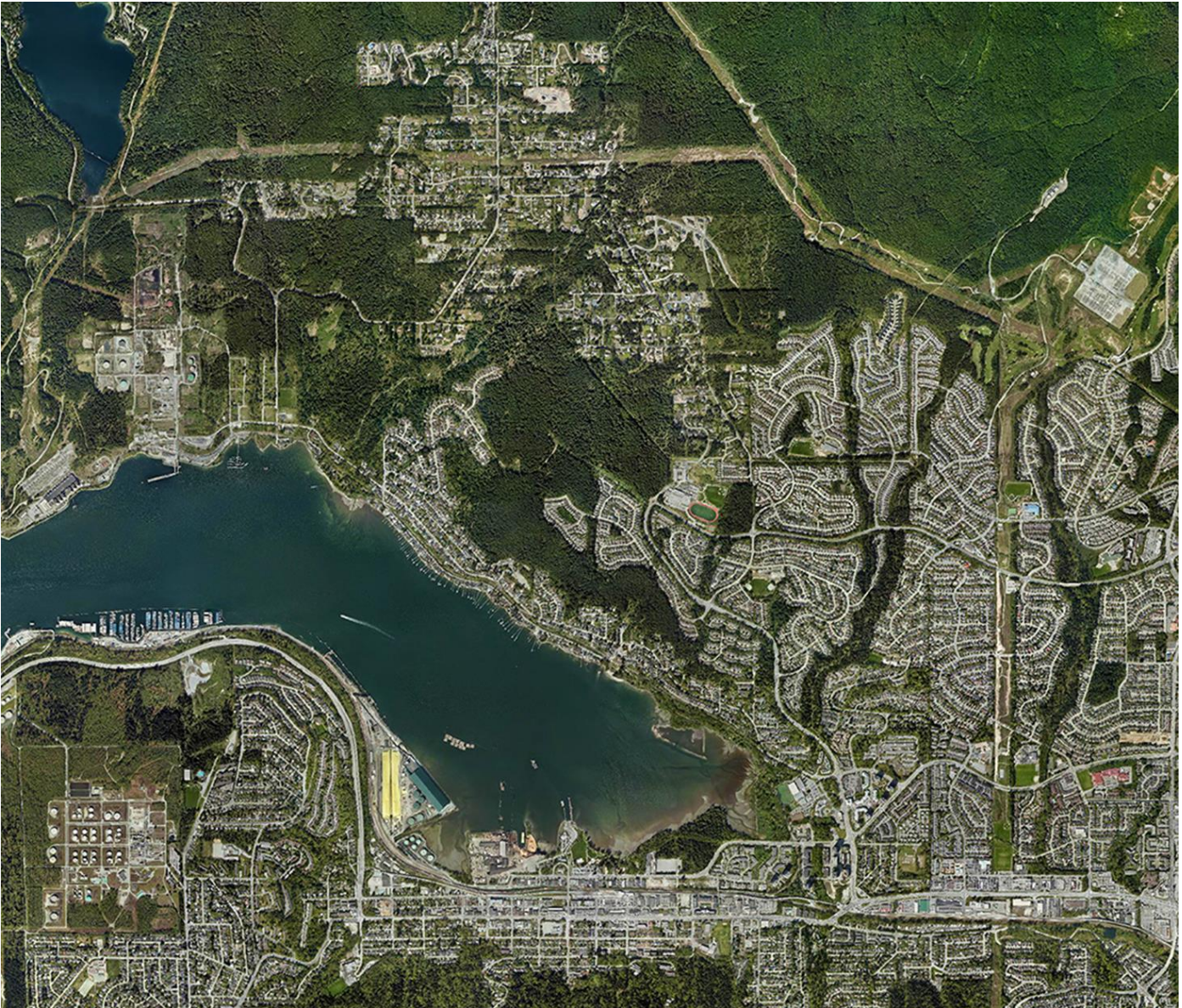




Transportation Infrastructure Operation and Maintenance Service Improvement Strategy



Engineering and Operations Department

Operations Division

City of Port Moody

Executive Summary

This report summarizes and highlights gaps in the operation and maintenance of transportation infrastructure, and outlines how operation and maintenance levels of service are affected by strategic influences on transportation infrastructure.

The key strategic influences on transportation infrastructure operation and maintenance include the City's Transportation Master Plan, which sets a broad vision for how pedestrians, cyclists, and motorists move through Port Moody, as well as the Council Strategic Plan which sets goals and objectives that necessitate the establishment of a clear level of service for transportation infrastructure operation and maintenance. The Accessible British Columbia Act, which is evolving after its introduction in 2021, will also influence accessibility considerations in levels of service.

A number of the existing projects included in the Capital Project Plan are related to gaps in the delivery of service in this area. Consideration should be given to how this existing work can be leveraged to make specific improvements to transportation infrastructure operation and maintenance. Gaps in capital rehabilitation and replacement programs, asset management, maintenance management, and other operational considerations must be addressed in order to make lasting changes to improve levels of service in this area, and to adapt to changing demands such as the growing need to accommodate active transportation modes.

Recommendations are made with the primary goal of positioning the City to deliver these higher levels of service. Further work on these recommendations may generate specific financial implications that should be brought forward to Council as part of future capital and operating budgets.

Organizational divisions and departments and specific assets involved in transportation infrastructure operation and maintenance discussed in this report, and recommendations are noted with each section. It is important to consider that not all recommendations are specific to transportation infrastructure; many are broadly applicable to operational effectiveness and may also provide improvements relating to Council's strategic priorities areas and goals.

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Definitions

Active Transportation Infrastructure	Features such as sidewalks, bicycle lanes, multi-use paths, or pedestrian bridges or overpasses that promote and enhance active transportation.
Cycling and Active Transportation Facilities	Road, part of a road, or off-street path that is intended for use by bicycles or other active modes of transportation, and is either used exclusively or shared with vehicle traffic and pedestrians.
Local Road Network (LRN)	All local roads and pedestrian areas not part of the regional transportation system. These roads are a mix of Priority 1, 2, and 3 routes for maintenance.
Major Road Network (MRN)	Roads considered to be part of the regional transportation system. The City receives funding for maintenance of these large roads, including: <ul style="list-style-type: none"> • Barnet Highway; • St. Johns Street; • Clarke Road and Clarke Street; • Moody Street from St. Johns Street to Clarke Street; • Murray Street; • Guildford Way; • Ioco Road; and • First Avenue and Bedwell Bay Road. These roads are generally Priority 1 and 2 routes for maintenance.
Multi-Use Paths(MUP)	Off-street paths that are physically separated from motor vehicle traffic.
Pedestrian	A person walking, including people using mobility aides such as canes, walkers, manual wheelchairs, electric wheelchairs, and mobility scooters.
Pedestrian Areas	Sidewalks, walkways, crosswalks, and pedestrian overpasses.
Quality Management	A system that documents processes, procedures and responsibilities to achieve objectives.
Sidewalks	A travelled way intended for pedestrian use, following an alignment generally parallel to that of the adjacent road.
Street Furniture	Items placed adjacent to the road in order to improve transportation operations.
Winter Road Maintenance	Application of anti-icing materials, and removal of ice, slush, and snow from roads, boulevards, and pedestrian areas.
Walkways	Walkways provide connections between roads and sidewalks, and typically run perpendicular to roads.

1. This Report

This report provides a high-level review of transportation infrastructure operation and maintenance functions. Additional gaps in the design and construction, asset management, and maintenance management of this infrastructure are also reviewed. This report makes recommendations to position the City to deliver improved operation and maintenance levels of service for transportation infrastructure in accordance with the strategic directions outlined in the Master Transportation Plan(MTP) and Council Strategic Plan . Further analysis, action plans, schedules, cost estimates, performance measures, and other details should be determined during subsequent staff review and implementation.

The condition of transportation infrastructure in Port Moody is influenced by the levels of service for their operation and maintenance, as well as their overall age and design. In some cases the condition or function of aging or outdated transportation infrastructure, such as narrow sidewalks or curb letdowns, is not able to be improved with changes to operation and maintenance levels of service.

Many of these recommendations are strategic and address challenges that are common to other areas of infrastructure maintenance. As the recommendations are executed, staff should identify specific operational, financial, and other consequences and report to senior staff and Council as required.

2. Strategic Influences

The City's Master Transportation Plan and the Council Strategic Plan form the strategic directions for the management of transportation infrastructure in Port Moody.

2.1.1. TransPort Moody

The City's Master Transportation Plan, referred to as TransPort Moody, sets a vision of a transportation network that supports a health, active liveable and sustainable community for people of all ages and abilities (Port Moody, 2015). The six directions, which are the areas of focus that will allow the City to fulfil this vision, are outlined in the MTP and include:

1. A Compact, Complete City
2. A Walkable City
3. A Bicycle-Friendly City
4. A Transit-Oriented City
5. Moving People and Goods
6. A Safe and Livable City

The Master Transportation Plan is currently undergoing updates which will reflect new targets in the City's Climate Action Plan, and identify strategic shifts referred to as "Big Moves" along with supporting policies, programs, and specific projects. The six directions outlined in the MTP require defined, complementary levels of service for the operation and maintenance of transportation infrastructure.

2.1.2. Council Strategic Plan

The 2023-2026 Council Strategic Plan outlines four strategic priority areas with corresponding strategic goals in each area (Port Moody, 2023). The strategic priority areas are:

- Sustainable Core Services
- Healthy Community Development
- Resilient Natural Environment
- Vibrant and Prosperous Community

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The level of service delivered for the operation and maintenance of transportation infrastructure is directly connected to the fulfilment of goals in each of the priority areas.

2.1.3. Accessible British Columbia Act

The Accessible British Columbia Act allows for increased compliance and enforcement related to accessibility standards (Accessible British Columbia Act, 2021). These standards will be developed over a 10 year introductory period following introduction of the act in 2021. As part of the act, the Province of British Columbia has authority to enact accessibility standards and regulations for the built environment and for transportation infrastructure. Sidewalks, walkways, and multi-use paths are notable examples of transportation infrastructure that must be designed, constructed, operated and maintained to ensure they are accessible for all users. The need to consider accessibility in transportation infrastructure, particularly consistency in design and features, will become especially critical as transportation modes change and projects to support MTP directions are implemented (AASHTO, 2021).

3. Capital Programs

Replacements, upgrades, improvements and additions to transportation infrastructure inventories, like off-street multi-use paths or bus stops, are typically delivered through capital programs.

Capital programs exist for some categories of assets, but a gap related to asset replacement exists as not all categories of assets have corresponding replacement programs.

3.1 Existing Capital Programs

The Corporate Project Plan, which supports the Council Strategic, currently includes a number of projects shown in Table 1 to rehabilitate, replace and improve transportation infrastructure, or with organizational impacts that will allow for improved performance in transportation infrastructure operation and maintenance.

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Table 1 Transportation Related Projects from Corporate Project Plan

Priority Area	Strategic Goals	Corporate Project Plan Project
Vibrant and Prosperous Community	Enhance vibrancy through placemaking, arts, culture, heritage and tourism	St. Johns Street Redesign Project Phase 1
		St. Johns Street Redesign Project Phase 2
		Moody Centre Streetscape Standards
Sustainable Core Services	Ensure financial sustainability	Asset Management Plan Investment Update
		Asset Management Policy Development
		Drainage Utility Enhancements
	Lead with Good Governance	Digital Strategy
		Corporate Learning Strategy
		Organizational Policy Review
		Update Subdivision and Development Servicing Bylaw
Resilient Natural Environment	Protect, integrate and enhance our natural assets	Natural Asset Management Plan
	Enhance and expand parkland and open spaces	Trail Network Plan
Healthy Community Development	Provide safe, efficient, and accessible transportation options	Master Transportation Plan Update
		School Traffic Safety Initiative
		Neighbourhood Traffic Calming Program
		Suter Brook Village Traffic Improvement Pilot
		Bus Stop Accessibility Improvements
		Guildford Way Cycling Facility Design Phase
	Bike Route Review	
Enhance community wellbeing	Accessibility Plan and Response	

The City operates two programs for capital rehabilitation and replacement of asphalt pavement, one on the Local Road Network(LRN) and the other on the Major Road Network(MRN). Additional transportation infrastructure capital projects related to traffic calming, cycling and active transportation facilities for example, are identified through the MTP framework.

MRN pavement rehabilitation projects, as well as other projects specific to structures, cycling and active transportation facilities, and sidewalks on MRN routes, are funded by grants from Translink, who provide funding to municipalities who operate regionally-important roads.

3.2 Capital Program Gaps

There are several categories of transportation infrastructure that exist in Port Moody which are without comprehensive asset management or capital replacement programs, including walkways, sidewalks, street furniture, and multi-use paths. In order to deliver service that meets the goals and objectives of the Council Strategic Plan and the MTP, capital programs should be developed that address categories of infrastructure that are either underserved or remain outside of the scope of existing programs.

The development of detailed design standards and specifications in addition to those outlined in the current Subdivision and Development Servicing Bylaw for transportation infrastructure would help ensure consistent accessibility for users and contribute to standardization and streamlining of repairs associated with operation and maintenance. Involvement of operation and maintenance staff in development of designs is desirable, particularly related to multi-use paths and cycling and active transportation infrastructure where small details can lead to large impacts for users (AASHTO, 2012).

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Recommendation:

- Develop asset management and capital replacement programs that include all types of transportation infrastructure
- Revise design standards to maximize durability and minimize maintenance
- Ensure appropriately durable products are selected for transportation infrastructure projects to ensure a high degree of serviceability and reliability
- Identify levels of service and corresponding operating budget requirements during early planning and design stages for new transportation infrastructure
- Review operation and maintenance requirements when planning for new or different infrastructure, and identify corresponding operating budget changes

4. Operation and Maintenance

Operation and maintenance of transportation infrastructure is carried out by the Roads & Drainage work group within the Operations Division of the Engineering and Operations Department. The Roads & Drainage work group has a complement of 8 regular full-time staff positions. Some of the existing operation and maintenance programs carried out by this work group are supported by policies that establish partial levels of service, but many programs or tasks do not have corresponding policies.

In addition to gaps in documentation and administration of operation and maintenance programs, areas of limited organizational capacity impact the ability to deliver service to transportation infrastructure.

4.1 Existing Operation and Maintenance Programs

The American Public Works Association (APWA) has established three categories of transportation infrastructure operation and maintenance; structural, operational, and aesthetic roadside (APWA, 2019). Table 2 summarizes the status of the City's existing operation and maintenance programs according to each category of maintenance.

Table 2 Operation and Maintenance Programs

Operation and Maintenance Programs	Existing Program?	Level of Service Established in Policy?
Structural Maintenance		
Asphalt pavement maintenance	Partial	No
Sidewalk inspection and maintenance	Yes	Yes
Walkways inspection and maintenance	Yes	Yes
Multi-use Path maintenance	Partial	No
Cycling and active transportation infrastructure	No	No
Bridge inspection and maintenance	Partial	No
Retaining Wall inspection	No	No
Drainage facility operation and maintenance	Partial	No
Operational Maintenance		
Signs	Partial	No
Street sweeping	Yes	No
Litter collection and removal	Partial	No
Winter road maintenance	Yes	Yes
Bus shelter	Partial	No
Roadside Maintenance		
Median and Boulevard area maintenance	Partial	No
Street furniture and appurtenance maintenance	No	No

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This inventory of programs should remain flexible to allow for the addition of different programs to suit user demand and infrastructure conditions. The need for additional operation and maintenance programs may be identified as further work to improve levels of service is done.

The development of corporate or administrative policies that include record keeping and documentation are critically important for the City to rely upon a policy defence. Corporate or administrative policies allow for consistent and transparent levels of service to be established, and set reasonable expectations for road users (MIABC, n.d.).

Recommendation:

- Develop corporate or administrative policies that outline levels of service for all operation and maintenance programs

4.1.1 Structural Maintenance

These programs are intended to protect and repair structures, many of which are significant in size, cost and function (APWA, 2019). Well developed structural maintenance programs produce detailed information that is important for use in budgeting and maintenance management, as well as long-term asset management planning. This relationship is especially strong with regards to pedestrian infrastructure such as sidewalks, which can have service lives exceeding 50 years (Huber et al., 2013).

Asphalt Pavement Maintenance

A comprehensive pavement management system that tracks utility cuts, identifies failure trends and optimal rehabilitation measures, and tracks overall pavement conditions according to established measurements is important to preserve asphalt pavement values and lifespans (APWA, 2019).

Gaps in road rehabilitation programs can translate into the need for extensive repairs, which may otherwise be considered to be larger scale rehabilitation, to be undertaken as part of asphalt pavement maintenance activities funded by operating budgets. This approach does not offer the value when compared to a coordinated rehabilitation program, and results in an impact to the overall level of service provided in this area.

Recommendation:

- Consider development of a comprehensive pavement management strategy that balances economic, engineering, and user interests to inform an asset management plan

Sidewalk Inspection and Maintenance

Sidewalks in the Moody Centre, Glenayre, College Park, Pleasantside and Seaview neighbourhoods are amongst the oldest sidewalks in the City, and in some instances are not consistent with modern design standards for accessibility and construction. Existing projects in the Corporate Project plan, like the Moody Centre Streetscape Standards project, present a valuable opportunity to align accessibility and maintenance considerations as part of future improvements to infrastructure, including capital projects and off-site works associated with development projects.

Sidewalk tripping hazards represent a source of risk for the City. The current Sidewalk and Walkway Inspections policy outlines inspection criteria consistent with MIABC requirements, but specifies methods and record keeping that are not consistent with modern technology or maintenance management practices. Information generated by these inspections is valuable for

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asset management, as well as documenting and resolving sidewalk tripping hazards in a way that ensures the safest possible surface for users and reduces risk for the City.

Recommendations:

- Identify opportunities to install modern accessible sidewalks when completing adjacent road and utility projects
- Update the Sidewalk and Walkway Inspection policy

Walkway Inspection and Maintenance

Walkways provide connections between roads and sidewalks, and typically run perpendicular to roads. Due to their location, walkways can include interfaces with private retaining walls, fences, and landscaping, as well as other City infrastructure like drainage and water distribution system assets. Stairs and railings in walkways can make them inaccessible or present barriers to mobility, particularly if they are not in satisfactory condition. Walkways are currently included in the Sidewalk and Walkways Inspection policy, but application of the policy is not practical due to the design, construction, location, and condition of walkways.

Recommendation:

- Develop capital programs for walkway rehabilitation

Multi-Use Paths

The City has an existing inventory of multi-use paths that are maintained by either Engineering and Operations, or by Parks and Environment staff depending on their location. They are typically maintained to a similar standard as sidewalks, despite being intended for use by various other modes of transportation. As demand for use by other modes increases, operation and maintenance practices should be shifted to ensure that multi-use paths are maintained in a way that reflects their highest and best use (British Columbia Ministry of Transportation and Infrastructure, 2019b).

Recommendation:

- Identify responsibility for operation and maintenance of multi-use paths according to their usage levels and locations

Cycling and Active Transportation Infrastructure

As the inventory of this type of infrastructure grows, there is a corresponding growth in the need for specialized operation and maintenance methods, resources, and equipment. In some cases, typical road maintenance methods and equipment cannot be used to maintain active transportation infrastructure. Additionally, demands for more specialized services may require additional numbers and new types of staff positions to support levels of service for this infrastructure without negatively affecting the City's ability to maintain existing transportation infrastructure.

Recommendation:

- Ensure that work groups tasked with the operation and maintenance of transportation infrastructure are equipped to identify and resolve gaps in operation and maintenance programs on an ongoing basis

Bridges

Structural inspections of bridges are conducted by contracted engineering consultants on a regular basis. However inspections of bridges on a non-structural basis, to address all issues like

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vegetation growth, graffiti, painting and coating, litter, cleaning, or other considerations, is currently only conducted on a limited basis and scope. This category of infrastructure includes pedestrian overpasses, like the Klahanie Drive Overpass and Union Street Overpass, in addition to vehicle bridges and overpasses. Bridges should be considered as part of the recommendation to establish corporate or administrative policies outlining levels of service for all transportation infrastructure.

Retaining Walls

The City has a limited inventory of retaining walls that have been constructed as part of transportation infrastructure like roads and bridge approaches. However, retaining walls can accumulate vegetation, graffiti, litter and other debris making them unsightly and noticeable. In some cases, retaining walls have been constructed as part of landscaping in boulevard areas by adjacent property owners. Retaining walls should be considered as part of the recommendation to establish corporate or administrative policies outlining levels of service for all transportation infrastructure.

Recommendation:

- Ensure that considerations specific to retaining walls including design, construction, ownership, safety and proximity to other City infrastructure are addressed in the Sidewalk and Boulevard Maintenance Bylaw No. 2426

Drainage

The Roads & Drainage Department of the Engineering & Operations Division is charged with the operation and maintenance of road infrastructure, as well as surface drainage infrastructure such as catch basins, culverts, inlets, outfalls, ravines, and other natural drainage features. Peak operational tempo for drainage infrastructure occurs during periods of high precipitation, as well as during the late summer and early fall when repairs and improvements can be completed in environmentally sensitive areas with less impact to fish and wildlife. While these features may not typically be considered to be related to road maintenance by users, that is most often the case. For example, drainage infrastructure that allows watercourses to cross under roads like culverts, inlets and outlets require maintenance to function with the greatest possible environmental benefits while protecting transportation infrastructure from flooding and erosion.

As part of the Corporate Project Plan that supports the Council Strategic Plan, the Drainage Utility Enhancements project is set to identify requirements for the establishment of a drainage utility. This project will identify resource and budget requirements to maintain a desired level of service for drainage utility infrastructure, including areas adjacent to roads. Most of the operations and maintenance of this infrastructure currently falls upon the Roads & Drainage Department. The Drainage Utility Enhancements project should consider the need for additional resources, including staff and equipment, in order to meet desired levels of service for drainage without impacting transportation infrastructure operation and maintenance.

Recommendations:

- Ensure all drainage infrastructure, including those adjacent to roads, are included in the consideration and planning for the establishment of a drainage utility
- Set appropriate levels of service for drainage infrastructure that considers impacts on transportation infrastructure, such as pedestrian safety adjacent to ditches, inlets, or other drainage infrastructure

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- Consider resource requirements in the Drainage Utility Enhancements corporate project to avoid negative impact to transportation infrastructure operation and maintenance

4.1.2 Operational Maintenance

This category of maintenance programs is focused on ensuring that transportation infrastructure functions as it was designed to do. Repair and replacement of signs, traffic calming features, or roadside barriers are examples of operational maintenance. Priority classifications are applied to each road in the City, based on factors such as operational experience, demand patterns, design, and location and topography.

The City's Winter Road Maintenance Policy is an example of an up-to-date policy that establishes levels of service for operational maintenance and is consistent with modern best practices in public works policy development.

Streetlighting, traffic signal, and pavement marking programs are not included in the scope of this report, but are examples of operational maintenance. Improvements to transportation infrastructure operation and maintenance service delivery should seek to align and integrate the operation and maintenance programs for these types of infrastructure.

Signs

The City has capacity to install and replace most typical regulatory, parking and no stopping, warning, pedestrian and school, bicycle, roundabout, guide, commercial vehicle and information signs. The development of additional capacity and a higher level of service, including sign washing, retroreflectivity inspections, and other best practices for sign maintenance, should be considered as policies and levels of service are developed (APWA, 2019).

Street Sweeping

The City's current street sweeping for roads incorporates cycling and active transportation infrastructure, and meets most of the best practices outlined in the British Columbia Active Transportation Design Guide (British Columbia Ministry of Transportation and Infrastructure, 2019b). However, staff have received some customer feedback noting a demand for a greater frequency of sweeping in the spring than is typically operationally feasible for roads.

Recommendation:

- Consider the development of capacity for separate levels of service for street sweeping on cycling and active transportation infrastructure

Litter Removal

The Solid Waste work group within the Operations Division of the Engineering and Operations Department conducts public waste can collection, along with removal of dumped debris and some roadside litter removal. Litter buildup can contribute to the accumulation of gravel and debris for cycling and active transportation and drainage infrastructure, and negatively impact aesthetic and environmental values. Litter collection outside of the public waste can collection is done on a limited basis, and is typically done in response to internal or external complaints.

Recommendation:

- Develop a level of service for litter removal along roadsides that considers strategic objectives outlined related to transportation infrastructure operation and maintenance

Bus Shelters

The City has partnered with a third party to install, own, operate and maintain bus shelters in select locations at no cost to the City. However, a smaller number of City-owned shelters still remain in service. Where partnership with third parties is not feasible and bus shelters are desired, the City may continue to own operate and maintain bus shelters.

Recommendation:

- Continue to seek partnerships with third party bus shelter operators. Where these are not feasible, develop a policy and level of service for bus shelters

Winter Road Maintenance

The Winter Road Maintenance Corporate Policy was introduced in 2022, outlining the City's level of service for this function. Facilities for making brine, for use in anti-icing, are currently under construction in the Works Yard. Strategic considerations for winter road maintenance levels of service include the expansion of multi-use paths, cycling and active transportation infrastructure, and demand for these modes of transportation.

Adoption of a quality management system related to transportation infrastructure operation and maintenance will help cement a continuous improvement approaches to this function, and allow for introduction of more widespread performance measurement, analysis and reporting.

4.1.3 Roadside Maintenance

The objectives of roadside maintenance programs include ensuring positive drainage, minimizing maintenance costs, keeping the road clear of debris and vegetation, enhancing overall user safety, enhancing sight distances and visibility, reducing pavement damage, and reducing deterioration of roadside features like signs (APWA, 2019).

Median & Boulevard Area Maintenance

Maintenance of areas between private property and the road edge is the responsibility of the adjacent private property owner in most cases, as established in the Sidewalk and Boulevard Maintenance Bylaw No. 2426. The Bylaw does not specify acceptable landscape treatments for these areas, and needs updating to ensure that requirements are clear for property owners, costs and risk to the City are managed appropriately, environmental considerations are included, and compliance and enforcement can be conducted effectively.

Medians are highly visible to all road users. Their design and the level of service to which they are maintained is associated with road safety, impacts to traffic, environmental values, and aesthetic values (AASHTO, 2011).

Recommendations:

- Update Sidewalk and Boulevard Maintenance Bylaw No. 2470 to reflect cost, risk, safety, and environmental considerations
- Optimize the design and operation and maintenance of medians to reflect strategic directions for transportation infrastructure operation and maintenance

Street Furniture

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Street furniture includes amenities such as benches, decorative railings, sign kiosks and guideposts, decorate pavements like paving stones or stamped concrete, and public waste cans. These features encourage the active transportation infrastructure (Transportation Association of Canada, 2010).

Recommendation:

- Identify organizational responsibility for all types of street furniture

4.2 General

In practice, extensive rehabilitation repairs are often completed with funding from operating budgets which are not intended to substitute for capital programs. This approach may be suitable to address urgent infrastructure failures on an as-needed basis, but erodes overall levels of service for operation and maintenance if applied on a sustained basis.

Recommendations:

- Develop appropriate mechanisms for addressing large-scale rehabilitation and replacement needs for infrastructure that fails in advance of its anticipated end of life
- Consider inclusion of mechanisms to audit and update policies related to transportation infrastructure in the Organizational Policy Review corporate project; alternatively, apply an approach consistent with this project to transportation infrastructure operation and maintenance policies if appropriate
- Ensure all transportation infrastructure is captured in the City's maintenance management system

4.3 Operation and Maintenance Organizational Gaps

Workforce Plan & Knowledge Management

A strong connection between knowledge management capacity and operation and maintenance performance of transportation agencies has been identified by the National Academies of Sciences, Engineering and Medicine (2015) Transportation Research Board in a study of American Departments of Transportation. Effective knowledge management helps reduce negative impacts to operation and maintenance performance due to typical organizational changes such as turnover, retirement, and technology or record keeping updates. Organizational knowledge is also vital in providing effective customer service responses. The establishment of knowledge management capacity places the City in a position to fulfill strategic goals outlined in the Council Strategic Plan, and further work in this area is to be conducted as part of the Organizational Development(OD) Plan included in the Corporate Project plan. Applications for workforce planning and knowledge management specific to the operation and maintenance of all public works infrastructure, including transportation infrastructure, should be considered as part of this project.

Technology Integration

The City's current transportation infrastructure operation and maintenance programs have a limited degree of technology integration. Examples of the application of technology for this purpose include automatic vehicle location(AVL) information for City fleet vehicles and equipment, field deployment of technology to gather maintenance management information and infrastructure condition information, and real-time reporting on operation and maintenance tasks. The Digital Strategy project included in the Corporate

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Project plan will offer guidance on the delivery of digital services within the organization, as well as for external stakeholders.

Most importantly, capacity to inventorize and update all types of transportation infrastructure in the City's maintenance management and financial planning systems is required in order to sustain continued improvements and changes in the level of service for transportation infrastructure. The further integration of technology into the operation and maintenance of transportation infrastructure also supports enhanced workforce planning and knowledge management.

The integration of technology and the use of the City's corporate systems allows for development of greater operations and maintenance capacity for all public works infrastructure, including water distribution systems, wastewater collection systems, and drainage infrastructure.

Recommendation:

- Include consideration in the Digital Strategy for the introduction of required technology to support improvements and changes to the levels of service for the operation and maintenance of public works infrastructure
- Ensure adequate capacity exists within the organization for large-scale use of the maintenance management system, including ongoing improvements and updates

Quality Management

A quality management approach provides structure and context for decision making and connects decisions about transportation infrastructure planning, operation and maintenance with strategic considerations and performance requirements. Quality management approaches and systems are used by the Province of British Columbia's Ministry of Transportation and Infrastructure to ensure that stakeholder interests are balanced with budgets, available resources, and highway maintenance performance requirements (British Columbia Ministry of Transportation and Infrastructure, 2019).

Adoption of a quality management approach will facilitate performance measurement and monitoring for transportation infrastructure operation and maintenance, and can allow for the introduction of reporting on operation and maintenance levels of service (AASHTO, 2021b).

Recommendation:

- Identify requirements for establishment of a formal quality management program based on the principles of the International Organization for Standardization (ISO) or similar standards for transportation infrastructure operation and maintenance

5. Financial Implications

Specific financial impacts from the implementation of the recommendations outlined in this report have not been analyzed as many relate to the inclusion and integration of transportation infrastructure operation and maintenance considerations in existing projects. The administration of Engineering and Operations Department structure, capacity, and budget planning should also integrate these considerations. Further actions taken in the interest of achieving strategic objectives or fulfilling the recommendations in this report may have financial implications.

6. Recommendation Action Plan

The recommendations included in this report have been grouped according to their section and their level of priority. These rankings are based on the strategic importance of the recommendations in achieving overall improved levels of service.

Many of these recommendations are strategic and address challenges that are common to other areas of infrastructure maintenance. Recommendations listed as high priority are those considered to be foundational in nature with their implementation required as the basis for further change, or to have direct impacts to address immediate risk to users or the City. Those listed as medium priority also require implementation in advance of further change, but are less foundational in nature and not required to be completed immediately in order to facilitate change. Those listed as low priority are operational in nature, or require high and medium priority recommendations or other projects to be implemented before they can be acted upon. As the recommendations are executed, staff should identify specific operational, financial, and other consequences and report to senior staff and Council as required. Detailed implementation plans should be developed to assist in identifying and considering the costs, resources, and priorities associated with many of these recommendations.

6.1. High Priority

Table 3-High Priority

Report Sections	Actions
Capital Programs	Develop asset management and capital replacement programs that include all types of transportation infrastructure
	Revise design standards to maximize durability and minimize maintenance
	Ensure appropriately durable products are selected for transportation infrastructure projects to ensure a high degree of serviceability and reliability
	Identify levels of service and corresponding operating budget requirements during early planning and design stages for new transportation infrastructure
	Review operation and maintenance requirements when planning for new or different infrastructure, and identify corresponding operating budget changes
Operation and Maintenance	Develop corporate or administrative policies that outline levels of service for all operation and maintenance programs
	Update the Sidewalk and Walkway Inspection policy
	Update Sidewalk and Boulevard Maintenance Bylaw No. 2470 to reflect cost, risk, safety, and environmental considerations

6.2. Medium Priority

Table 4-Medium Priority

Report Sections	Actions
Capital Programs	Develop capital programs for walkway rehabilitation
	Ensure all drainage infrastructure, including those adjacent to roads, are included in the consideration and planning for the establishment of a drainage utility
	Set appropriate levels of service for drainage infrastructure that considers impacts on transportation infrastructure, such as pedestrian safety adjacent to ditches, inlets, or other drainage infrastructure
	Consider resource requirements in the Drainage Utility Enhancements corporate project to avoid negative impact to transportation infrastructure operation and maintenance
	Optimize the design and operation and maintenance of medians to reflect strategic directions for transportation infrastructure operation and maintenance
Operation and Maintenance	Identify responsibility for operation and maintenance of multi-use paths according to their usage levels and locations

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	Ensure that work groups tasked with the operation and maintenance of transportation infrastructure are equipped to identify and resolve gaps in operation and maintenance programs on an ongoing basis
	Identify requirements for establishment of a formal quality management program based on the principles of the International Organization for Standardization (ISO) or similar standards for transportation infrastructure operation and maintenance
	Consider the development of capacity for separate levels of service for street sweeping on cycling and active transportation infrastructure
	Develop a level of service for litter removal along roadsides that considers strategic objectives outlined related to transportation infrastructure operation and maintenance
	Continue to seek partnerships with third party bus shelter operators. Where these are not feasible, develop a policy and level of service for bus shelters
	Ensure all transportation infrastructure is captured in the City's maintenance management system

6.3. Low Priority

Table 5-Low Priority

Report Sections	Actions
Operation and Maintenance	Consider development of a comprehensive pavement management strategy that balances economic, engineering, and user interests to inform an asset management plan
	Ensure that considerations specific to retaining walls including design, construction, ownership, safety and proximity to other City infrastructure are addressed in the Sidewalk and Boulevard Maintenance Bylaw No. 2426
	Identify organizational responsibility for all types of street furniture
	Develop appropriate mechanisms for addressing large-scale rehabilitation and replacement needs for infrastructure that fails in advance of its anticipated end of life
	Consider inclusion of mechanisms to audit and update policies related to transportation infrastructure in the Organizational Policy Review corporate project; alternatively, apply an approach consistent with this project to transportation infrastructure operation and maintenance policies if appropriate
	Ensure all transportation infrastructure is captured in the City's maintenance management system
	Include consideration in the Digital Strategy for the introduction of required technology to support improvements and changes to the levels of service for the operation and maintenance of public works infrastructure
	Ensure adequate capacity exists within the organization for large-scale use of the maintenance management system, including ongoing improvements and updates

References

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