Peterborough's Recommended Transit Priority Corridors

Corridor	Extents	PM Peak Buses / Hour	PM Pk Hour- Pk Direction Ridership	Delay
Water Street – George Street	Nassau Mills Rd to Simcoe St	15 – 25	200-500	High
Parkhill Rd	Monaghan Rd to Armour Rd	4	100-150	Moderate
Sherbrooke St	Aylmer St to Goodfellow Rd	5	100-150	Moderate
Lansdowne St	George St to Brealey Dr	6 – 8	75-100	Moderate
Hilliard St	Marina Blvd to Water St	5	100	High
Marina Blvd	Hilliard St to Water St	11 – 15	150-180	High

Transit signal priority (TSP) is a set of tools and traffic management systems that detect transit vehicles and modify the timing of traffic signals to prioritize transit movements. Signal prioritization can be given to all buses or exclusively to buses that are running behind schedule. Signal priority can be implemented throughout an entire corridor or at specific intersections and require sensors along a corridor and an on-board GPS system for vehicle detection. Different treatments can include phase reservicing, phase extension, phase truncation, and phase insertion.

TSP has been shown to reduce bus travel time by up to 18%, decrease delay at a single intersection by up to 80%, and reduce travel time variability by up to 40%. Challenges can include increasing delay on cross streets, reduced effectiveness in situations of heavy congestion, and a minor increase to general traffic delay. As transit service levels, route frequency, and passenger demands grow the City should assess opportunities to introduce various levels of TSP on the above noted corridors.

Transit Priority Hot Spots

Transit priority-driven infrastructure improvements are recommended for consideration at four 'hot spot' locations identified in **Table 9** due to high projected delays in general purpose traffic and heavy transit demand. It is unlikely that transit signal priority improvements alone will be able to address the type and extent of performance issues that are being anticipated along these core transit network corridors.

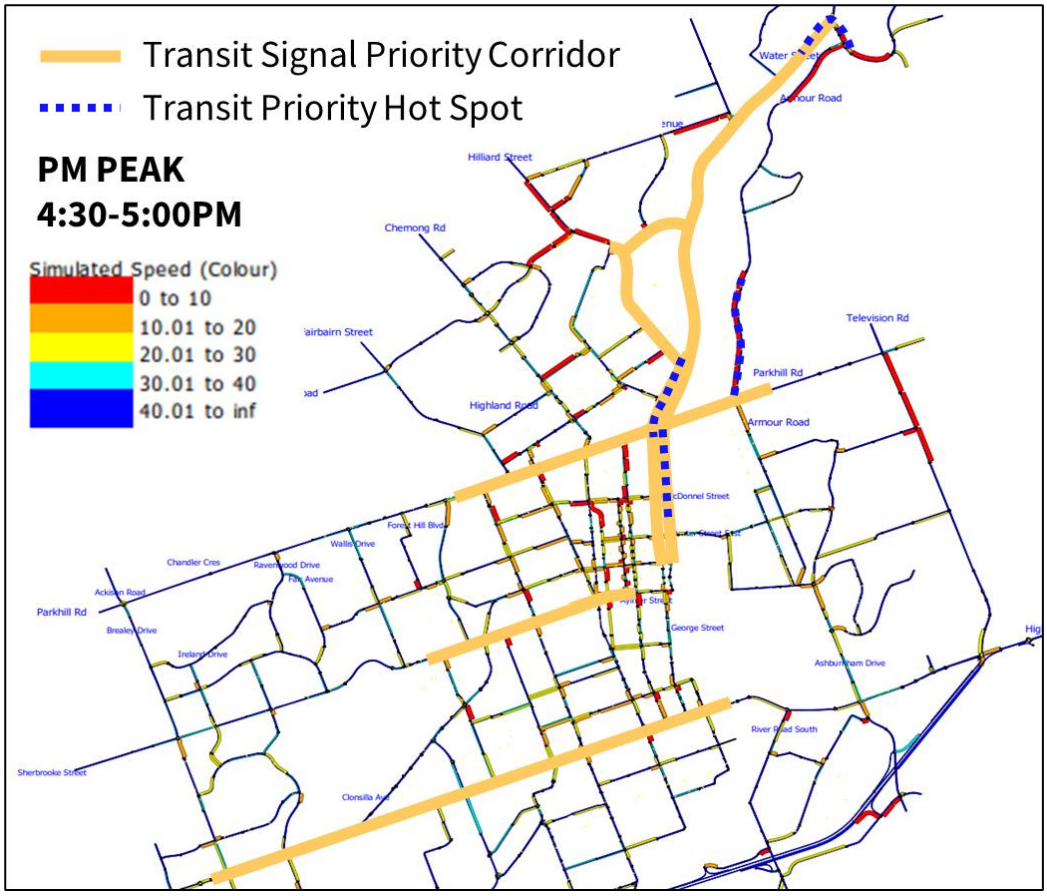
All four priority 'hot spots' impact service between the North End of the City and Downtown Peterborough, with three of the four hot spot locations directly impacting the City's primary Water Street-George Street corridor, where bus frequency will ultimately reach every 5-10 minutes during peak periods.

Table 9: Peterborough's Recommended Transit-Priority Infrastructure Improvement Locations

Location	Extents	PM Pk Hour-Pk Direction Buses	PM Pk Hour- Pk Direction Ridership	Delay
1. Nassau Mills Rd / Water St	W Bank Rd to south of signal	25	300	High
2. SB Water St-George St	Langton St to Parkhill Rd	15	250	Very High
3. NB Water Street	Dublin St to Parkhill Rd	13	150	High
4. Armour Rd / Parkhill Road	Signal	8	200	Very High

Figure 10 illustrates the location and extents of the six transit signal priority corridors and four transit priority hot spot locations recommended for transit priority-driven infrastructure improvements.

Figure 10: Recommended Transit Priority Improvement Locations



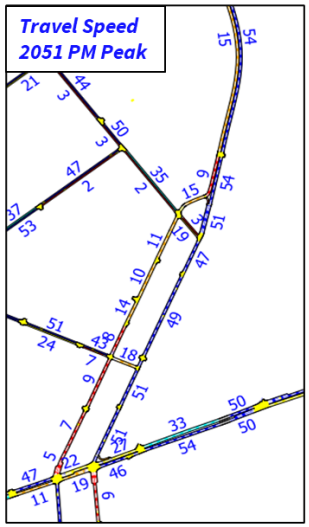
2.2.6 Potential Transit Priority-Driven Infrastructure Improvement Options

Transit priority-driven infrastructure improvements at the four priority hot spot locations identified above could include reserved bus lanes and turning movements and could be delivered through lane reallocation or roadway widening.

Figure 11 through **Figure 14** define the problem and provide potential transit priority improvement options at the four priority hot spot locations. The improvement concepts presented reflect potential options and opportunities the City might wish to explore to prioritize transit through hotspot locations. The need and scale of all transit priority-driven infrastructure improvements will be confirmed by future studies. While the conceptual cross sections for midblock locations illustrate that exclusive lanes can be accommodated, additional widening may be required at intersections where existing turning lanes are present or future turning lanes are recommended.

Figure 11: George Street (Hilliard St to Parkhill Rd) Problem Definition and Conceptual Improvement

Problem Statement

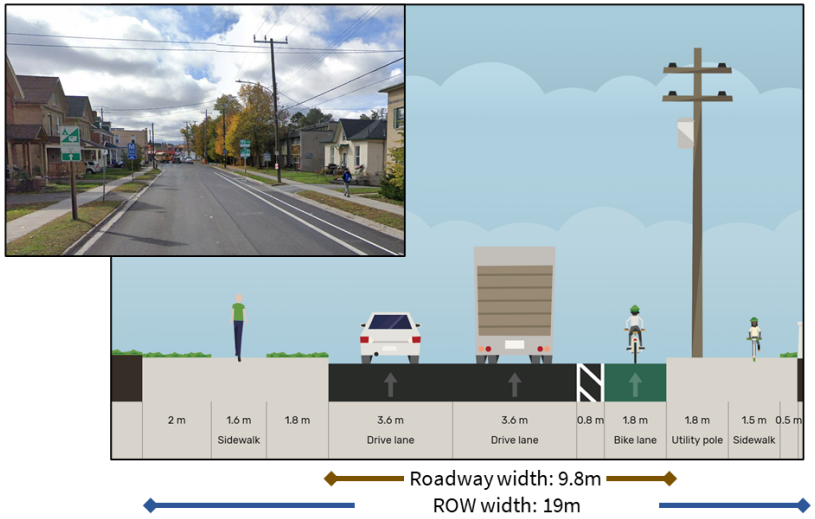


The segment is located along the Peterborough's primary transit corridor, with combined frequencies of a bus every 3 to 4 minutes in 2051. The corridor serves up to 300 passengers per hour in the PM peak hour.

In 2051, queue spillback from the George Street / Parkhill Rd signal is projected to extend 1.7km to approximately Langton Street, resulting in very slow conditions, with speeds averaging between 5 and 15 km/h in the PM peak hour.

Slow speeds result in delays of approximately 6 min per bus and equate to approximately 1,500 minutes for transit riders during the PM peak hour

Existing Cross-Section



Potential Improvement Option

A potential transit priority improvement option that **can be completed within the existing public right-of-way** could include:

- A new southbound peak period bus only lane between Hilliard St and Parkhill Road;
- Improved cycling facilities with the provision of a one-way cycle track; and,
- A new bus queue jump signal at Parkhill Rd.

The bus-only lane could be used in off-peak hours for general purpose operation or on-street parking.

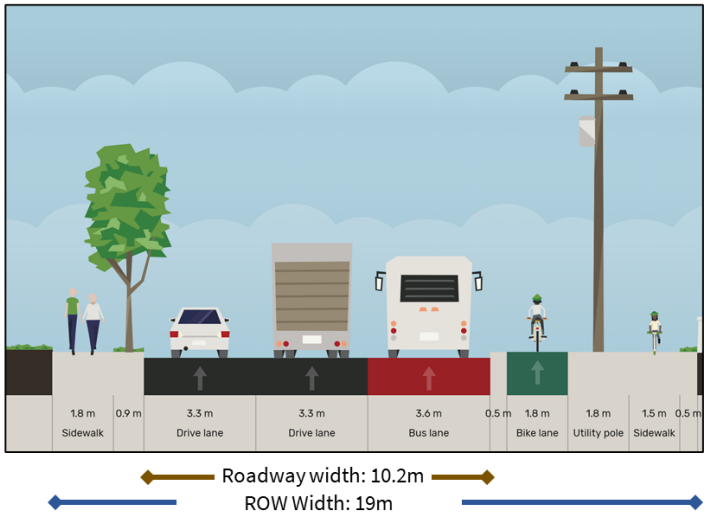
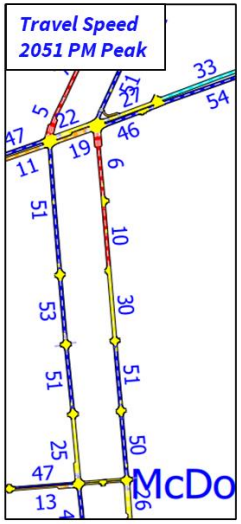


Figure 12: Water Street (Dublin St. to Parkhill Rd.) Problem Definition and Conceptual Improvement

Problem Statement

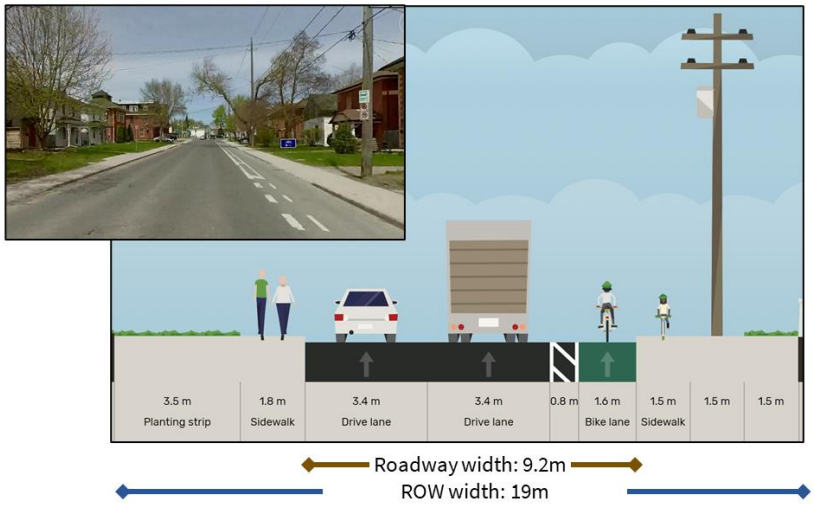


The segment is located along the Peterborough's primary transit corridor, with combined frequencies of a bus every 3 to 4 minutes in 2051. The corridor serves up to 300 passengers per hour in the PM peak hour.

In 2051, queue spillback in the PM peak hour from the Water Street / Parkhill Road signal is projected to extend 400m to approximately Dublin Street, resulting in slow conditions, with travel speeds ranging between 5 and 30 km/h.

Slow speeds result in delays of approximately 1 min per bus and equate to approximately 250 minutes for transit riders during the PM peak hour. AM peak hour conditions have not been modeled.

Existing Cross-Section



Potential Improvement Option

A potential transit priority improvement option that **can be completed within the existing public right-of-way** could include:

- A new northbound peak period bus only lane between Dublin Street and Parkhill Road;
- Improved cycling facilities with the provision of a one-way cycle track; and,
- A new bus queue jump signal at Parkhill Rd

The bus-only lane could be used in off-peak hours for general purpose operation or on-street parking.

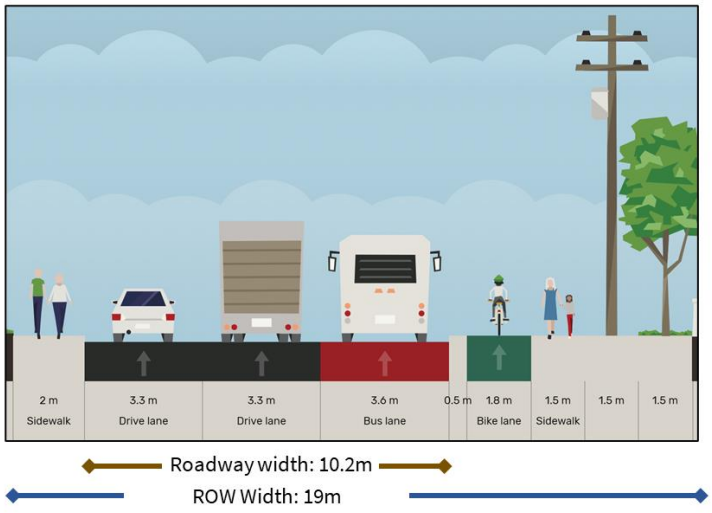
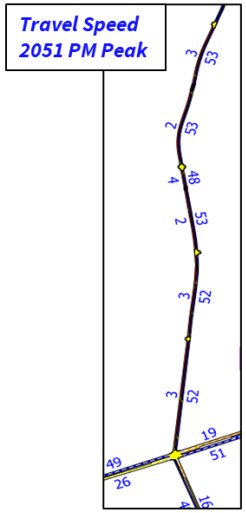


Figure 13: Armour Road (TASS to Parkhill Rd.) Problem Definition and Conceptual Improvement

Problem Statement

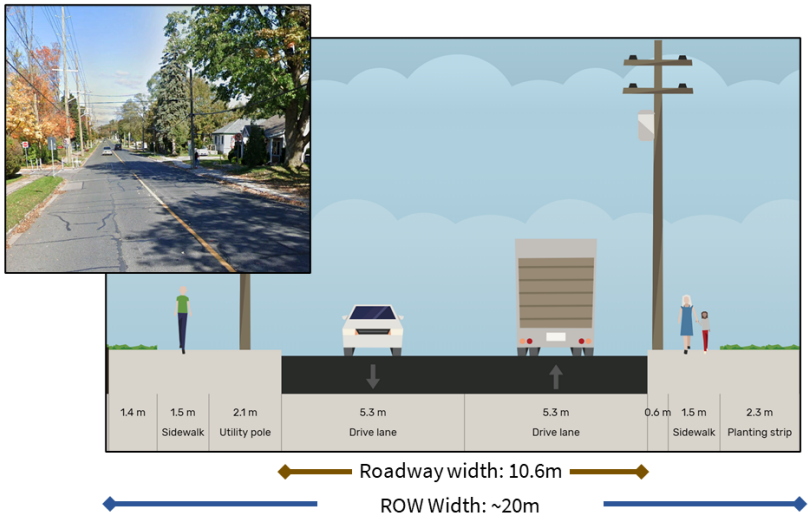


The segment is located along an important transit corridor connecting Trent University and Downtown Peterborough. The corridor serves about 200 passengers per hour in the peak direction in the PM peak hour.

In 2051, queue spillback along southbound Armour Road in the PM peak hour from Parkhill Road signal is projected to extend 1.4km to the TASS campus, resulting in very slow conditions, with travel speeds ranging between 2 and 4 km/h.

Slow speeds result in delays of approximately 26 minutes per bus and equate to approximately 5,200 minutes for transit riders during the PM peak hour.

Existing Cross-Section



Potential Improvement Option

A potential transit priority improvement option that **can be completed within the existing pavement width** involves:

- Providing a new southbound shoulder peak-period bus only lane between TASS and Parkhill Road, which would allow buses to bypass queue spillback. While an additional bus-only lane extending to the TASS campus is required to fully bypass queuing, a shorter bus bypass lane would still reduce significant delays for passengers.

Improvements could largely be completed within the existing pavement by reducing existing 5.3m wide lanes to 3.5m lanes. The bus lane could be used in off-peak hours as an additional southbound general purpose lane, a designated southbound bicycle lane, or for on-street parking.

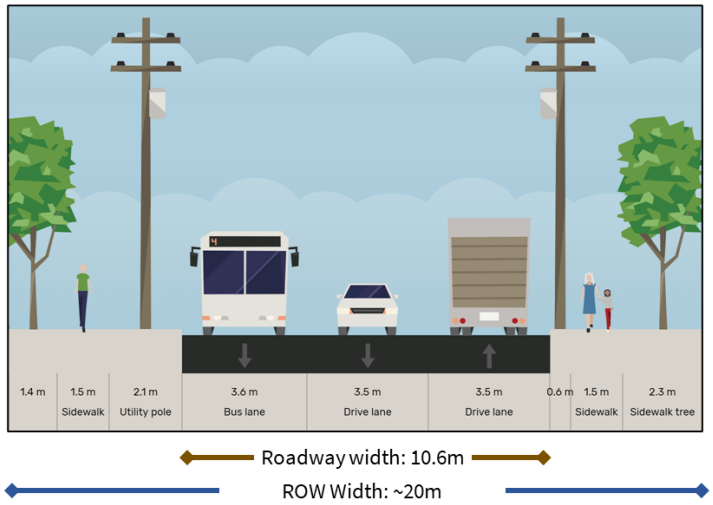
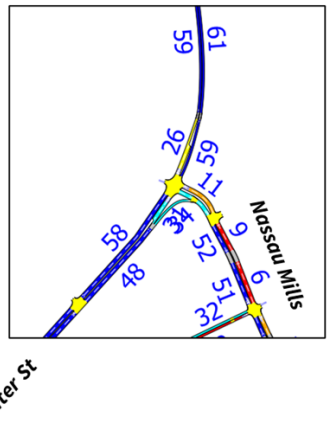


Figure 14: Water Street / Nassau Mills Road Problem Definition and Conceptual Improvement

Problem Statement

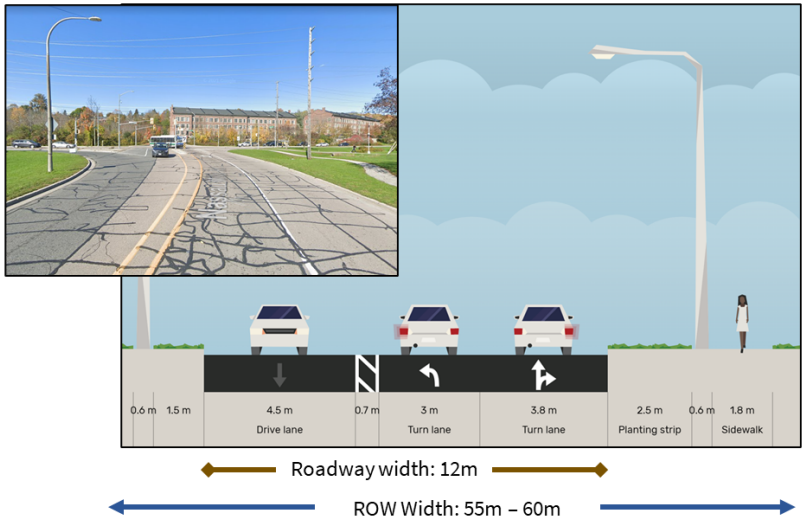
Travel Speed 2051 PM Peak



This significant intersection is located at the start of Peterborough's primary transit corridor, with combined frequencies of a bus every 3 to 4 minutes in 2051. The westbound left-turn movement serves all Downtown-bound buses exiting campus, which amounts to over 300 passengers per hour the PM peak hour.

In 2051, queue spillback from the Water Street signal occurs along westbound Nassau Mills Road beyond West Bank Drive, resulting in very slow conditions, with travel speeds of 11 km/h identified.

Slow speeds would result in delays and reliability challenges at the beginning of the route, which would continue to negatively impact on-time performance through to Downtown Peterborough.

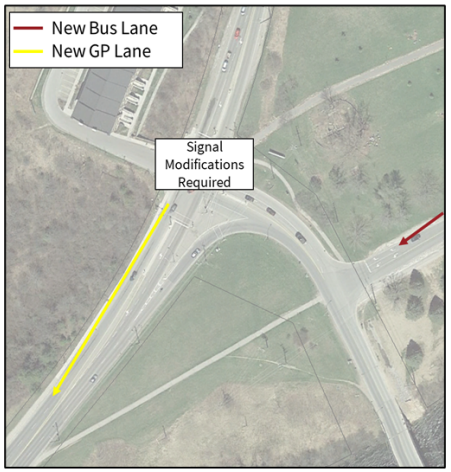


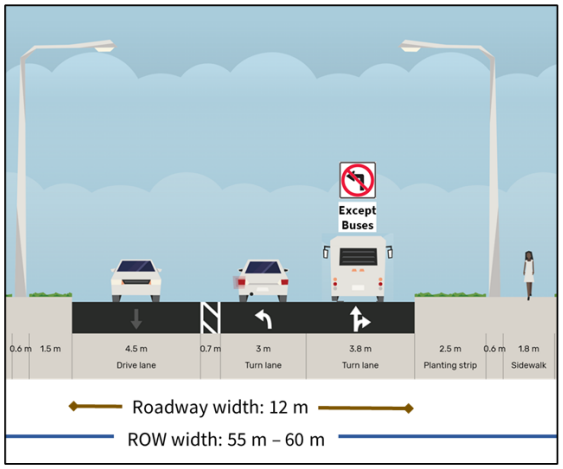
Potential Improvement Option

A potential transit priority improvement option that **can largely be completed within the existing public right-of-way** could include:

- A new westbound transit queue jumper lane along West Bank Drive to get ahead of signal queue spillback;
- Permitting transit vehicles to use the existing westbound through / right turn lane at the Water Street / Nassau Mills signal as a transit only left turn facility;
- Extending the existing southbound Water Street curbside lane 100m to the Nassau Mills Road signal, to accommodate a second WBL turning lane at the signal; and,
- Rephasing the Water Street / Nassau Mills Road signal to function as a split-phase signal, providing protected operation for all westbound and eastbound movements in separate phases.

It is understood that this intersection is being reconfigured as part of the Northend EA, currently underway.





2.3 Integrating the Cycling Network with the TMP

The transform strategy for the TMP incorporates the Cycling Master Plan's (CMP) hybrid accelerate / spark scenario that includes up to 160km of new cycling infrastructure in the city over the next 30 years, a significant investment in programming to encourage a shift of travel behaviour toward cycling, and a major expansion of the off-road trail system. The CMP provides the blueprint to build a more cycling-friendly city and encourage more people to choose cycling as a transportation option.

The ultimate cycling network, shown in **Figure 15**, shows the existing network as well as the proposed network that will create a city-wide cycling network that allows people to travel by bicycle to anywhere in the city. The CMP identified a Crosstown Network shown on **Figure 16** which represents the first priority for implementation, with routes that connect to all major destinations throughout the city. One of the objectives for the Crosstown Network is to have 80% of this network designed for all ages and abilities of cyclist, featuring cycling lanes that are protected from traffic to encourage less experienced riders to try cycling.
The new projects shown on the cycling network would be expected to be constructed in multiple ways. If the City is undertaking road or utilities reconstruction, this offers the opportunity to construct the appropriate cycling facilities at the same time. The City has an annual budget for cycling infrastructure that can be used to help build the proposed network. Some infrastructure may be constructed through new developments or redevelopment of properties. The City may also receive provincial or federal grants, when available, to construct parts of the network, particularly for projects identified as part of the Spark Scenario within the CMP.

The supportive programs and themes of the CMP that assist in the implementation of the infrastructure and the modal shift to more people cycling as a means of travel are highlighted in **Section 3.1.8**.

Figure 15: Ultimate Cycling Network

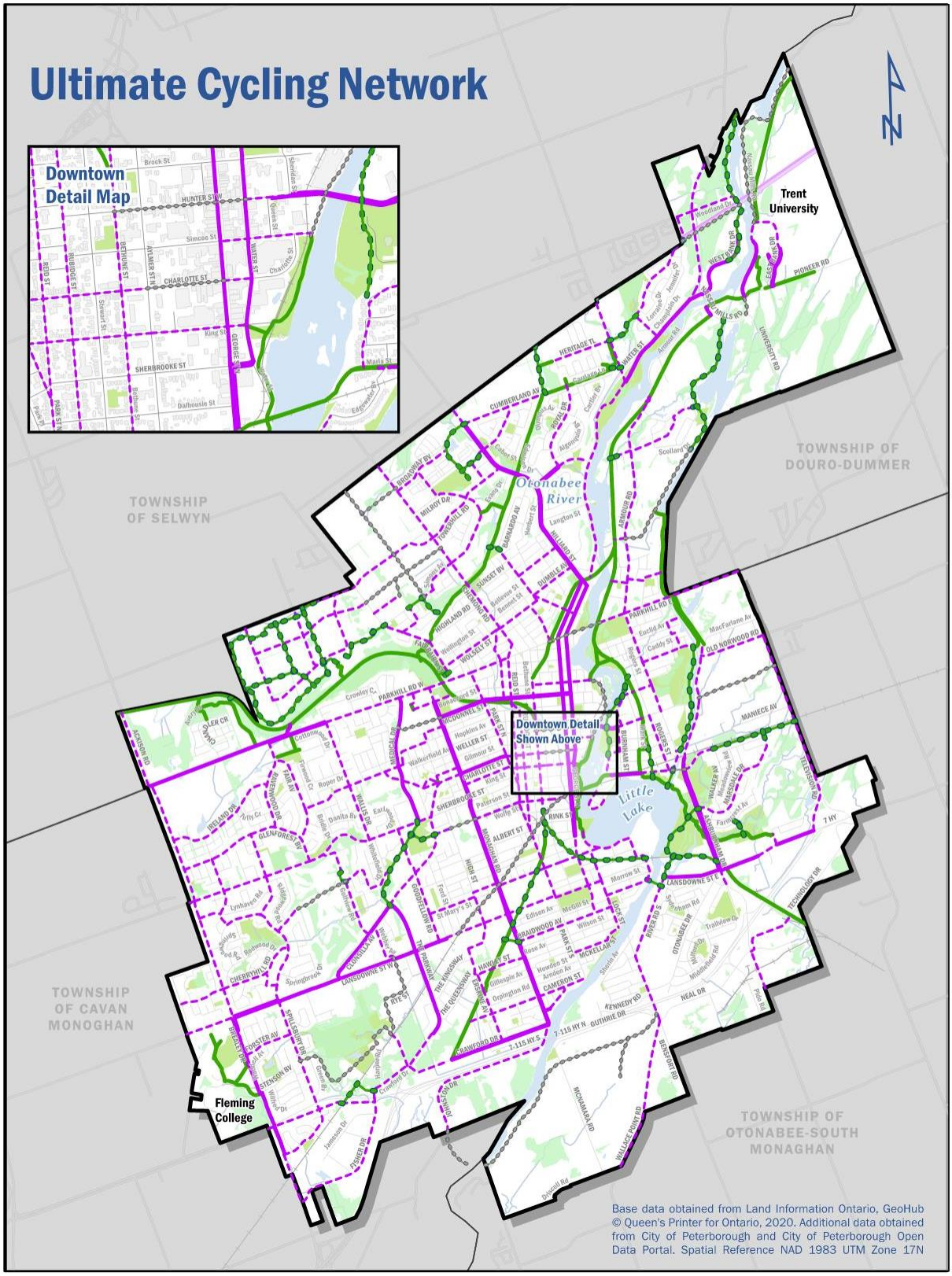
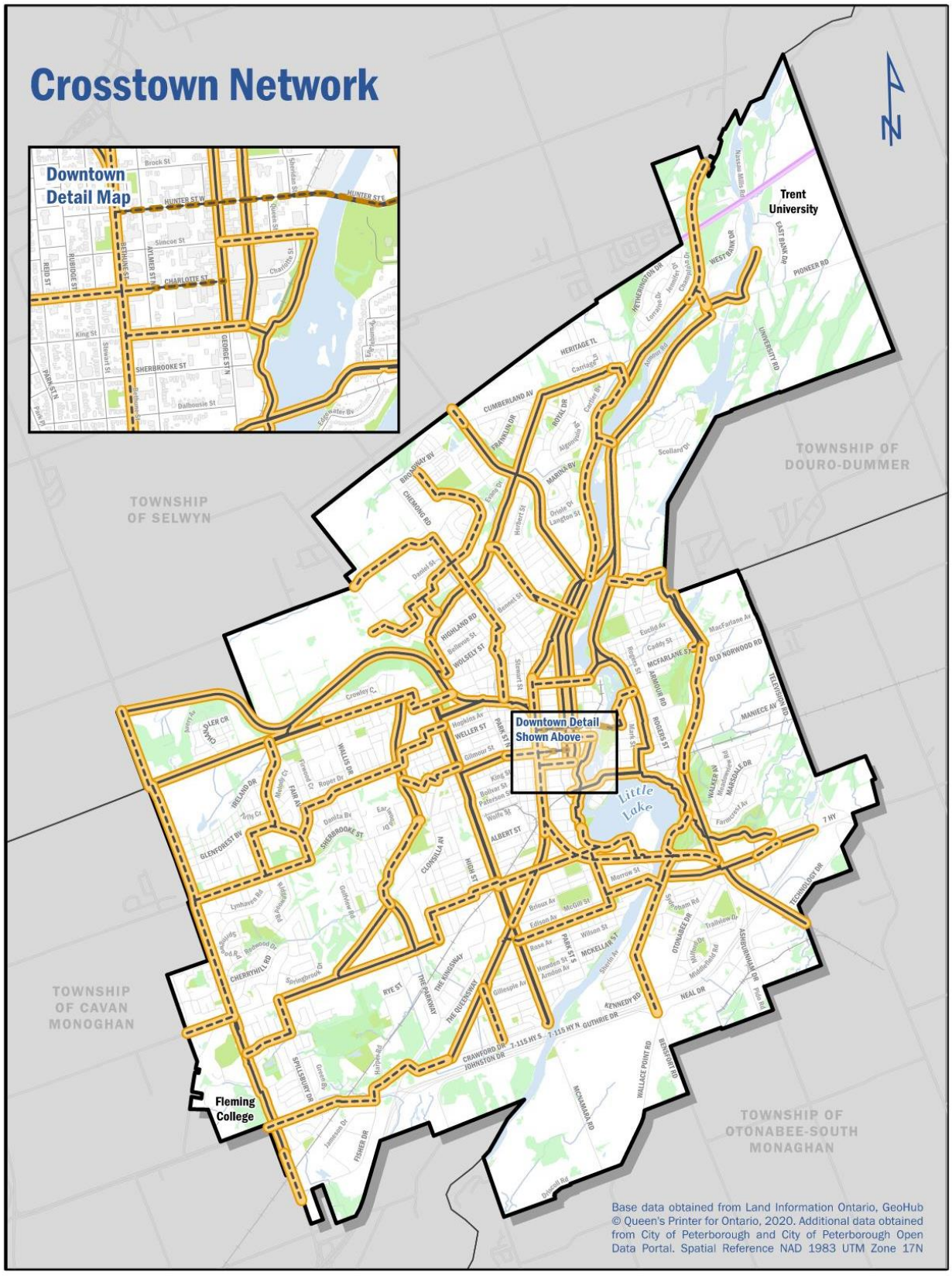


Figure 16: Crosstown Network



2.4 Sidewalk Network

The preferred strategy includes an aggressive investment in the sidewalk network. The importance of this has been confirmed through public consultation, as comments have consistently been received advocating for the creation of an all ages and all abilities network, of which the sidewalk network is an essential element. Sidewalk expansion is envisioned to fill in gaps in the network in the downtown and along corridors designated for intensification of land uses. The sidewalk network would be extended to connect to new growth areas. These new growth areas would be fully serviced with sidewalks on both sides of all new roads.

Another focus of sidewalk investment would be on “first and last mile” connections. Any missing links in the sidewalk network that connect to transit stops would be prioritized to help make taking transit more convenient and easier to access. These investments support not only walking but also transit ridership.

Accessibility has been another theme heard through consultation throughout the TMP development. The City has an ongoing program to install infrastructure to retrofit existing intersections for accessibility. Any new intersections would be constructed as accessible intersections. Additionally, when improvements or reconstruction of roadways are being undertaken the City would use these opportunities to also construct missing sidewalk links and accessible infrastructure.

3 Policies, Guidelines, and Standards

3.1 Actions that Influence Change in the City's Transportation System

To realize the goals of the City's Transportation Master Plan, actions leading to impactful change are required. The previous sections of this report detail the ways road improvements, transit priority measures, cycling improvements, and investments in the sidewalk network can support future growth, support sustainable modes of travel, and instill resiliency for the future of Peterborough. Beyond these "hard measures" that are categorized as supportive infrastructure, there are "soft measures", which encompass policies, guidelines, and City standards that are foundational to long-lasting change. Part of coupling these two measures together is to ensure there are supportive tools available to staff, decision-makers, and stakeholders to implement the TMP.

Policies, guidelines, and standards are foundational to the TMP because they inform short-, medium-, and long-term infrastructure and programming investments that support implementation of the preferred alternative. These three components serve as the blueprints for how the transportation master plan will evolve to the 2051 horizon year, and ultimately, how the neighbourhoods that make up Peterborough will grow into the future.

The effectiveness of the proposed road and transit priority improvements is rooted in municipal policy frameworks such as the Official Plan, Development Charges Background Study and By-law, and Strategic Plans. To this effect, the Transportation Master Plan requires direction around designing a network that channels decisions and investments into establishing a network that is equitable, balanced, and meets the needs of all users.

This section summarizes and outlines the policy-, guidelines, and standards-driven recommendations for successful implementation of the TMP, including:

- Transportation Demand Management
- Complete Streets
- Goods Movement
- Parking Management
- Road Safety
- Transit Fare Discount Program
- Emerging Transportation Technologies
- Cycling

3.1.1 Transportation Demand Management in the City of Peterborough

Transportation Demand Management (TDM) is the application of programs, policies, and services that are intended to influence people's travel behaviours. The combination of the measures is intended to promote sustainable travel modes such as walking, cycling, transit, micromobility (i.e. e-scooters and e-bikes), and/or carpooling as viable options. Implementing TDM can support municipalities with decision-making tools that give residents and visitors the option for equitable, accessible, and sustainable travel options to meet their needs.

Currently, the City of Peterborough is one of the few medium sized Cities that has a formal Transportation Demand Management Program, introduced following the approval of the 2002 Transportation Master Plan. The City's existing Transportation Demand Management (TDM) program employs community outreach and partnerships with external organizations to encourage residents to consider more sustainable modes of travel as an alternative to driving alone by automobile. Programs include education and promotion of walking or cycling to school, a strategic sidewalk program to

prioritize construction of missing sidewalk links, support for carpooling, and various campaigns and programs to promote cycling and other community based initiatives that highlight opportunities to rethink how residents travel. Policy measures recommended in the TMP are an extension of our current Transportation Demand Management Programs and are designed to support and encourage a shift in travel behaviours to meet our mode share targets.

Investment in TDM strategies can be categorized as place-based or systematic. Place-based strategies can be categorized as tangible (i.e. a new bike facility or transit services), or less tangible but designed to benefit target groups across the broader community (i.e. carpooling groups along specific corridors). Systematic strategies are planned with goals and objectives that have desired outcomes (i.e. promotion of public transit in an entire market area). Along similar lines, TDM consists of soft measures that are focused on programming that create opportunities for residents to easily access sustainable modes other than the automobile. Hard programs are focused on interconnected infrastructure opportunities such as on-road and off-road active transportation facilities, bicycle parking and associated amenities, and safety features that encourage an uptake of active travel options for daily travel.

Of the TDM measures available to municipalities to date, the following are shown to be the most effective and are being recommended for integration and implementation through the City of Peterborough's Transportation Master Plan.

- **Telework** – Employers to develop a framework policy allowing employees to work from home on a regular basis to reduce traffic congestion. This measure is focused on removing vehicular trips during peak travel periods. Implementing telework policies is a successful measure because it can be cost neutral to the employer and bears no cost to the taxpayer. The COVID-19 pandemic has accelerated and proven that teleworking and can be used effectively by large and small employers, and serves as a catalyst to maintain telework as an ongoing transportation demand management measure.
- **Active School Travel Programming** – Active School Travel Peterborough is an Active and Safe Routes to School program run in Peterborough by the non-profit group GreenUP. The City already is a partner with this program, and can continue to seek ways to expand the program to vehicle trips to and from schools to drop off and pick up students. Other added elements to the active school travel programming can include Crime Prevention through Environmental Design and improved multi-use paths designed with these users in mind.
- **Carpooling** – Incentives can be provided for those who choose to carpool to destinations like major employment hubs such as Peterborough Regional Health Centre, Trent University, Fleming College, Lansdowne Place shopping mall, or business areas like the downtown. Incentives to carpool can help create a network of commuters who share similar travel patterns to increase the number of non-single occupant vehicle trips being made throughout the network. Incentives for both public and private sector employees could include preferential parking locations and reduced parking rates (where applicable).
- **Public Transit Improvements** – Improving transit infrastructure and services has the potential to increase the likelihood of commuters using this mode for business and leisure trips. Attention should be given to frequency, reliability, efficiency, and connections to multiple routes. Service and infrastructure improvements across the network can facilitate a meaningful shift in travel behaviour by creating access and connections to the broader community.
- **Outreach** – The City should focus on expanding outreach programs with the local businesses, residents, and property owners to develop TDM-specific policies and regulations that continuously encourage use of alternative modes of travel. This can include pilot programs that explore mobility needs and requirements highlighting areas for improvement through policy and programming updates.

Transportation Demand Management does not stop with the five measures discussed above. The combination of the measures detailed in this section and below are not intended to be exhaustive. Rather, they are meant to provide a framework and breakdown of measures, policies, guidelines, and standards that can be effective for the City of Peterborough. The sections that follow are additional forms of transportation strategies targeted at managing traffic flows, supporting the movement of both people and goods, and creating greater equity and access across several modes of travel.

3.1.2 Complete Streets

Complete Streets are streets that are planned, designed, constructed, operated, and maintained for all transportation modes as well as users of all ages and abilities. The overarching concept of a Complete Street focuses on place-making and connected communities, through this focus on promoting more sustainable modes of travel versus emphasising single-use automobile. In the past, streets were designed primarily for auto-mobility and automobile safety, with limited regard for resiliency towards future change, livability of the streets, and multi-modal mobility.

The objectives of introducing Complete Streets across Peterborough's network are to:

i. Clarify the intended use of a street
ii. Improve overall transportation safety and public health
iii. Promote sustainable travel choices by providing mechanisms that encourage multi-modal choices and access to those choices
iv. Encourage more comprehensive capital programming planning and budgeting
v. Develop stronger knit communities, encouraging greater livability and quality of life
vi. Increase local economic development through the lens of place-making
vii. Improve the City of Peterborough's resiliency to adapt to future change, including climate change

A Complete Streets policy can be considered for all types of projects and policies at any given stage. The policies detailed in this section are intended to guide the City of Peterborough with the design and retrofits of existing or new infrastructure. The guiding elements ensure all road users are familiar with roadway features and facilities to accommodate for their needs, regardless of their choice of travel.

Complete Streets policies follow the National Complete Street Coalition, a leading association that developed the 10 elements of Complete Streets and has been adapted by Complete Streets for Canada. The elements detailed in **Table 10** will guide the City of Peterborough with planning and design processes that create equitable and context-sensitive transportation networks.

Table 10: Elements of a Complete Streets Policy

Guiding Element	Description
Vision	
1. Embodies a Community Vision	Establish a motivating community vision, objectives, and purpose for implementing Complete Streets elements.
Core Commitments	
2. Defines All Users and Modes	Specify and provide equal consideration to people of all ages and abilities, as well as all modes of travel, especially walking, cycling, riding transit, on wheelchairs or scooters, driving trucks, buses, and automobiles.
3. Applies to All Projects and Phases	Recognize that opportunities of application to new and retrofit transportation projects are subject to the policy, including design, planning, construction, maintenance, and operations.
4. Identifies Clear, Accountable Exceptions	Account for any appropriate exemptions due to legislative, topographical, technical, cost-benefit limitations or other exemptions that are specified and approved by a high-level official.
5. Encourages Network Connectivity and Integration	Promote continuous integration of different modes in a comprehensive and connected street network.

Best Practices		
6.	Adoptable by All Agencies and Jurisdictions	Establish an approach that can be adopted and understood by all departments and other agencies that may be involved in the process.
7.	Utilizes Latest Design Guidelines	Draw from the use of the latest and best design criteria and guidelines while recognizing the need for flexibility to balance user needs.
8.	Acknowledges Context Sensitive Solutions	Consider the current and planned context, buildings, land use and transportation needs to recommend planning and design solutions that are to be adapted.
9.	Defines Performance Standards with Measurable Outcomes	Establishes qualitative or quantitative performance indicators to evaluate and monitor policy impacts over time.
Implementation		
10.	Proposes Specific Implementation Steps	List specific steps and identify a timeline for implementing Complete Streets.

The recommended City of Peterborough Complete Streets Policy is an adaptation of these 10 guiding elements.

Vision

The vision for Peterborough's complete streets policy is that everyone and everything will be able to move safely and efficiently around town on an interconnected network, whether by foot, pedal, transit, or vehicle.

Defines All Users and Modes

The roadway functions will differ depending on the road classification. Arterial roads are designed to move people at larger volumes at higher speeds compared to local roads, which are designed for providing access to properties and destinations. Depending on the roadway function, the design should be planned for the appropriate users and modes. During the planning stage for new and updating existing roadways, all road users should be considered that align with the overall network for connectivity and space availability for on the roadway. Facilities should be free of barriers for pedestrians, cyclists, transit riders and drivers as well as children, seniors, and those with disabilities to ensure safety, reliability, and convenience.

Applies to All Projects and Phases

The Complete Streets approach should be considered at all stages of a project that may require physical changes to the road. The City should develop a process to integrate Complete Streets elements to allow for designs to accommodate all road users and for efficiency and cost saving purposes. Connectivity of facilities such as gaps and transition between facilities at intersections should be especially reviewed for retrofitting and upgrading existing roadways. For any City roadways intersecting with County Roads, City and County staff should work together to implement a consistent design that carries seamlessly throughout the network. Privately funded projects within the City boundaries should also adhere to this policy and be constructed with special attention to vulnerable road users.

Identifies Clear, Accountable Exceptions

The Complete Streets Policy is intended for all road and streetscape projects within the practical, technical, and financial boundaries. Such boundaries can include rights-of-way that are defined by the built form, or municipal capital budgeting. While the Complete Streets Policy will be considered for all relevant opportunities, there may be exceptions that may hinder its full applicability. Exceptions included within the policy framework can include:

- Accommodation of a complete streets is not necessary where specific uses are prohibited, such as collector-industrial
- Where there may be negative impacts to the natural environment and topographical limitations exist
- The benefit or the expected outcome cannot be justified by the use and the overall implementation cost of Complete Streets elements

— When emergency and transit vehicle services and maintenance operations are compromised; and
— The travel demand or the future needs are not supported.

Encourages Network Connectivity and Integration

The Complete Streets Policy encourages facility and network connection by providing seamless transitions between multiple travel modes. To support pedestrians, the policy encourages to plan for a continuous sidewalk network. To support cyclists, either for recreational or commuting, the policy encourages connection between on-road bike routes to trails as well as key destinations like schools, libraries, community centres and the Downtown. The end-of-trip infrastructure such as bike parking will be planned to support accessibility needs and to encourage higher non-motor vehicle trips at popular destinations and at transition points like Trent University, Fleming College, City Hall and downtown locations, Otonabee River-side parks, and recreation centres, like the Kinsmen Civic Centre and Peterborough Memorial Centre. Streetscaping elements should be designed and placed to prioritize the mobility of pedestrians, cyclists, wheelchairs, and scooters.

BEST PRACTICES

Adoptable by All Agencies and Jurisdictions

The Complete Streets Policy will be reviewed by the City departments to review impacts to their operations. External stakeholders will be informed and consulted, as appropriate.

Utilizes Latest Design Guidelines

The City's policies, by-laws, standards, and guidelines will be used in combination with the latest industry's best practices when designing for Peterborough streets. The following are recommended design guidelines used in best practices in Canada:

Transportation Association of Canada – Geometric Design Guide for Canadian Roads (2017)
The Province of Ontario – Ontario Regulation 191/11 Integrated Accessibility Standards (2016)
Transportation Association of Canada – Manual of Uniform Traffic Control Devices for Canada (2021)
The Ministry of Transportation Ontario - Ontario Traffic Manual Book 15 Pedestrian Crossing Treatments
The Ministry of Transportation Ontario - Ontario Traffic Manual Book 18 Cycling Facilities

Acknowledges Context Sensitive Solutions

The Complete Streets Policy notes that every project will have location-specific concerns and needs. With the same vision, to enhance mobility experience for all people, the recommendations may differ depending on the location. Recommendations are built upon considerations focused on land use, demographics, topography, available width, travel demand, operating speed, road capacity, resident concerns, future plans, maintenance requirements and other geographical and technical circumstances. Within these aforementioned considerations, it is recommended the City also account for how location-specific concerns are supporting or potentially excluding road users, what impacts there will be to parallel roadways, and how the road network will be impacted after final implementation. These overarching location-specific considerations will inform the design features and planning processes.

Defines Performance Standards with Measurable Outcomes

Once a Complete Streets project is implemented, regular monitoring and evaluation by City staff is recommended to gauge how well the street operates as a complete street. A set of evaluation criteria are used to understand future needs and the performance of complete streets elements. Suitable evaluation criteria include:

Network-wide	Project-specific
Ratio of travel choice (mode split)	85th percentile vehicle travel speed
Number, type, and severity of any collisions	Number of end-of-trip facilities installed
Total km of cycling facilities and trails by facility types	Number of streetscaping elements such as trees planted, and streetlights installed

Total km of sidewalks built, widened, and repaired
Number of new projects with Complete Streets elements incorporated
Number of safety improvements projects
Number of AODA accommodations implemented and updated

Number of safety improvements projects
Number of AODA accommodations implemented and updated

It is recommended the City confirm measurable criteria that aligns with the goals and objectives of the TMP, the Official Plan, and the overall strategic direction of community development. From there, develop thresholds for the criteria to monitor success and rate of implementation. An audit of existing infrastructure in queue for capital works, future road improvements being considered in capital budgets, and policy frameworks would provide an appropriate starting point for developing a measuring and monitoring tool.

IMPLEMENTATION

Proposes Specific Implementation Steps

The Complete Street Policy is a guiding document that outlines principles and parameters. There are series of next steps to follow in order to achieve a full cycle of designing and implementing Complete Streets. The following action items are for City of Peterborough staff to consider and determine how to best move forward with promoting the application of its Complete Streets Policy:

1. Gather input from appropriate City departments and staff to confirm and incorporate the Complete Streets Policy as part of its best practices
2. Consider developing an internal working committee of City staff involved with the delivery, operations, and maintenance of the street network to help ensure construction and maintenance of complete streets
3. Update existing City design standards with Complete Streets principles and determine where changes may be required to support with implementation. One objective can be to establish design guidelines based on a Complete Streets approach as part of the City's practices
4. Revise the City road classification network to tailor the classifications to user needs
5. Review ongoing projects and new projects to implement Complete Streets element
6. Support and provide education opportunities for City staff for staff development and training through workshops and seminars
7. Develop a measuring and monitoring tool to evaluate implementation of complete streets elements

3.1.3 Goods Movement

With the rapid change the City of Peterborough will experience with growth, it is increasingly important to understanding the role of goods movement through Peterborough's network and to plan and design for this type of movement to maintain economic competitiveness. Planning and designing a transportation network that moves both people and goods requires understanding how existing and new infrastructure can balance the interests and needs of these two spheres. Goods movement impacts not only automobile drivers, but also active transportation users and transit riders. Therefore, the configuration of existing and future roadways will need to accommodate truck traffic flow in a manner that does not compromise use of alternative travel facilities.

This TMP looks at truck routes in relation to road, transit, and active transportation solutions. The questions considered when developing the City's goods movement policy initiative included:

1) What are the ongoing concerns with truck traffic on a policy planning level?
2) How can the City of Peterborough accommodate trucks (i.e. long-distance through trucks; delivery trucks)?
3) Where are the goods movement connections with County Roads?
4) What potential future truck route should be protected?

5) How can the city accommodate deliveries through strategies such as curbside management?

At this time, the City of Peterborough does not have a stand-alone Goods Movement Plan. However, there are several recommended steps that can better support the transporting of Goods throughout its communities.

1) **Build a framework suited to the City of Peterborough using Ontario's Freight-Supportive Guidelines**. The guidelines are focused on providing direction for land use planning, site design practices, and operational procedures that help with the movement of goods; planning for various modes and types of vehicles used in the transport of goods; as well as support the economic health and competitiveness of Ontario municipalities.

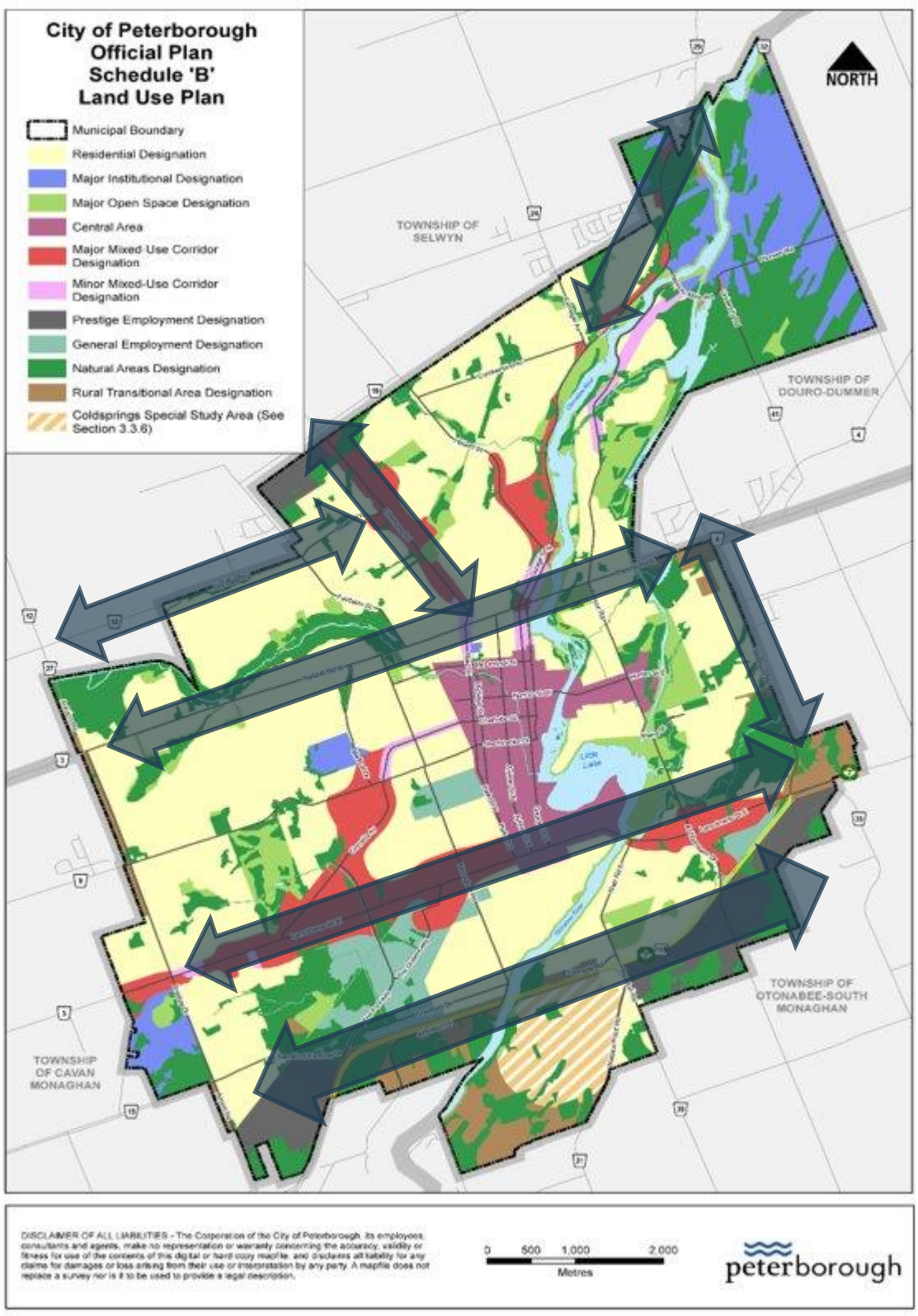
2) **Conduct a truck-focused review of the transportation network.** Applying a goods movement lens to the transportation network is an exercise the City should undertake to establish priority goods movement routes. As an example,

3) **Figure 17** illustrates proposed corridors for goods movement in the City of Peterborough. The proposed corridors were analyzed against the City's Official Plan Schedule B – Land Use Plan, focusing on major mixed-use corridors, high-volume roadways, and key connecting corridors to the Provincial Highway Network as well as the County Network.

4) **Identify Category of Goods Movement Routes.** Through a City-led exercise, in consultation with key stakeholders and agencies, identify a category of goods movement routes suitable to the City of Peterborough (i.e. primary, regional, and local). A categorization of the routes, similar to road classification, can ensure the safety and protection of communities while also establishing the appropriate connections to goods movement facilities to support economic development. The City's road classification system will provide the framework to prioritizing competing road function, including goods movement. Through the road classification approach, the routes will be designed to support sound transportation planning and that allows the street network to perform efficiently and safely.

5) **Develop a Goods Movement Strategy.** One of the objectives of Ontario's Freight Supportive Guideline is to support municipalities towards good practices that marries land use and transportation planning with strategies for incorporating goods movement requirements into planning processes. To become more supportive of goods movement through its evolving planning and design processes, the City of Peterborough should move towards developing a Goods Movement Strategy and integrating it with the goals and objectives of this TMP, the City's Official Plan, and Zoning By-laws.

Figure 17: Proposed Goods Movement Corridors in the City of Peterborough



3.1.4 Parking Management

As mentioned earlier in Section 3.1.1, there are several strategies and measures that can be adopted under the umbrella of Transportation Demand Management. Parking policies and initiatives are one form of managing traffic demands and supporting alternative modes as viable travel options.

There are several opportunities for implementing parking management measures related to Transportation Demand Management and as an overall approach for successfully implementing the recommended Transportation Strategy. These measures include:

1) **Expand Areas where Paid Parking is Required**. Paid Parking can be introduced at City-owned locations such as City Hall, Community Centres and Arenas and can be set by time of day as a means of encouraging alternate modes of travel while not penalizing local businesses.
2) **Prioritize bus passes over parking passes**. The City of Peterborough should consider increasing the monthly parking rates at City-owned parking lots over time to be more expense than a monthly bus pass. Parking rates should be increased for all-day use. Hourly parking rates could be maintained at lower rates to not deter shopping and access to local downtown businesses.
3) **Enhance facilities for active transportation and transit services.** To encourage residents to adopt active modes of travel, the City should provide infrastructure like secure bike parking facilities and enhanced transit amenities in areas where paid parking is implemented. Through this approach, the City can create an a more connected and accessible atmosphere for multi-modal users.
4) **Parking requirements in new developments**. The City of Peterborough should consider reviewing new development parking requirements, stipulating parking maximums, to ensure that parking is not over-supplied at any given development. The City can explore expanding the current cash-in-lieu policy, that currently only applies in the downtown, to other areas such as designated intensification corridors as a mechanism to enhance active transportation facilities and transit service to these new developments, increasing ease of access to alternative modes of travel.
5) **Shared parking**. The City can improve parking efficiency by combining two or more parking facilities into one centralized location. As an example, provide one parking lot for two or more similar uses reduces the number of spaces require and in fact maximizing parking utilization, while minimizing the total supply footprint that would otherwise be needed and reducing maintenance for underutilized infrastructure.
6) Over time, other areas outside the downtown should be considered for paid parking. This could include new City controlled lots or other measures such as charging fees for an on-street permit parking program, which may reduce the number of vehicles people own and shift some trips to more sustainable travel modes.

3.1.5 Road Safety

Road safety has increasingly become an area of focus in federal, provincial, and municipal jurisdictions, recognizing the societal and economic impact of serious and fatal collisions on municipal roadways. As part of the Transportation Master Plan process, road safety has been highlighted as a key objective by City Council and members of the public.

A number of municipalities in Ontario and across Canada have implemented Road Safety Strategies in the past few years. Some of these strategies have been modelled after the “Vision Zero” program, first adopted in Sweden, while others have adopted elements of Vision Zero but designed their programs to address local needs and priorities. The City of Toronto and New York City were two early adopters of the Vision Zero concept. Other Road Safety Plans prepared in medium sized municipalities such as London, Hamilton, and Kingston have tended to focus on local problems and issues while endorsing the concept of Vision Zero, or at least setting goals to significantly reduce fatal and serious injury collisions. Elements of the Road Safety programs in these other jurisdictions have informed an initial Road Safety Strategy for the City of Peterborough.

In Peterborough, a Transportation Safety Working Group (TSWG) was established in 2017 to begin the process of developing a local Transportation Safety Strategy for the Peterborough Area. Membership in the RSWG include various departments within the City of Peterborough, the County of Peterborough, Peterborough Police Service, Ontario Provincial Police (Peterborough Detachment), Peterborough Public Health, Green-Up, Active and Safe Routes to School Peterborough, and the Peterborough Bicycle Advisory Committee (PBAC).

The TSWG provides a forum for co-operation and co-ordination of transportation safety activities undertaken by the various members with the goals of collaborating in terms of sharing information and resources and feedback. The key areas of work are currently focused on Education, Enforcement, and Engineering strategies that can support enhanced road safety, combined with Evaluation and Engagement activities to monitor success, inform future strategies, and build support for improvements in the community.

The primary source of data used in preparing the draft Safe Moves program is the MTO Collision Data downloaded for the roadways falling within and under the jurisdiction of the City of Peterborough. Collision data for County Roads, township roads, and for Ministry of Transportation Highways (such as Highway 7, 28, and 115) are not included in the statistics reported herein**.**

On average, in a typical year, there are approximately 1,542 reportable collisions that occur on City of Peterborough roadways, as defined under the Highway Traffic Act. Of these collisions, approximately 1,473 collisions (95.5%) involved only cars and trucks, while 42 collisions (2.7%) involved pedestrians and 27 collisions (1.8%) involved cyclists, as summarized in **Table 11**.

Table 11: Vehicle, Pedestrian and Cyclist Collision Data – 2014 to 2020

Year	Vehicles Only	Pedestrians	Cyclists	Total
2014	1353	51	36	1440
2015	1470	50	35	1555
2016	1565	58	32	1655
2017	1597	41	28	1666
2018	1646	38	25	1709
2019	1598	27	20	1645
2020	1081	29	16	1126
Average	**1473**	**42**	**27**	**1542**

On a year by year basis, total collisions in the City were increasing between 2014 and 2018, with a reduction in collisions observed in 2019, followed by a significant drop in 2020, due to reduced driving during COVID lookdowns and restrictions.

To put the City's collision statistics into context, a comparison of annual collisions and collision rates was undertaken for 2018, the most recent data provided by the Ministry of Transportation as part of their Road Safety Annual Report. **Table 12** summarizes the estimated 2018 population, collisions, and collision rate per capita for 8 other communities in Ontario of a similar size as Peterborough.

Table 12: Comparison of Per Capita Collision Rates – 2018

City	2018 Population (Est.)	2018 Collisions**	Collisions per 1000 People
Sarnia	70,262	869	12.4
Sault Ste Marie	62,780	982	15.6
Peterborough	**86,756**	**1,308**	**15.1**
Niagara Falls	99,143	1,194	12.0
Brantford	106,395	1,624	15.3
Kingston	123,375	1,764	14.3
Guelph	154,580	1,723	11.1
St. Catharines	136,596	1,500	11.0
Barrie	156,589	2,349	15.0

** Based on statistics from Ontario Road Safety Annual Report, 2018 – totals reflect collisions on City roads only and do not include collisions occurring at intersections with City roads and Provincial Highways or City and County Roads, which are reflected in the City collision database

Peterborough's per capita collision rate of 15.1 collisions per 1000 residents is lower than Sault Ste Marie and Brantford and is comparable to the rate observed in Barrie. While care should be taken in drawing conclusions based on the comparisons above, it is evident that per capita collision rates in Peterborough are in the range of rates observed in other similar sized communities in the province.

Collision reported to the province are categorized by four levels of severity; Fatalities, Major Injuries (requiring extensive treatment or hospital stays), Minimal/Minor Injuries, and No Injuries (often referred to as Property Damage Only collisions). For analysis purposes Fatal collisions and Major Injury Collisions are typically grouped and reported together as both types of collisions are very traumatic and the conditions that result in major injuries can often also result in fatalities. These combined collisions are often reported as KSI collisions (where someone is killed or seriously injured).

On average KSI collisions represent just under 1% of total annual collisions, with an average of 12 KSI collisions per year between 2014 and 2020. Of these, there has been an average of 1 fatal collision per year between 2014 and 2020, with an average of 11 major injury collisions per year over the same period. Collisions involving minor injuries represent approximately 19% of average annual collisions and the remaining 80% of collisions involve property damage only.

As illustrated in **Table 13**, there was an abnormally high number of major injury collisions in 2015 and a higher than average number of fatal collisions were experienced in 2016 compared to the six year average. Despite the overall lower number of collisions reported in 2020, during the pandemic, the number of KSI collisions increased noticeably with 13 KSI collisions reported compared to 9 KSI collisions reported in the previous two years.

Table 13: Annual KSI Collisions – 2014 to 2020

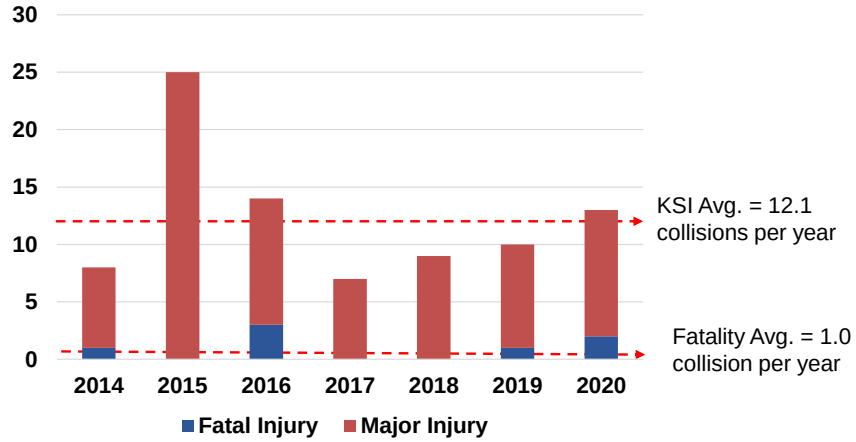


Table 14 summarizes the collisions between 2014 and 2020 by collision severity and mode of travel. Over this period 16.3 % of all collisions have resulted in some form of injury, with the majority being minor injuries (15.5%). However, when this is broken down by mode of travel, pedestrian and cyclist collisions represent 42% of all serious / fatal collisions and 22% of minor injury collisions in the City. Approximately 92% of pedestrian and 74% of cyclist collisions result in some form of injury, versus only 13% of collisions involving motor vehicles. Of these, approximately 10% of pedestrian collisions and 4% of cyclist collisions result in serious / fatal injuries.

Table 14: Collision Severity by Mode of Travel – 2014 to 2020

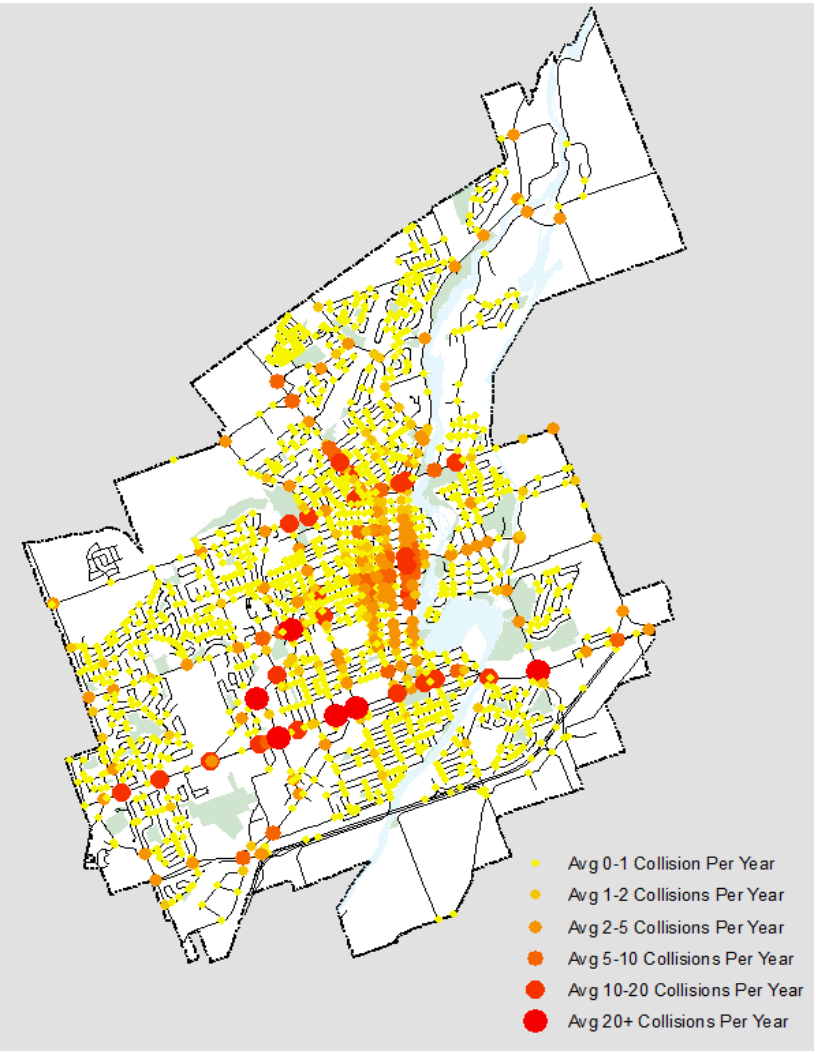
Type	Vehicle	Pedestrian	Cyclist	Total
KSI	**50**	**28**	**7**	**85**
% of mode	(0.5%)	(9.6%)	(3.6%)	(0.8%)
% by mode	(58.8%)	(32.9%)	(8.3%)	(100%)
Minor Injury	**1,298**	**239**	**134**	**1,671**
% of mode	(12.6%)	(82.2%)	(69.8%)	(15.5%)
% by mode	(77.7%)	(14.3%)	(8.0%)	(100%)
No Injury	**8,965**	**24**	**51**	**9,040**
% of mode	(86.9%)	(8.2%)	(26.6%)	(83.7%)
% by mode	(99.2%)	(0.3%)	(0.5%)	(100%)
Total	**10,313**	**291**	**192**	**10,796**
% of mode	**(100%)**	**(100%)**	**(100%)**	**(100%)**
% by mode	**(95.5%)**	**(2.7%)**	**(1.8%)**	**(100%)**

Despite the observation that pedestrian and cyclist collisions only represent 5% of total collisions occurring in Peterborough, these two user groups are the most vulnerable users of the road network in terms of the share of collisions resulting in the potential for injuries.

The majority of collisions in Peterborough (37%) occur at intersections, which is typical in an urban setting as these locations feature the highest potential for conflicts between vehicles and between vehicles and other road users. An additional 17.5% of collisions have been categorized as intersection related, which typically means the collision occurred in close proximity to an intersection or was related to the operation of the intersection. The share of intersection and intersection related collisions in Peterborough, at almost 55% of all collisions, are collectively higher than the provincial average of approximately 41% of all collisions. Similarly, collisions at private driveways are almost double the provincial average.

Figure 18 illustrates the collision locations geographically dispersed across the City. As illustrated in the map, the influence of intersection collisions in very apparent along Lansdowne Street, Clonsilla Avenue, Parkhill Road, Chemong Road and in the downtown.

Figure 18: Collisions by Location – 2014 to 2020



Framework for a Road Safety Strategy

Based on the collision overview and a review of other road safety programs in other municipalities it is recommended that future road safety initiatives should be aligned with existing safety issues and patterns observed in the Peterborough context. The collision data in Peterborough suggests that there are a number of key areas where safety can be enhanced. In some cases, the collision statistics suggest areas for targeted programs, and in other areas, such as

neighbourhoods, residents often feel unsafe due to traffic and infrastructure conditions even when collision frequencies are low.

Road Safety initiatives will incorporate evidence-based strategies and solutions where practical, and a safe systems approach will be considered in the design of new transportation infrastructure to enhance the safety for vulnerable users of the transportation network.

The Road Safety Vision for the City will target a 50% reduction in fatalities and major injuries over the next 10 years, such that collisions involving fatalities and major injuries will represent no more than 0.5% of total annual collisions by 2031.

Each area of road safety emphasis should include a shared vision for safety amongst all users and should feature a mixture of initiatives that include:

- Education measures to inform residents of safety risks and safe habits,
- Enforcement measures that enhance the ability of the Peterborough Polices Service to target at-risk behaviours and use enforcement to compliment education, and
- Engineering measures to improve transportation infrastructure in ways that reduce the opportunity for collisions, including the use of emerging technology to reduce collision risk.

The proposed Road Safety Strategy will feature “Five safe moves” which target the key opportunities to enhance road safety in the City:

- Safe School Zones
- Safe Neighbourhoods
- Safety for Vulnerable Users
- Safe Corridors
- Safe Intersections

A more thorough assessment of collision patterns in the City and those related to each Safe Move is included in **Appendix A**. The key recommendations for each safe move are further discussed in the sections that follow.

Five Safe Moves

3.1.5.1 *Safe School Zones*

The City has 31 elementary and secondary schools distributed geographically across the City. Of these, 28 of the schools border on arterial or collector roadways which provide good access from various areas of the City, but due to higher traffic volumes and higher operating speeds of vehicles on these roads, the potential for vehicle / pedestrian conflicts around school areas is increased.

Safe School Zone Recommendations

The following key education, engineering and enforcement recommendations outlined in **Table 15** are proposed to compliment existing school area safety programs:

Table 15: Safe School Zone Recommendations

Education Measures	**Description**
Enhance promotion of walking and cycling to school	Build on the Active School Travel Peterborough program and undertake additional outreach to more schools each year to promote safety awareness for those walking and cycling to schools.
Safe arrival plans – managing on-side/on-road parking	Develop school area traffic management plans to better manage on-site and on-street parking, student pick-up and drop off protocols, management of school bus loading areas, and designating safe walking and cycling routes to schools
Engineering Measures	**Description**
Enhanced signage and markings in school zones	Develop enhanced school area signing plan incorporating additional warning signs, active speed feedback signs, and additional pavement marking treatments to raise awareness of school zones – apply consistently across City
Enhanced school crossings, where required	Investigate application of enhanced ladder cross walks for all school crossings to enhance visibility and awareness
Enforcement Measures	**Description**
Default school area speed limits	Establish default 40 km/h speed limit in all school zones – eliminate “when flashing” signs
Introduce community safety zones (2x fines)	Establish Community Safety Zones in all school zones to enable double fines to be applied
Parking Enforcement	Proactive enforcement of no parking / no stopping restrictions in school areas during school times
Enhanced Automated Enforcement	Investigate feasibility of Automated Speed Enforcement cameras for school zones

3.1.5.2 *Safe Neighbourhoods*

Road safety in local neighbourhoods is often raised by residents as a topic of concern. Every neighbourhood is different and has different types of roads within the neighbourhood boundaries, which makes analysis of neighbourhood collisions on a city wide basis a little more challenging.

There are a number of existing safety programs that the City already has in place to address concerns in neighbourhoods. In some neighbourhoods, portable radar message boards are used to monitor the speed of approaching vehicles and display the speed being travelled on a digital display that shows the driver how fast they are going. In 2021, the City established a Traffic Calming Policy, which was approved by Council. The policy includes criteria for when Traffic Calming will be considered, a toolbox of typical Traffic Calming treatments that can be used to address various issues, and a neighbourhood consultation process to provide a consistent approach to developing a Traffic Calming Plan and obtaining support from residents.

Targeted speed enforcement programs have also been effective in reducing speeding through neighbourhoods, although sustaining enforcement programs have been difficult due to competing demands for police services and resource constraints. Targeted enforcement combined with clear thresholds of speed tolerance (the speed where an officer will issue an infraction) can be very visible and effective ways of encouraging drivers to comply with posted speed limits.

Safe Neighbourhoods Recommendations

The following key education, engineering and enforcement recommendations outlined in **Table 16** are proposed to compliment existing neighbourhood safety programs:

Table 16: Safe Neighbourhood Recommendations

Education Measures	**Description**
Expanded use of Community Safety Zones (CMZ)	Establish Community Safety Zones in key neigbourhoods to raise awareness of safety concerns, to promote safe driving habits, and to permit double fines to be applied for infractions. This could be implemented in conjunction with lower speed limits on local roads.
Expansion of Speed Monitoring Program	Expand the number of radar speed monitoring signs to allow for additional locations to be monitored.
Engineering Measures	**Description**
Annual Traffic Calming Program	Establish funding to support annual traffic calming program including staff resources to complete neighbourhood studies, plus annual capital funding to implement plans.
Accelerating implementation of missing sidewalks	Secure additional dedicated funding to accelerate the construction of missing sidewalks, according to the Sidewalk Strategic Plan.
Improving Arterial performance to benefit neighbourhoods	Improving the operation of key intersections and arterial road segments can reduce the perceived benefits of short cutting through neighbourhoods, which is one of the main concerns expressed by residents.
Expansion of Speed / Driver Feedback sign program	Expand the number of radar speed monitoring signs to allow for additional locations to be monitored at the same time. Use of portable signs will allow for 4 to 5 locations to be targeted in rotation for each new sign purchased.
Enforcement Measures	**Description**
Investigate automated speed enforcement in CMZ	Investigate feasibility of Automated Speed Enforcement cameras for neighbourhoods where Community Safety Zones have been established.
Pilot default area speed limits (reduce to 40km/h)	Pilot project to implement default 40km/h speed limit for all local roads in 2-3 neighbourhoods, with potential expansion to other neighbourhoods across the City.
Safe under 7 program	Establish “Safe Under 7” program for speed enforcement – charge all vehicles travelling more than 7 km/h over the posted speed limit – instead of using the demerit point threshold of 15 km/h over posted speed limit

3.1.5.3 *Safety for Vulnerable Users*

A safe systems approach to road safety planning considers the needs of the most vulnerable users of the transportation system explicitly, as one of the primary considerations in the design and operation of transportation infrastructure.

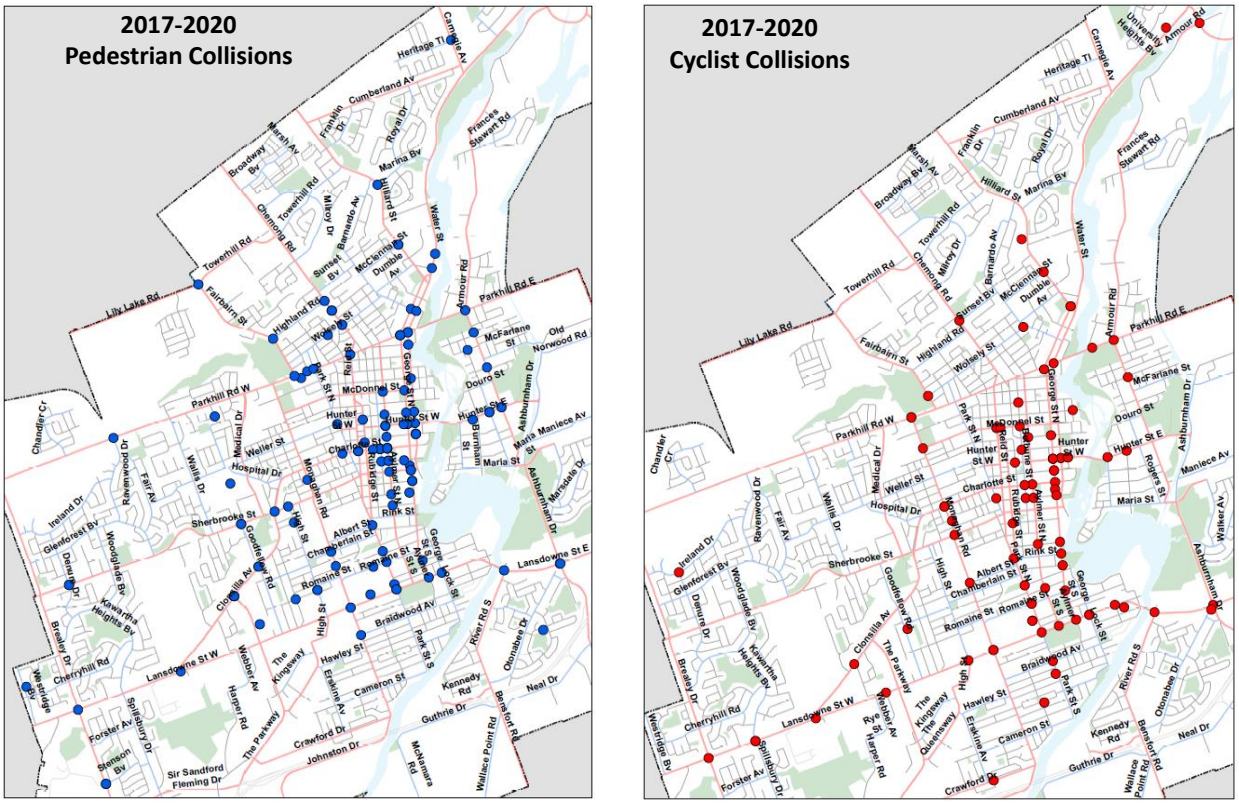
Over the past 5 years the City has implemented a number of programs to enhance safety for vulnerable users of the transportation system. In 2019 the initiated a capital program to install pedestrian countdown timers and enhanced cross walks at signalized intersections across the City.

Intersection treatments to improve the safety for cyclists have also been implemented in a number of locations in the City over the past few years. Where the on-road cycling lanes approach intersections green paint combined with cycling symbols have been used to highlight key conflict areas where turning vehicles and cyclists often have to share the same space.

Between 2014 and 2020, there have been 486 collisions involving pedestrians or cyclists in the City of Peterborough. On average this equated to 42 pedestrian and 27 cyclist collisions per year. Pedestrian collisions over this entire period represent 2.7% of total collisions while 1.8% of total collisions involve cyclists.

On the positive side, this trend has been reducing over time, with the total number of collisions for both pedestrians and cyclists showing a downward trend since 2014. In 2019, pedestrian collisions represented 1.6% of total collisions, down from 3.5% in 2014, and cyclist collisions represented 1.2% of total collisions, down from 2.5% in 2014.

Figure 19: Pedestrian and Cyclist Collisions by Location – 2017 to 2020



As illustrated in **Figure 19**, the majority of pedestrian and cyclist collisions have occurred in the downtown, which coincides with the locations where higher pedestrian and cycling use typically occurs. A number of pedestrian and cyclist collisions are also occurring along major arterial roads such as Lansdowne Street, Chemong Road, Monaghan Road, Parkhill Road and Clonsilla Avenue.

Safety for Vulnerable Users Recommendations

The following key education, engineering and enforcement recommendations outlined in **Table 17** are proposed to compliment existing safety programs aimed at protecting vulnerable users:

Table 17: Safety for Vulnerable Users Recommendations

Education Measures	**Description**
Distracted Driving Education Programs	Develop programs to raise awareness of distracted driving, safety risks, and penalties. Include general programs for the entire population and incorporate a program aimed at new drivers.
Aggressive Driving Education Programs	Develop programs to raise awareness of aggressive driving, safety risks, and penalties. Include general programs for the entire population and incorporate a program aimed at new drivers.
Walk Safe - Pedestrian Safety and Awareness	Develop programs to raise awareness of distracted walking, rules of the road for walking and crossing roads, existing safety measures used for crossings, etc. Include section on penalties for disobeying crossing guards.
Engineering Measures	**Description**
Arterial Road Pedestrian Crossing Program	New program to identify locations for controlled pedestrian crossings on Arterial Roads, including warrants for different types of crossings and standardized design treatments.
Update Road Design Standards	Review and update City road design standards to incorporate safety related design considerations, design treatments for pedestrians and cyclists, along with considerations for use
Targeted Intersection Improvements	Develop a program in intersection improvements to address key observed safety patterns while incorporating updated design treatments for pedestrians and cyclists as appropriate
Connected Vehicle Technologies	Explore the use of connected vehicle technology to improve safety programs, including pilot projects to enhance safety for all users
Enforcement Measures	**Description**
Reduced Speed Limits on Key Downtown Corridors	Explore the application of reduced vehicle speed limits within the downtown urban area on key corridors featuring heavy pedestrian / cyclist volumes, enhanced streetscape features, etc.
Speed Monitoring and Targeted Enforcement Program	Implement ongoing speed monitoring program using traffic counters, driver feedback signs, and explore targeted enforcement program to address observed trends
Distracted Driving enforcement program	Continue and expand upon distracted driving enforcement as part of themed enforcement program.

3.1.5.4 *Safe Corridors*

Approximately 75% of the annual collisions in Peterborough occur on the arterial road network. These roadway corridors represent the backbone of the City transportation network and feature the highest traffic volumes and the widest variety of road users; including cars, trucks, pedestrians, cyclists, municipal transit buses, oversized loads, and visitors who may be new to the region. Approximately 34% of Arterial Road collisions, representing about 390 collision each year, occur in mid block locations, between major intersections. Strategies to address these mid block collisions are the focus of the Safe Corridors initiatives discussed in this section.

A ranking of arterial road corridors in terms of the average number of mid block collisions occurring per year is summarized in **Appendix A**. Many of these arterial road corridors, such as Lansdowne Street, Chemong Road, Clonsilla Avenue, and a portion of Water Street are multilane arterial roads with a pattern of rear end or sideswipe collisions that can be attributed to the lack of centre turning lanes. Monaghan Road, between Lansdowne Street and Romaine Street features a number of collisions at private driveways and George Street, between Hunter and Simcoe has experienced a number of sideswipe collisions related to lane changes and interactions between through vehicles and parked vehicles.

A number of these corridors are already included in the City's capital budgets and reconstruction projects to improve safety have already been identified for Lansdowne Street W, from Kawartha Heights Boulevard to Clonsilla Avenue, Chemong Road from Parkhill Road to north of Sunset Boulevard, and Water Street between Nassau Mills Road and Woodland Drive. The remaining corridors should be prioritized for upgrades to improve safety performance as funding permits.

Safe Corridors Recommendations

The following key education, engineering and enforcement recommendations outlined in **Table 18** are proposed to compliment existing safety programs aimed at improving safety on key corridors:

Table 18: Safe Corridor Recommendations

Education Measures	**Description**
Aggressive Driving Education Programs	Develop programs to raise awareness of aggressive driving, safety risks, and penalties. Include general programs for the entire population and incorporate a program aimed at defensive driving techniques for busy roadways.
Walk Safe - Pedestrian Safety and Awareness	Develop programs to raise awareness of pedestrians and how they interact with and the challenges they have crossing arterial roads. Include defensive driving techniques to anticipate distracted walking and highlight existing safety measures used for crossings. Include section on penalties for disobeying crossing guards.
Engineering Measures	**Description**
Enhanced Markings	Continue with existing program to provide enhanced pedestrian crossings and count down pedestrian signals on arterial road corridors.
Update Road Design Standards	Update Road Design Standards to incorporate Complete Streets approaches and safe systems approaches to design decisions.
Arterial Road Improvement Program	In addition to planned arterial road improvement projects, consider safety improvements for: 1) Lansdowne St W - Park St to Edwards St 2) Clonsilla Av - Lansdowne St W to Sherbrooke St 3) Lansdowne St E - Ashburnham Dr to River Rd S

	4) Parkhill Rd W – Medical Dr to Fairbairn St 5) Water St - University Heights Blvd to Woodland Dr 6) Monaghan Rd - Lansdowne St to Romaine St
Access Management Guidelines	Include a section on Access Management policies for Arterial Roads in new design guidelines to reduce friction between through traffic and uncontrolled traffic at busy entrances.
Connected Vehicle Technologies	Continue to monitor advances in connected vehicle technologies and work with private developers to pilot enhanced technologies to support vehicle to infrastructure (V2X) communications to improve upon collision avoidance technologies in newer vehicles.
Enforcement Measures	
Speed Monitoring and Targeted Enforcement Program	Implement ongoing speed monitoring program using traffic counters, driver feedback signs, and explore targeted enforcement program to address observed trends.
Distracted Driving enforcement program	Continue and expand upon distracted driving enforcement as part of themed enforcement program.

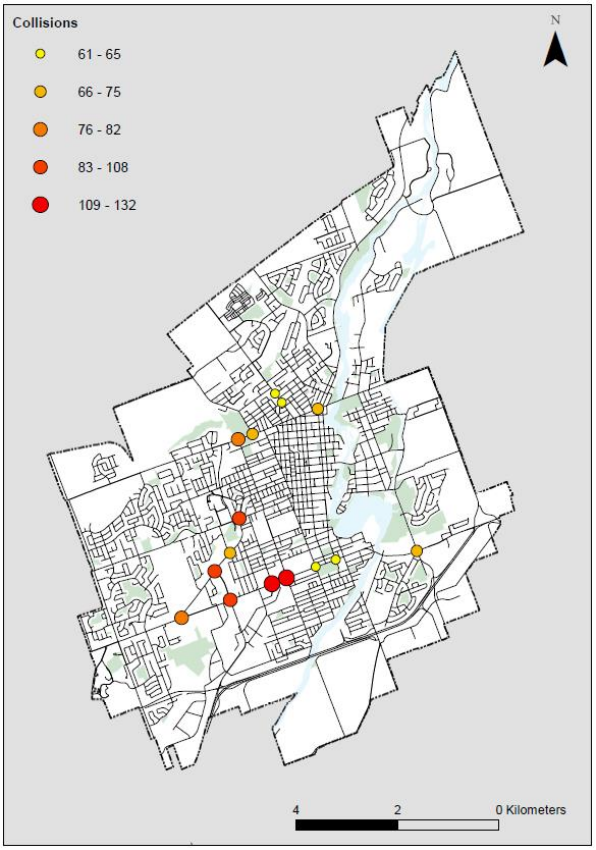
3.1.5.5 *Safe Intersections*

Approximately 55% of the total collisions reported between 2014 and 2020 in the City occurred at intersections or were related to the operation of intersections. Fatal and Major Injury collisions represent approximately 1% of total intersection collisions, with 20% resulting in minor injuries and 79% resulting in no reported injuries. On average, 846 intersection collisions occur on the City road network each year.

Approximately 64% of intersection collisions occur at signalized intersections, as these are typically the busiest intersections in the City. Intersections controlled by stop signs result in just under 21% of the intersection collisions and 12% of intersection collisions occur at intersections with no form of traffic control. Collisions at pedestrian crossover or crosswalks controlled by School Crossing Guards represent less than 1% of intersection related collisions.

Angle collisions represent approximately 20% of the total number of intersection collisions. Angle collisions are those where vehicles traveling on different roadways collide at right angles. These are almost equally spilt between intersections controlled by traffic signals and those controlled by stop or yield signs. The number of angle collisions occurring at signalized intersections is much higher than expected given that the intent of a traffic signal is to alternate the right of way. High rates of angle collisions at intersections may be indicative of congestion at intersections, where vehicles extend into the all-red clearance period to proceed through the intersection, creating a higher potential for collisions. This trend may also be indicative of a widespread pattern of red light running. **Figure 20** illustrates the top 15 locations, for intersection collisions across the City, all of which experience between 9.3 and 20.6 collisions per year on average.

Figure 20: Top 15 Intersections by Total Number of Collisions – 2014 to 2020



Top locations include the following intersections:

- Lansdowne Street at Monaghan Road, High Street, The Parkway, Clonsilla Avenue, Ashburnham Drive, Park Street, and George Street;
- Clonsilla Avenue at Sherbrooke Street, Goodfellow Road, and The Parkway;
- Parkhill Road at Monaghan Road, Fairbairn Street, and George Street; and
- Chemong Road at Wolsely Street and Bellevue Street.

These locations represent the first priority for the review and assessment of collision patterns in order to identify patterns and potential corrective measures. Some locations, such as the two locations on the Chemong Road corridor and the Lansdowne Street / Clonsilla Avenue intersection have already been identified for improvements that are currently in design.

Safe Intersections Recommendations

The following key education, engineering and enforcement recommendations outlined in **Table 19** are proposed to compliment existing safety programs aimed at improving safety at intersections across the City:

Table 19: Safe Intersection Recommendations

Education Measures	**Description**
Aggressive Driving Education Programs	Develop programs to raise awareness of aggressive driving, safety risks, and penalties. Include general programs for the entire population and incorporate a program aimed at red light running and defensive driving techniques for busy roadways.
Walk Safe - Pedestrian Safety and Awareness	Develop programs to raise awareness of pedestrians at intersections. Include defensive driving techniques to anticipate distracted walking and highlight existing safety measures used for crossings. Include section on penalties for disobeying crossing guards.
Engineering Measures	**Description**
Enhanced Markings	Continue with existing program to provide enhanced pedestrian crossings and count down pedestrian signals at arterial road intersections.
Intersection Design Standards	Update Road Design Standards to incorporate enhanced intersection design treatments and safe systems approaches to design decisions
Intersection Improvement Program	Establish an intersection improvement program to upgrade intersection designs to promote safety and address key collision patterns.
Traffic Signal Strategies	Review traffic signal timing parameters at key intersections and consider changes to amber and all red clearances, long distance detection, etc. to reduce collisions
Enforcement Measures	**Description**
Investigate Red Light Camera Program	Investigate costs and benefits of introducing a red light camera program in Peterborough
Investigate Connected Vehicle Technology	Continue to monitor advances in connected vehicle technologies and work with private developers to pilot enhanced technologies to support vehicle to infrastructure (V2X) communications to improve upon collision avoidance technologies in newer vehicles.

Next Steps

The proposed Road Safety Strategy is not intended to be a static document nor is it intended to be a complete analysis of safety issues or safety oriented recommendations for the City. The current strategy is a starting point for incorporating road safety into the transportation decision making processes of the City.

Additional analysis of collision data and the assessment of potential measures should be undertaken for each of the five Safe Moves in the future as the implementation of the Road Safety Strategy progresses. Feedback and monitoring of before-after collision trends will help to inform future actions and additional corridor and intersection analysis is expected to be incorporated into the identification of future capital projects and the design of projects that have already been recommended.

3.1.6 Transit Fare Discount Program

A Transit Fare Discount Program for the City of Peterborough is an expansion and further reinforcement of the "Public Transit Improvement" measures detailed in Section 3.1.1. To increase the use of public transit, the City should introduce fare incentives through a Fare Discount Program that subsidizes, or in specific cases provides free, transit fares to various categories of residents and commuters. One important aspect of fare discount programs is to make public transit more affordable and easily accessible for persons with childcare requirements, those with low-incomes, or those who receive support through the Ontario Disability Support Program.

A Transit Fare Discount Program for the City of Peterborough can include the following policy initiatives and strategies to leverage the benefits of a multi-modal travel:

1) **Fare Discount Pilot Program.** The City should monitor the outcomes of free transit for children 12 and under pilot program to incentivize increased use of transit services. The lessons learned from this pilot program can be applied for future and more permanent programs.
2) **Expand transit fare incentives.** Beyond the pilot program for children 12 and under, the City of Peterborough should explore expanding free transit to those who are 18 years and under, in consultation and coordination with external agencies, school boards, and university/college campuses.
3) **Equitable access to public transit.** Improving and supporting equity across populations in the City of Peterborough is critical to the continued socio-economic growth of the community. Equity-deserving communities and persons require resources to access all modes of travel, including public transit services. Reduced pass fares should be considered for low-income residents as well as persons with disability to ensure continued economic security, community development, and access to places of employment.

A discounted fare program is an important measure for moving residents, students, and commuters who are more reliant on public transit, without barrier to accessing critical services and support. Combining a transit discount fare program with transit service improvements is a step towards enabling increased ability for more individuals to participate in daily activities. One approach to ensuring the success of this type of program in the City of Peterborough, is for City staff in consultation with relevant agencies and stakeholders, to consider the discounted rates against cost of living for the individuals and groups who would be most reliant on this program.

3.1.7 Emerging Transportation Technologies

Transportation and mobility are rapidly changing with the introduction of technological advancements and its role in expanding travel options. With the introduction of new technologies into the TMP, Peterborough has an opportunity to transform the way people and even goods move. The combination of technologies can create a new mobility landscape that can be built upon over the planning horizon of this Plan.
The following provides an overview of the trends that are being proposed for the City of Peterborough, identified through context-sensitive planning, stakeholder feedback, and existing frameworks. These policy directives are intended to lay the groundwork for appropriate actions around their implementation.

Pursuing New Technologies

With the challenges faced by municipalities around climate change and environmental resiliency, pursuing new technologies such as bus fleet conversions and expansion of electric vehicle charging stations can be a step towards minimizing the municipal carbon footprint. The City should explore and pursue federal and provincial grants to convert its bus fleet to **low emission buses** to minimize its transportation greenhouse gas emissions while simultaneously moving its entire community towards reducing their overall carbon footprint and environmental impact. Prioritizing this form of investment can be a step towards improving Peterborough's transit system, ensuring its continued success.

With Canada announcing a mandatory target for all new light-duty cars and passenger trucks to be zero-emissions by 2035, an increased number of **electric-vehicle charging stations** will be required. For future transportation to be

convenient throughout Peterborough's transportation network, charging stations should be introduced where not currently available and increased where already in place at City-owned properties such as City Hall, Peterborough Public Library, Peterborough Memorial Centre, community centres, and City-owned parking lots and garages.
The City can also incorporate electric vehicle charging stations into its by-laws for residential, commercial, and institutional development to stipulate the provision of these facilities in new development. The City can encourage existing non-City owned facilities to expand or introduce electric vehicle charging at places such as Peterborough Regional Health Centre, Trent University, Fleming College, and Lansdowne Place.

In pursuit of new technologies **smart signalization and a connected vehicle program** can be implemented. The City is currently testing an adaptive Traffic Signal program on Lansdowne Street which uses camera based sensors to detect traffic flows and automatically adjust the signal settings to improve flow, reduce delays, and lower emissions. Following the test of this pilot program, they should consider opportunities to expand this program to other busy arterial roads as well. In addition to Smart signals, emerging technologies associated with connected vehicles and even self driving vehicles are rapidly becoming more viable in the future. In many cases, connected vehicles will be able to communicate with the transportation infrastructure or with other vehicles on the roadway to improve efficiency, reduce the potential for collisions, or even request priority at a traffic signal (i.e. for transit vehicles, emergency vehicles, etc.). This feature can be accessed via smartphone apps that are setup at the start of a trip and will notify the occupant if the vehicle is approaching a red light or communicating sudden breaks to prevent collisions. The City is currently upgrading the traffic signal infrastructure in the field to be in a position to supporting these advanced technologies as they become more common in the local vehicle fleet.

Future Mobility

Leveraging new technologies now, as part of the broader strategies and recommendations in this TMP, the City sets a foundation for a future that is heavily reliant upon and intertwined with smart mobility. For new technologies to successfully drive transportation planning, the City will need to enhance areas such as data collection, monitoring of services and programs, and modification of technology to implement solutions that are tailored to local needs.

3.1.8 Cycling

The Cycling Master Plan (CMP) includes recommendations across five themes to help implement the crosstown and ultimate cycling networks. These include strategies and programs to break down barriers to cycling and to help promote cycling for daily trips. These recommendations are highlighted here and are spelled out in greater detail in the CMP.

CMP Goal 1: Create an irresistible network

Upgrade the existing network
Prioritize the crosstown network
Progress toward the ultimate cycling network
Ultimate network phasing and implementation

CMP Goal 2: Pursue design excellence

Focus on All Ages and Abilities (AAA) facilities
Enhance transition and intersection treatments
Provide attractive network amenities
Support a safe systems and complete streets approach to roadway design

CMP Goal 3: Build a cycling culture

The cycling culture would be based on:

Equity

Safety and education
End of trip integration and support for inter-modal travel
Recreation and tourism
Outreach, promotion, and events

CMP Goal 4: Encourage year-round riding

Explore a priority winter cycling network
Construct facilities for easy maintenance
Explore new maintenance techniques and equipment

CMP Goal 5: Go for gold

Continue to track progress
Raise the profile in Peterborough
Revisiting and updating the plan

4 Phase 4 Consultation Highlights

Consultation during Phase 4 focused on providing an overview of the recommended infrastructure improvements, roads, and transit, based on the selected Transportation Strategy from Phase 3. Included with the infrastructure improvement recommendations are policies, guidelines, and standards that are intended to support the long-term implementation of the Transportation Master Plan goals and objectives. These analyses and the recommendation were shared with stakeholders and the public through a series of events as part of the Phase 4 work. The events are summarized in **Table 20**. A Phase 4 Consultation Summary is attached to this report as **Appendix B**.

Table 20: Phase 4 Consultation Events

Technical Advisory Committee Meeting	Engagement Date: January 17, 2022 Engagement Format: Virtual Presentation & Facilitation Focus: Review of technical analysis that led to road network and transit priority measure recommendations. Review of policy directives to support implementation of infrastructure recommendations.
Steering Committee Meeting	Engagement Date: January 19, 2022 Engagement Format: Virtual Presentation & Facilitation Focus: Review of rationale for road network and transit priority measure recommendations. Review of policy directives to support implementation of infrastructure recommendations.
Community Working Group Meeting	Engagement Date: January 27, 2022 Engagement Format: Virtual Presentation & Facilitation Focus: Presenting the recommended infrastructure improvements and policy directives
Online Public Survey	Engagement Date: January 28 to February 11, 2022 Engagement Format: Taped Presentation and Survey Focus: Presenting the recommended infrastructure improvements and policy directives Responses: 59
Public Information Centre #1	Engagement Date: February 3, 2022 (Two Sessions: 12:00pm and 6:30pm) Engagement Format: Virtual Presentation & Facilitation Focus: Presenting the recommended infrastructure improvements and policy directives Participation: 75+ for both sessions combined
Peterborough Environmental Advisory Committee	Engagement Date: February 16, 2022 Engagement Format: Virtual Presentation & Facilitation Focus: Presenting the recommended infrastructure improvements and policy directives. Discussing Contribution to Climate Change Action Plan and Strategies

Steering Committee Meeting

Engagement Date: March 4, 2022
Engagement Format: Virtual Presentation & Facilitation
Focus: Hear themes of comments received during Phase 4 consultation, review and confirm recommendations and draft Council presentation

Themes heard throughout these consultation events included:

- Provide greater clarity on safety measures associated with road improvements
- Incorporate accessibility requirements into all road improvements
- Mixed reaction to protecting for a new bridge across the Otonabee River at Sherbrooke / Maria
- Add more transportation demand management strategies
- Provide more details for the parking policy directives to discuss implementation and location of paid parking
- Add Sidewalk Strategic Plan and Policy

5 Costing and Implementation Schedule

There are many multi-modal projects recommended for implementation over the next 30 years. The costing and implementation schedule of the cycling network improvements have been defined in the City's Cycling Master Plan and the transit service improvements will be addressed through regular capital and operating budgets. This section seeks to provide greater clarity on the prioritization of implementation by grouping road network projects into short-, medium-, and long-term horizon years. High-level cost estimates have been provided to give an order of magnitude cost for these projects. While the implementation framework is set out in the TMP, it needs to be recognized that implementation is dynamic and responds to Council priorities and budget allocation, receipt of funding grants, and opportunistic implementation when construction works are planned for other infrastructure, such as underground utilities.

Some of the projects identified in the TMP have already been studied by the City in more detail through other studies, such as Environmental Assessments. These costs have been carried forward into the TMP and include costs for utility relocation, land acquisition, and structures (culverts and bridges). Project construction costs where no cost has been developed previously have been developed using the following assumptions:

- $6million per kilometre for road widening;
- $6million per kilometre for urbanization of a road;
- $1million per intersection for signalization and intersection improvements, such as adding turning lanes; and
- $200,000 per turning lane at an intersection if that is the only improvement being recommended.

All costs assume year 2022 pricing and have been rounded to the nearest hundred thousand of dollars. All costs would be expected to be reconfirmed and updated, as needed, once the project proceeds to the detailed design stage.

5.1 Short-term Improvements to the Road Network

Short-term improvements are generally considered to be implemented within the next ten years. These improvements are summarized in **Table 21**.

Table 21: Short-term Road Network Improvements and Indicative Costs

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
4	Armour Rd	Cunningham Blvd to Nassau Mills Rd	New 2 Lane Road Realignment	$21,900,000
13	Simons Ave / Hillside St	Chemong Road to New Collector Rd	Reconstruction to Urban Standard - Collector Rd	$5,400,000
14	Chemong Rd	Parkhill Rd to North of Sunset Blvd	Widen to 5 lanes	$37,500,000
17	Brealey Dr	Lansdowne St W to Sherbrooke St	Reconstruction to Urban Standard - Arterial	$14,300,000
18	Sherbrooke St	Glenforest Blvd to West City Limit	a) Widen to 3 lanes b) Reconstruction to Urban Standard - Arterial	$20,800,000
21	Lansdowne St W	Spillsbury Dr to Clonsilla Ave	Widen to 5 lanes	$7,000,000
22	Lansdowne St W	Park St to George	Widen to 5 lanes	$3,000,000
28	Old Norwood Rd	Ashburnham Dr to Television Rd	Reconstruction to Urban Standard - Collector Rd	$5,300,000

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
35	Harper Rd Rail Crossing	Fisher Dr to N of CP Rail Corridor	New 2 Lane Road Realignment	$3,600,000
45	Charlotte St	Park St to Water St	Reconstruction to Urban Standard - Arterial	$14,500,000
47	Crescent Street	Perry St to Haggart St	Reconstruction to Urban Standard one-way street	$2,400,000
48	Lily Lake Road	Street B (Heideman Street)	Install Left / Right Turn lanes / Future Signals when Warranted	$500,000
49	Lily Lake Road	Street C (Dolman Street)	Install Left / Right Turn lanes / Future Signals when Warranted	$500,000
50	Armour Road	Francis Stewart Blvd	Install Signals	$500,000
51	Armour Road	Parkhill Road	Install N/S Left Turn; SB Right Turn; E-W Left Turn Lanes	$3,400,000
55	Television Road	Paul Rexe Blvd	Install Signals + West Approach	$800,000
56	Lansdowne Street	Aylmer Street	Install Signals and Left Turn Lanes	Cost included in Project #22
57	Brealey Drive	Cherryhill Blvd	Install Signals + Left Turn Lanes	Cost included in Project #17
58	Brealey Drive	Kawartha Heights Blvd	Install Signals + Left Turn Lanes	Cost included in Project #17
59	Brealey Drive	Hewitt Drive	Install Signals + Left Turn Lanes	Cost included in Project #17
60	Brealey Dr	Glenforest Blvd	Install Signals + Left Turn Lanes	$1,000,000
61	Sherbrooke St	Denure Drive	Install E-W Left Turn Lanes / Permanent Signals	Cost included in Project #18
63	Lansdowne	Webber Avenue	Upgrade turn lanes N/S	$400,000
64	Webber Avenue	Clonsilla Avenue	Provide E-W Left Turn Lanes + Signals	$1,000,000
67	Sherbrooke Street	Monaghan Road	Improve Turning Radius / Provide Left Turn Lanes	$1,000,000
68	Lansdowne Street	Park Street	Realign N/S approach to improve sight lines	Cost included in Project #22
69	Lansdowne Street	Lock Street	Provide E-W Left Turn Lanes	$3,000,000
71	George Street	Romaine Street	Provide Signals and Enhanced Trail Crossing	$1,000,000
74	Hunter Street	Mark Street	Traffic Signals	$500,000
75	George Street	Hilliard Street	Traffic Signals and Enhanced Trail Crossing	$500,000
77	Hillard Street	Cumberland Avenue	Install Signals	$500,000

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
79	Water Street	Woodland Blvd	Install Left Turn Lanes and Traffic Signals	$4,000,000
80	Nassau Mills Road	University Road	Install Turn Lanes / Traffic Signals / realignment	$1,000,000
81	Nassau Mills Road	Armour Road	Install Turn Lanes / Traffic Signals / realignment	Cost included in Project #4
82	Monaghan Road	Lansdowne Place Entrance	Install Signals + Enhanced Trail Crossing	$1,000,000
83	Hunter Street	Park Street	Right-turn channelizaton (slip lanes) reconstructed to eliminate the channelization	$200,000
85	Towerhill Road	Millroy Drive	Install Signals / Enhanced Crossings	$500,000
86	Towerhill Road	Fairbairn Street	Install Signals and Turn Lanes (consider roundabout)	$3,000,000
87	Lily Lake Road	Street A (York Drive)	Install Left / Right Turn lanes / Future Signals when Warranted	$500,000
Total Cost				**$160,500,000**

5.2 Medium-term Improvements to the Road Network

The medium-term is generally defined as within the next 10 to 20 years. These projects are summarized in **Table 22**.

Table 22: Medium-term Road Network Improvements and Indicative Costs

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
1	Water Street	Nassau Mills Rd to North City Limit	Widen to 4 lanes	$21,200,000
2	Water Street	University Heights Blvd to Nassau Mills Rd	Widen to 5 lanes	$7,500,000
16	Brealey Dr	Sherbrooke St to Parkhill Rd	Reconstruction to Urban Standard - Arterial	$13,700,000
26	Television Rd	Lansdowne St E to South of Parkhill Rd	Widen to 4 lanes	$46,200,000
29	McFarlane St	New 2 Lane Bridge Across Trent Canal	New 2 Lane Road Realignment	$6,600,000
30	McFarlane St	Armour Rd to Trent Canal	Reconstruction to Urban Standard - Collector Rd	$4,200,000
31	Ashburnham Dr	Maniece Avenue to Old Norwood Rd / McFarlane St	New 2 Lane Road Realignment	$11,100,000
34	Webber / Rye St	CP Rail to Lansdowne St W	Reconstruction to Urban Standard - Collector Rd	$7,900,000

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
36	River Rd South	Otonabee Dr to Lansdowne St	Reconstruction to Urban Standard - Arterial	$21,500,000
42	Wallis Dr	Sherbrooke St to Parkhill Rd	Reconstruction to Urban Standard - Arterial	$6,100,000
52	Armour Road	McFarlane Street	Install SB Left Turn + Signals	$1,000,000
53	Armour Road	Maria Street	Install Signals - Interconnect to Swing Bridge and Ashburnham Dr	$500,000
54	Television Road	Old Norwood Road	Install NB/SB Left Turn Lanes + Signals	$1,500,000
62	Parkway	Kingsway	Install Signals / remove channelized right turn	$1,000,000
65	Wallis Drive	Weller Street	Provide Signals and Left Turn Lanes	$1,000,000
66	Weller Street	Hospital Drive	Realignment of Weller Street	$2,500,000
70	Lansdowne Street	Ashburnham Drive	Realign - Provide 4 Lanes N/S through intersection, New SB RT Lane	$3,400,000
72	Television Road	Maniece Ave	NB Left Turn Lane	$200,000
73	Television Road	Parkhill Road	Urbanize and Provide Signals (or Roundabout)	$1,000,000
76	Chemong Road	Milroy Drive North	SB Left Turn Lane	$200,000
78	Cumberland Avenue	Carnegie Avenue / Water Street	Reconfigure intersection, signals (or Roundabout)	$8,600,000
84	Chemong Road	Towerhill Road	Widen E-W approaches to 5 lanes	$4,000,000
Total Cost				**$170,900,000**

5.3 Long-term Improvements to the Road Network

Long-term improvements are seen to be needed by the year 2051 if the growth forecasts for population and employment hold true. The TMP is expected to be reviewed and updated on a regular basis before 2051 and the list of long-term improvements can be refined to respond to evolving transportation needs. The long-term road network improvements are summarized in **Table 23**.

Table 23: Long-term Road Network Improvements and Indicative Costs

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
3	Nassau Mills Rd	Water Street to Pioneer Rd	Widen to 4 lanes (including Bridges)	$50,200,000
5	University Rd	Nassau Mills Rd to City Limit	Reconstruction to Urban Standard - Arterial	$8,600,000
6	Carnegie Ave	Cumberland Ave to City Limit	Reconstruction to Urban Standard - Arterial	$6,000,000
7	Future Roads	Cumberland Ave to Hilliard St	Corridor Protection - New Arterial / Collector	$10,300,000

Project #	Street	Limits / Cross Street	Improvements	Indicative Cost
8	Future Roads	Towerhill Rd to Chemong Rd	Corridor Protection - New Collector	$6,600,000
9	Future Roads	West of Fairbairn St to Hillview Dr / Hillside St	Corridor Protection - New Collector	$7,800,000
10	Towerhill Rd	Fairbairn St to Chemong Rd	Reconstruction to Urban Standard - Arterial	$9,000,000
11	Lily Lake Rd	Fairbairn St to City Limit	Reconstruction to Urban Standard - Arterial	$26,800,000
12	Chemong Rd	Towerhill Rd to Broadway Blvd	Widen to 5 lanes	$4,200,000
15	Ackison Rd	Parkhill Rd to City Limit	Reconstruction to Urban Standard - Arterial	$12,700,000
19	Nornabell Ave Extension	Ireland Dr to Parkhill Rd	Corridor Protection - New Collector	$4,400,000
20	Brealey Dr	Sir Sandford Fleming Dr to City Limit	Reconstruction to Urban Standard - Arterial	$6,000,000
23	Lansdowne St E	a) George St to Otonabee river b) River Rd to Ashburnham Dr	Widen to 5 lanes	$15,200,000
24	Lansdowne St E	Ashburnham Dr to Willowcreek Plaza	Widen to 5 lanes	$3,800,000
25	Ashburnham Dr	Lansdowne St E to Maria St	Widen to 5 lanes	$11,000,000
27	Maniece Ave	Ashburnham Dr to Television Rd	Reconstruction to Urban Standard - Collector Rd	$8,600,000
32	Parkhill Rd	Water St to East of Leahy's Lane	Widen to 4 lanes	$18,500,000
33	Parkhill Rd	Chemong Rd to Water St	Widen to 4 lanes	$25,000,000
37	Otonabee Dr	River Rd S to Lansdowne St	Reconstruction to Urban Standard - Collector Rd	$10,600,000
38	Maria St	Walker Ave to Television Rd	Corridor Protection - New 2 lane Arterial	$7,500,000
39	Sherbrooke St	George St to Maria St	Corridor Protection - New 4 lane Arterial (Bridge Crossing)	$25,000,000
40	Maria St	Otonabee River to Ashburnham Dr	Widen to 4 lanes (including new CP Bridge and New Canal Crossing)	$49,200,000
41	Pioneer Rd	CleanTech Commons to 9th Line	Reconstruction to Urban Standard - Arterial	$7,000,000
43	Parkhill Rd	Leahy's Lane to East of Television Rd	Reconstruction to Urban Standard - Arterial	$8,400,000
44	Hilliard St	Cumberland to City Limit	Reconstruction to Urban Standard - Arterial	$1,800,000
46	Monaghan Road	Romaine St To Edison Ave	Reconstruction to enhance safety	$3,500,000
48	High Street	Sherbrooke St to Chamberlain St	Reconstruction to Urban Standard	$4,600,000
Total Cost				**$352,300,000**