DISTRICT OF OAK BAY

PREPARED FOR:	Committee of the Whole
FROM:	Ed Robertson, Director Engineering and Public Works and Pierce Mimura, Manager of Engineering, Infrastructure, Maintenance, Analysis & Planning
MEETING DATE:	October 21, 2024
SUBJECT:	State of the Infrastructure Report 2 of 2

RECOMMENDATION(S)

THAT the report titled “State of the Infrastructure Report 2 of 2," co-authored by Pierce Mimura, Manager of Engineering, Infrastructure, Analysis, and Planning and Ed Robertson, Director of Engineering and Public Works dated October 21, 2024 be received;

THAT Staffing recommendation numbers 1, 2 and 3 as noted in "Part 2 Staffing and Equipment" section of the staff report titled “State of the Infrastructure Report 2 of 2 dated October 2024”, be included in the 2025 budget cycle for Council's consideration as follows:

- costs associated with the addition of four (4) positions that will form a maintenance repair crew that will be primarily responsible for responding to spot repairs / urgent maintenance and emergency work repairs;
- costs associated with the addition of two (2) positions to maintain critical infrastructure withing the District's water, sanitary sewer and storm water systems; and
- costs to acquire equipment required for the increased maintenance program as outlined in Table 7 of Part 2 of the staff report.

Alternatively, staff await another direction from Council.

EXECUTIVE SUMMARY OF REPORT

The State of the Infrastructure Report attached to this staff report is the second of a two-part series to Council. This first part outlined findings, issues, and recommendations regarding water, sanitary sewer, stormwater, roads, sidewalks, and streetlighting infrastructure based on engineering assessments and master plans. It also covered the application of engineering standards, specifications, and best practices related to identification of risks to municipal infrastructure, decision-making, methodologies used for prioritizing infrastructure projects, and overall scoring of each infrastructure type.

Staff is presenting this second part of the State of the Infrastructure Report which expands our review to include critical maintenance program issues related to our aging infrastructure as identified in the previous report. While we undertake important Capital projects to renew and replace existing infrastructure, maintenance programs must be improved to maintain reliability and reduce risk until the capital works can take place. Staff have identified a potential solution for Council’s consideration that has staffing and operational implications, and provide financial analysis for consideration. The report

also presents how the District is working to improve Capital Project delivery through development of an integrated 5-year capital plan, improving procurement practices and training, exploring alternate funding sources and developing a Project Manager's Manual to provide clarity on complex infrastructure projects.

Staff are working towards providing Council with a detailed long term capital plan with funding scenarios that will mitigate potential vulnerabilities identified within the District's various types of infrastructure.

COUNCIL PRIORITY SUPPORTED
Livability

FINANCIAL IMPACT
The financial impacts are presented in the full report and will be brought forward as part of the 2025 Water and Sewer Utility budgets and the 2025 Operating budget for Council's consideration.

IAP2 FRAMEWORK ENGAGEMENT
☒ **INFORM** ☐ **CONSULT** ☐ **INVOLVE** ☐ **COLLABORATE**

Respectfully submitted,

Ed Robertson, Director Engineering and Public Works
Pierce Mimura, Manager of Engineering, Infrastructure, Maintenance, Analysis & Planning

With respect to the Financial Impact described in this report, I concur with the staff recommendation.

Rianna Lachance
_____
Rianna Lachance, Director of Financial Services

Reviewed and approved by the Director of Corporate Services.

Dianna Plouffe
_____
Dianna Plouffe, Director of Corporate Services

I have read and consider staff's recommendation to be supportable for Council's consideration.

Selina Williams
_____
Selina Williams, Chief Administrative Officer

ATTACHMENTS(S):
State of the Infrastructure Report 2 of 2_October 16

State of the Infrastructure Report

Report 2 of 2

District of Oak Bay

October 2024

Glossary

The intention is to use standard terms that are recognized across the Engineering discipline. These definitions have been provided, courtesy of the Federation of Canadian Municipalities (FCM) and definitions commonly used by Staff:

Asset Management: A formalized and integrated approach to planning and budgeting for municipal infrastructure needs, which considers a wide variety of data from across an organization with the long-term vision of the community in mind.

Capital plan: A plan for infrastructure investments, including cost and timing information on asset renewal, decommissioning, disposal and investments in new assets.

Critical Infrastructure: Assets that provide extremely important functions in service delivery, especially those for which there is no available redundancy or substitution. The consequences of failure of critical assets are serious.

Maintenance Management: A critical component of ensuring the optimal performance, reliability, and longevity of assets and encompasses the systematic planning, implementation, and oversight of maintenance activities.

Non-Routine Maintenance: Refers to maintenance that causes an interruption to daily schedules, this work could be urgent in nature (urgent maintenance) to prevent further issues or emergency maintenance that requires a rapid response to protect life, property, or the environment and may require the use of overtime.

Risk: The effect of uncertainty on objectives that is the combination of the likelihood that a hazard will occur and the consequence of the hazard.

Risk Management: A structured and disciplined approach to identify and mitigate risk and reduce uncertainty in the achievement of organizational goals and objectives.

Routine Maintenance: Refers to maintenance that is planned, that can be scheduled in advance (corrective maintenance), and regularly scheduled (preventative maintenance) as directed by best practices, manufacturers recommendations, industry standards. Preventative maintenance is done to prevent a possible break down or failure of an asset, whereas corrective maintenance can be planned rather than undertaken immediately.

Tables, Figures, and Appendices

The following Tables, Figures, and Appendices can be found within this State of the Infrastructure Report.

Tables

Figures

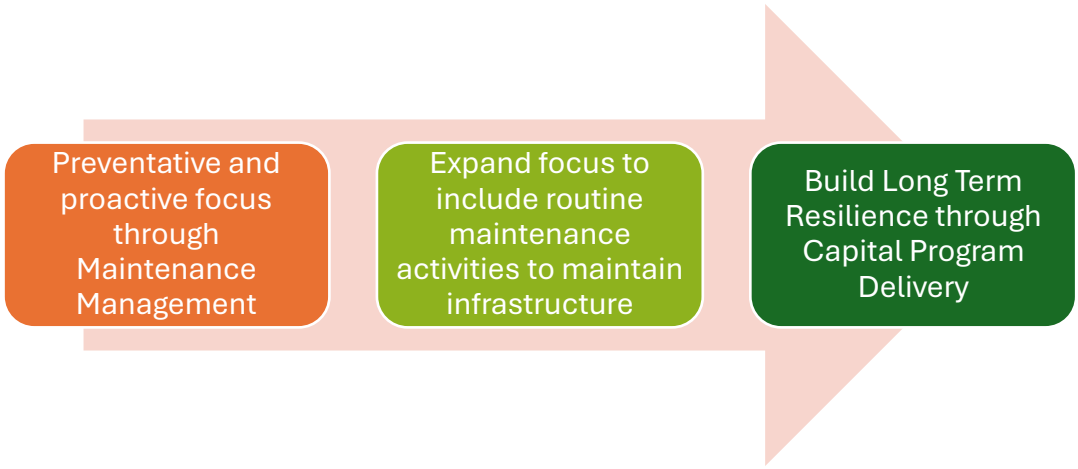
Appendices

Introduction

In May of 2024, Staff presented to Council the findings, issues, and recommendations regarding water, sanitary sewer, stormwater, roads, sidewalks, and streetlighting infrastructure based on engineering assessments and master plans. A list of key concerns across the District's infrastructure which is summarized from the initial report is as follows:

1. Infrastructure is at or past its useful life and is vulnerable to failures due to age and/or material type
2. Critical pieces of infrastructure such as pressure reducing stations, pump stations, and lift stations are vulnerable to operational failure due to physical condition and deferred maintenance
3. The water supply system has a lack of redundancy
4. Emergency maintenance work is rising, such as responding to sewer backups and water main breaks and results in increased capital and maintenance costs
5. Some infrastructure is undersized to meet current and/or future demands
6. Inflow and Infiltration is an ongoing issue for the sanitary system and results in reducing downstream capacity of the CRD treatment plant to treat sewage, and results in higher costs to the District to treat rainwater that gets into in the sanitary sewer system
7. There is a lack of accurate record drawings and maintenance documentation
8. Capacity issues have been identified due to inadequate depths and/or slopes of the sanitary and stormwater mains
9. Poor condition of roads and sidewalks results in safety hazards and reduced useful life
10. Many streetlights are in poor condition and are vulnerable to collapse and operational failure

This report, "State of the Infrastructure – Report 2 of 2" is the second presentation of a two-part series to Council. To address risks, Staff are recommending the following approach, which will be described in further detail in this report:



Purpose and Context

The purpose of this State of the Infrastructure Report is to produce recommendations and options for Council that focus on operational and maintenance considerations for the purpose of mitigating potential vulnerabilities within the District's infrastructure network and reducing risk and claims until the Capital replacement programs can be built out. The Capital Project delivery challenges are also included in this report.

Since the first part of this report was delivered on May 13, 2024, significant underground infrastructure issues across the country have been reported, including a catastrophic break on the Bearspaw South Feeder Water Main on June 5, 2024 within the City of Calgary, where water restrictions, disruptions, and repairs haven taken multiple months to fix. In August 2024, a major water main break in Montreal occurred on a pipe that was installed in the 1980's. Infrastructure issues are a significant challenge and concern for many municipalities across the country, not unique to Oak Bay. These recent events bring further awareness and importance to addressing aging infrastructure issues.

This report has been broken down into three parts, as follows:

Part 1: Maintenance Management

Part 1 focuses on the importance of maintenance management and the importance of reducing reactive maintenance by using maintenance management software and principles, instead of paper-based records for asset management to mitigate risks to the District's infrastructure.

Part 2: Staffing and Equipment

Part 2 proposes an operating model to support the District's utility infrastructure. A focus has been placed on two areas:

1. Increasing time performing critical maintenance functions related to the water, sanitary sewer, and stormwater systems – specifically water pump stations, pressure reducing valve (PRV) stations, critical water system valves, sanitary sewer lift stations and stormwater pump stations. The current maintenance program does not meet industry standards and regulations.

And

2. Improve Staff's ability to respond to unplanned emergency maintenance (i.e.: watermain breaks, stormwater and sanitary sewer main breaks, flooding, etc.) and spend more time on planned maintenance and repair work. This ensures staff are not pulled away from capital projects to undertake emergency work or maintenance issues.

An overall review of all the maintenance functions for water, sewer and stormwater has been undertaken relative to industry standards and regulations. Due to time constraints, Staff are unable to develop the detailed programs for all areas in time for the 2025 budget process. The emphasis was put on areas that are high risk due to a historic lack of focus in those areas and the impact of failures. Areas that are not being considered in this report have at least some level of maintenance

being undertaken that reduces the risk. Maintenance programs for these outstanding utility areas and other Public Works activities will be completed for the 2026 budget process. This work will include staffing and budget recommendations along with a recommended implementation schedule.

Part 3: Capital Project Delivery

Part 3 highlights the importance of developing 5-year and Long-Term Capital Plans, training Staff, improving procurement processes, investigating new technologies, and working with Finance to develop a balanced long-term plan that addresses competing capital project priorities throughout all District operations.

Part 1: Maintenance Management

Analysis

Maintenance management is a critical component of ensuring the optimal performance, reliability, and longevity of assets, with the aim of reducing risk, damage and legal claims. It encompasses the systematic planning, implementation, and oversight of maintenance activities to ensure that infrastructure assets, such as water mains, sewer mains, and pump stations are kept in acceptable working condition. The District does not have a proactive, robust maintenance management system in place and as a result, much of the maintenance is reactive and based on memory. The District is currently relying on paper-based records and memory for maintenance management, and does not have the necessary software to implement a robust maintenance management system. The result is significant Staff time spent on reactive maintenance. A 2022 consultant's report identified that there is no easy information tie that links Public Works data collection efforts with Geographic-Information Systems (GIS). As such, the current practice involves manually recording information such as maintenance schedules, work orders, inspection results, and repair data on paper forms and/or in physical binders which cannot be easily accessed or cross referenced to find patterns of reoccurrence or to schedule preventative maintenance.

Reliance on paper-based records for maintenance management reduces the availability of information, which results in increased service disruptions over time and contributes to the District's inability to reduce the amount of reactive maintenance. The nature of paper-based records (handwritten) leads to inconsistencies in the way data is collected, resulting in increased errors. Moreover, due to the sheer number of assets within the District, paper-based records can become outdated or be incomplete resulting in difficulty analyzing trends, metrics, etc. when it comes to implementing maintenance schedules and it is difficult to access records in a systematic way.

For example, when a pump requires urgent repair, Staff manually search through multiple logbooks/binders to find relevant maintenance history, including when it was last maintained/serviced, the type of servicing, etc. which could lead to delays and/or higher costs in addressing the issue. Paper-based record keeping can also result in incomplete records if forms are lost or improperly filled out, which impacts overall maintenance effectiveness.

There is also an increased demand from the Public for transparency in how municipalities are spending tax dollars and maintaining critical assets. As such, there is an increased need to digitize information and to automate maintenance scheduling to make better data-driven decisions. The District could use technology to their advantage and to utilize maintenance management software systems to record, monitor, and report on maintenance activities. The benefits to implementing maintenance management software are:

- **Better lifecycle management** – maximize the asset's value before it needs replacement.
- **Maintenance scheduling** - through documentation and being able to schedule timely maintenance activities, emergency maintenance is reduced or avoided.
- A **centralized database** of information that allows in-field Staff and managers to share, access, and report on the District's assets much more effectively.

- **Benchmarking** against industry standards, other municipalities, and ability to share data with other municipalities to be operationally more effective
- **Increased accuracy and transparency** and ability to defend against legal claims

The following risk analysis has been completed for maintenance management software.

Table 1: Risk Analysis for Inadequate Maintenance Management Software

Description and Impacts	Likelihood	Consequence	Risk Score	Risk Level
Lack of Data-Driven Decision Making	5	4	20	Critical
Without maintenance management software Staff lack comprehensive data to support informed decision-making regarding capital programs and maintenance activities. This is a critical risk to the District because there is an increased potential of critical system disruptions due to reliance on outdated or inaccurate maintenance information that has not been digitized and/or difficult to access.				
Budget Tracking and Resources	5	4	20	Critical
Without maintenance management software tracking of maintenance tasks, Staff time, and equipment time is more difficult due to the number of differing tasks performed by Staff and the number of assets within the system. This is a critical risk because inefficient budget tracking can lead to increased costs and resource misallocation.				
Deferred Maintenance	4	4	16	Very High
The absence of a systematic approach to maintenance can result in more frequent equipment failures and operational disruptions of critical infrastructure. Manual paper-based tracking is more difficult to track and analyze. This is a very high risk because it negatively impacts service delivery and increases the likelihood of system disruptions.				
Higher Costs	4	4	16	Very High
Ineffective maintenance management may lead to accelerated deterioration of assets resulting in higher repair and replacement costs over time. This is a very high risk because it shifts maintenance from a proactive to a reactive approach and increases costs over the long term.				
Compliance and Safety	4	5	20	Critical
Inadequate maintenance management increases the risk of non-compliance with regulatory requirements and safety standards, which could lead to legal issues and safety hazards. This is a critical risk because it could lead to hazards that threaten public health and safety.				
No Performance Metrics	4	3	12	High
The lack of a maintenance management system makes it difficult to track performance metrics, which can hinder efforts to improve operational efficiency and identify areas for cost savings. This is a high risk because it limits the District's ability to track maintenance activities effectively.				
Maintenance Documentation and Policies	5	3	15	Very High
Tracking of past inspections and maintenance activities is currently not sufficient for analysis/future reference, etc. this makes it difficult to quantify levels of service and for the District to defend against legal claims. This is a very high risk because it makes it challenging to ensure accountability in maintenance practices.				
Overall Risk Level/Score = 17 (Very High Risk)				

Significant/very high risk to health, safety, operations, or environment or potential for substantial impact on property. Urgent action needed to mitigate risk.

Recommendations

In alignment with the *Asset Management Policy* approved on March 26, 2018, adopting maintenance management software is in alignment with asset management best practices and is an industry-standard approach to sustainable service delivery of the District's infrastructure. As per the Policy, one of the key responsibilities for Council is to allocate resources to the asset management program.

At this stage, no action is required from Council. Staff are actively reviewing the acquisition and implementation of maintenance management software to enhance data collection and to improve the efficiency of maintenance operations for the aim of effective asset management.

In the interim, Staff are developing detailed digital spreadsheets to familiarize Staff with the inputs required for collecting maintenance information and that will be able to be entered into maintenance management software, when it becomes available to Staff.

Financial Impact

There are initial costs associated with setting up maintenance management software. These include purchasing the software and ongoing costs associated with running and maintaining the system. However, Staff anticipate that the implementation of maintenance management software will be absorbed into the existing operational budgets. It is difficult to quantify the return on investment at this time, but the operationalization of software will likely offset the reduced labour costs to maintain the infrastructure as there will be cost savings in the long run due to improved asset management and a reduction in emergency repairs and legal costs over time.

Timeline/Process/Next Steps

Procurement of maintenance management software is planned with implementation to follow. Additionally, standard operating procedures will be created to standardize maintenance functions and ensure maintenance activities are being executed properly. Engineering will work on policies and data standards to support maintenance management and seek Council endorsement on service levels.

Part 2: Staffing and Equipment

Analysis

Due to the significant number of concerns brought forward in the initial report related to the water, sanitary sewer, and storm water infrastructure, such as increases in emergency maintenance work for Staff to respond to sewer backups, water main breaks, and deferred maintenance to critical pieces of infrastructure - Staff worked with a consultant to review staffing levels to maintain its water, sanitary sewer, and storm water infrastructure.

Through this review, Staff have learned that **the District is facing critical staffing challenges to meet industry standards and best practices to perform regular inspections and preventative maintenance for its critical infrastructure**, which is creating significant risks for the District.

A significant amount of maintenance work is reactive, responding to calls for service – rather than completing routine maintenance tasks. For example, in July 2024, Staff had to mitigate the risk of a District-wide water service disruption by responding to an equipment malfunction in one of the District's water chambers/vaults, where one of the pressure reducing valves was malfunctioning, which was temporarily impacting service pressures within the water system. Pressure reducing valves regulate the operating pressure in the water system and provide necessary pressures for domestic use and hydrants for fire-fighting purposes. This is an example of where Staff are diverted from routine maintenance tasks for a couple of weeks to non-routine/urgent maintenance work that needs to be completed to prevent damages to property due to high pressures in the system. This type of maintenance is reactive in nature, not preventative. The District is not meeting maintenance levels that are required in standards.

It is evident that due to the number of maintenance functions required by Public Works Staff (see Table 2, 3, and 4) that Staff are often overwhelmed by the volume of tasks, which can result in incomplete or deferred maintenance, including delayed and/or interrupted capital project delivery (if dedicated crews are pulled off projects to do reactive maintenance work). This inadequacy in Staffing impacts the quality and responsiveness of service delivery, making it difficult to keep up with the demands of aging infrastructure.

The following tables (Table 2, 3, and 4) shows the total number of infrastructure assets relevant to water, sanitary sewer and stormwater that is to be routinely inspected and maintained by Public Works Staff**. Critical routine maintenance functions have been *italicized in red*.**

Table 2: Water Maintenance Functions

Service Area	Asset Type	# of Assets	Routine Maintenance Functions at Public Works
Water	Mains	115 km	**Flushing** – to maintain water quality through water mains; maintenance programs include unidirectional and dead-end flushing.
	Hydrants	497	**Hydrant and *Valve Maintenance*** – routine exercise and maintenance of hydrants and valves to ensure they operate correctly during emergency fire-fighting operations and to isolate mains that break to reduce flooding.
	Valves	1098	
	Meters	6013	**Water Meter Maintenance** – routine inspections for leaks and meter accuracy. routine inspections for leaks and meter accuracy.
	Pump Stations	4	***Pump Station Maintenance*** – to ensure flows and pressures meet design specifications; routine inspections and maintenance to ensure the efficient and reliable operation.
	Pressure Reducing Valve (PRV) Stations	2	***PRV Station Maintenance*** – to ensure the water system controls water flow and pressure is operating effectively; routine inspections and maintenance to ensure the efficient and reliable operation.
	Various Assets		**Non-Routine Maintenance Functions at Public Works**
			Urgent Response – responding to calls for service and/or investigating local issues
			Emergency Response – respond to water main breaks, leaks, etc. to mitigate public health risks and flooding.

Table 3: Sanitary Sewer Maintenance Functions

Service Area	Asset Type	# of Assets	Routine Maintenance Functions at Public Works
Sanitary Sewer	Mains	97 km	**Mains Inspections** - to assess condition of sewer main using acoustic assessment technology (SL-RAT) or closed-circuit television (CCTV); inspections to identify blockages, structural defects, joint offsets and other potential issues. **Mains Cleaning** - scheduled cleaning of sewer main segments to remove debris, grease, root intrusion to ensure flow capacity.
	Lift Stations	8	***Lift Station Maintenance*** – routine inspections and maintenance to ensure wastewater is discharged as per design specifications, testing control systems and related components.
	Manholes	1349	**Manholes (Access ports) Maintenance** – regular inspections to record structural integrity and inlet/outlet pipes, flow characteristics, deficiencies reported for maintenance repairs or replacement.
	Various Assets		**Non-Routine Maintenance Functions at Public Works**
			Urgent Response – responding to calls for service and/or investigating local issues
			Emergency Response – respond to sewer main breaks, backups, etc. to mitigate public health risks, property damage, and environmental impacts, such as sewage overflows.

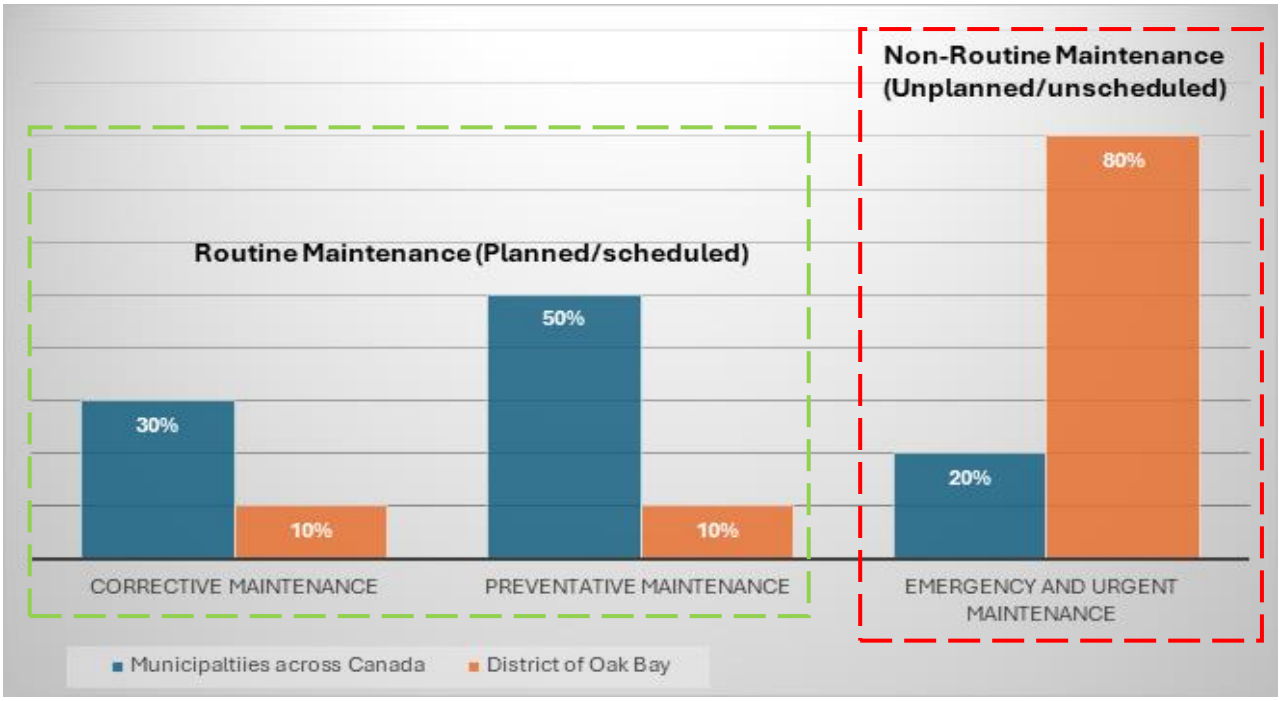
Table 4: Stormwater Maintenance Functions

Service Area	Asset Type	# of Assets	Routine Maintenance Functions at Public Works
Stormwater	Mains	140 km	**Mains Inspections** - to assess condition of stormwater main using closed circuit television (CCTV); inspections to identify blockages, structural defects, joint offsets and other potential issues. **Mains Cleaning** - scheduled cleaning of stormwater main segments to remove debris, grease, root intrusion to ensure flow capacity.
	Lift Stations	2	***Lift Stations Maintenance*** – routine inspections and maintenance to ensure stormwater is discharged as per design specifications, testing control systems and related components.
	Catch Basins	2500	**Catch Basins Maintenance** – routine inspections and maintenance to remove sediment and debris which can restrict flow and cause flooding.
	Manholes	1250	**Manholes (Access ports) Maintenance** – regular inspections to record structural integrity, inlet/outlet pipes, flow characteristics, deficiencies reported for maintenance repairs or replacement.
	Outfalls	37	**Outfall Maintenance** - routine inspections and maintenance to record structural integrity, debris buildup, flow characteristics.
	Various Assets		**Non-Routine Maintenance Functions at Public Works**
			Urgent Response – responding to calls for service and/or investigating local issues
			Emergency Response – typically respond to flooding requests to mitigate public and private property damage, and environmental impacts.

Staff recently attended a national benchmarking conference in March 2024, where historical data was shared regarding how much time municipalities across Canada deal with routine and non-routine maintenance work. Based on data collected, it is estimated that 80% of time is spent on routine corrective and preventive maintenance, and 20% on emergency and/or urgent maintenance.

By way of comparison, the District of Oak Bay spends a significant amount of time "reacting" to non-routine (emergency/urgent maintenance) work that is unplanned. It is estimated that the District spends 80% of their time on non-routine maintenance and 20% of time on routine-maintenance. **As an organization, Staff are spending too much time doing non-routine maintenance work responding to emergencies and calls for service, which is important work, however, it is at the expense of doing preventive maintenance, which is inadequate to maintain infrastructure over the long-term.** This is a result of inadequate staffing, which results in Staff doing the best they can to respond to urgent requests and deferring maintenance that is scheduled.

Figure 1: Routine and Non-Routine Maintenance Comparison Across Canada



A risk analysis has been completed for inadequate Staffing to maintain infrastructure.

Table 5: Risk Analysis for Inadequate Staffing at Public Works

Description and Impacts	Likelihood	Consequence	Risk Score	Risk Level
System Disruptions/Failures	5	4	20	Critical
Current staffing levels are inadequate to meet the demands of maintenance functions. This is a critical risk to the District because insufficient Staff can lead to delayed inspections and maintenance, further increasing the likelihood of system disruptions/failures such as pump stations being out of service and water main breaks. Delays in addressing system failures can pose health risks to the public, such as sewage contamination.				
Reduced Asset Life	3	3	9	Moderate
Insufficient staffing results in less proactive maintenance, which in turn can accelerate deterioration of water, sanitary sewer, and stormwater assets, ultimately reducing their lifespan and increasing replacement costs.				
Employee Morale/Satisfaction	3	4	12	High
This is a high risk to the District because overworking/over allocating existing staff due to understaffing can lead to burnout and decreased morale, which ultimately impacts overall productivity and efficiency.				
Ineffective Resource Allocation	3	4	12	High
This is a high risk to the District because Staff are commonly diverted from planned maintenance tasks to address urgent issues. This misallocation reduces the effectiveness of both routine and emergency maintenance efforts.				
Overall Risk Level/Score = 13 (Very High Risk)				
Significant/very high risk to health, safety, operations, or environment or potential for substantial impact on property. Urgent action needed to mitigate risk.				

Recommendations

- Staffing **Recommendation #1** shown in Table 6 is to add four positions that will form a new maintenance repair crew that will be primarily responsible for responding to spot repairs/urgent maintenance and emergency repair works. This will allow existing Staff to focus on capital works projects and routine planned maintenance functions as they will not be pulled away from these tasks to tend to emergency repairs except in extraordinary circumstances.

- Staffing **Recommendation #2** shown in Table 6 is to add two positions to maintain critical infrastructure within the District's water, sanitary sewer, and stormwater systems. The District is not performing to prescribed maintenance levels to properly maintain these specific critical assets, which include pump stations, pressure reducing valve stations, lift stations, and critical valves as presented in Table 2, 3, and 4 italicized in red.

The critical maintenance functions have been prioritized; the remainder of the maintenance functions for water, sanitary sewer, and stormwater need further program development over the next year to be able to finalize recommendations in those areas.

The Staffing recommendations shown in Table 6 are presented to meet minimum industry standards and best practices for maintaining municipal infrastructure.

These references include:

- American Waterworks Association (AWWA)
- Water Environment Federation (WEF)
- American Public Works Association (APWA)

Table 6: Recommended Staffing Increase at Public Works for 2025

Staffing	Forecasted Position Needs for 2025	Trigger for increase
General Foreman	+1	**Recommendation 1:** **Add four positions to form a new maintenance repair crew.** This crew would be dedicated to responding to spot repairs/urgent repair maintenance and emergency maintenance works related to water, sanitary sewer, and stormwater to allow existing Staff to work on routine maintenance functions, as described in Table 2, 3, and 4, and Capital projects.
Lead Skilled Labourer	+1	
Skilled Labourer	+1	
Equipment Operator III	+1	
Fitter II	+2	**Recommendation 2:** **Add two positions to maintain critical infrastructure** (lift stations, critical valves, pump stations, PRV stations).
Total	**+6**	

- Equipment **Recommendation #3** shown in Table 7 is only recommended if a new maintenance repair crew proposed in Recommendation #1 is approved.

Additional equipment such as a backhoe and transportation vehicles are required to aid in the maintenance of the District's assets. The truck and cube van are necessary to facilitate transport of the newly added Staff and to move equipment between jobsites.

Table 7: Recommended Equipment for Public Works Staff for 2025

Equipment	Forecasted Equipment Needs for 2025	Trigger for increase
Backhoe	+1	**Recommendation 3:** Increase equipment required for Public Works Staff, if additional Staff are added in 2025 to maintain water, sanitary sewer, and stormwater infrastructure.
Cube van crew truck	+2	
Pickup truck	+1	
Total	**+4**	

Options

- Option 1: Increase staffing and equipment for water, sanitary sewer, and stormwater as described in Table 6 and 7 of this report.

- Option 2: An alternative direction given to Staff.

Financial Impact

The annual wages for the staff in Table 6 total approximately $445,000. Labour load for these employees would cost an additional $275,000. The total annual cost for these employees would be approximately $720,000. It is not anticipated that the entire $720,000 would need to be net new funding. Currently, employees are taken away from capital projects and cost recovery work when needed to work on emergency or unplanned maintenance. If the additional staffing in Table 6 were added, there would be fewer disruptions to planned capital projects, allowing additional capital projects and cost recovery services to be built each year. It is estimated that approximately 25% of the $720,000, or $180,000, could be taken from existing budgets and reallocated to the new staff.

The remaining $540,000 would be net new funding, partially from the water and sewer utilities and partially from general taxation. It is estimated that approximately $225,000 of new annual funding is required from the water utility, $135,000 is required from the sewer utility, and the remaining $180,000 is required from general taxation.

The equipment in Table 7 is estimated to cost approximately $550,000. This would be a one-time capital purchase. Once the equipment is purchased, it would form part of the equipment pool. The annual cost of operating these pieces of equipment is estimated at approximately $200,000, which

includes saving for replacement when the equipment reaches the end of its life. In addition to the equipment, it is recommended that approximately $150,000 of new funding be set aside each year for consumable supplies and small tools associated with repairing the underground utilities, such as pipe couplers, new valves, soil, concrete, asphalt, etc.

The total cost for the recommended staffing and equipment is approximately $870,000 of net new funding per year, plus a one time $500,000 capital purchase of equipment. These costs would be distributed across the water and sewer utilities, as well as general taxation.

Timeline/Process/Next Steps

Staff will present the next steps for Council consideration by preparing detailed recommendations to accommodate staffing and equipment requests at both the utility budget (in November 2024) and the operational budget discussions (in Q1 2025) for approval.

Part 3: Capital Project Delivery

Analysis

Due to the significant number of concerns brought forward in the State of the Infrastructure Report Part 1 related to the water, sanitary sewer, and storm water infrastructure, such as undersized infrastructure, asbestos cement mains, and lack of redundancy in the water system – Staff are reviewing the rationale through which projects are selected on an annual basis, such as the "Engineering Capital Works Plan" presented to Council on February 26, 2024. However, Staff are continuing to connect all of the information presented from all the condition assessments and master plan reports to develop 5-year and Long-Term Capital Plans.

The new Manager of Engineering Capital Projects is responsible for prioritizing capital projects and developing the capital plans in addition to managing capital and utility budgets for various infrastructure projects on an annual basis. For 2025, an annual capital plan will be presented as part of the budget update. Capital projects address systemic root-cause issues found within the system and include upgrading mains to have more capacity to meet current or future demands. These projects are more expensive and are different in scope than maintenance activities. They require involvement of consultants and contractors, along with District staff, to improve or rehabilitate the District's infrastructure. Capital projects need to be executed to build long term resilience within the District, whereas maintenance activities preserve or restore infrastructure assets to a functional state to extend their useful life and reduce risk and claims. Both maintenance and capital project delivery activities are essential to maintain and improve the District's infrastructure over the long-term.

Engineering has taken strides in recent years to work on projects that are in alignment with engineering assessments and master plans to have a longer-term focus, rather than just responding to immediate infrastructure issues as they arise, however, there is much work to be done. This work includes working closely with the Finance department to better understand how long-term upgrade projects, such as the North Oak Bay Pump Station Consolidation and Watermain Upgrades identified in the 2023-2027 Financial Plan will be prioritized due to the complexity of upgrading and

sequencing multiple watermains and potential funding strategies that may be needed to accommodate these costly required upgrades (reserve funding, grants, debt-servicing, etc.).

A strategic directions report delivered to staff in 2022 highlighted the organizational impacts of the infrastructure challenges facing the District. Key points included the necessity for higher levels of replacement, which will require increased infrastructure funding, as well as the likelihood of unplanned maintenance activities until a "critical mass" of rehabilitation (i.e. capital projects) is completed.

There are also further demands on the Engineering department to understand the impacts of the newly tabled legislation regarding Small-Scale Multi-Unit (SSMU) housing will have on the District's infrastructure. Legislated changes from the Province will impact the District's infrastructure and it is inevitable that to increase the housing supply through densification, upgrades to infrastructure will need to happen. Staff are trying to take a proactive approach and work inter-departmentally with Finance and Planning to ensure that infrastructure replacement projects are well coordinated with planning initiatives, and that bylaws are in place to establish development cost charges (DCC's) to service new developments for capital costs related to infrastructure upgrades, as prescribed by the provincial government.

Due to the increased complexity and costs of the infrastructure projects delivered within Oak Bay, from a departmental level, Staff have been developing a Project Manager's handbook that will better define expectations from Staff from inception to closure for each capital project. This includes reviewing projects, such as the nine (9) Active Transportation routes to identify potential utility upgrades in advance of surface works and to understand how these utility upgrades will be prioritized against other critical infrastructure upgrades. This also includes reviewing developments and their impacts to surrounding infrastructure, such as capacity concerns, and triggered upgrades that may be required as a result. An example of such a development would be the new student housing project at Camosun College, which was released on July 17, 2024, which is projected to accommodate 423 affordable beds and expected to be completed in fall 2027. Engineering needs to review servicing, grading, drainage studies, etc. for all developments to ensure that Staff understand how developments will impact the District's infrastructure and long-term planning, especially from such significant sized housing projects.

And finally, as mentioned earlier in this report, maintenance management is needed to better inform capital project planning. Engineering and Public Works need to continue to coordinate and work closely together to ensure that capital projects delivered within Oak Bay improve long-term resilience.

Since 2020, Engineering and Public Works have executed several underground infrastructure projects, these are shown on Table 8. Paving projects have not been shown for brevity.

Table 8: Infrastructure projects completed, in progress, or planned from 2020 to 2025

Project Name	Year	Infrastructure Upgrades
Central Sanitary Replacement Project	2020	Approximately **5 km** of underground infrastructure upgrades (2020 to 2024)
Heron Utility Replacement Project	2020	
Armstrong Ave Water Main Replacement	2021	
Burdick Watermain Replacement Project	2021	
Hampshire - Cranmore Watermain Improvements	2021	
Kings Road Storm Replacement Project	2021	
Monterey Storm Main Improvement	2021	
Uplands Watermain Replacement Project	2021	
1912 - 1920 Crecent	2022	
261 King George Terrace	2022	
3535 Upper Terrace	2022	
706 Mountjoy	2022	
Mayhew Storm Drain Replacement Project	2022	
Thompson Storm Drain Replacement Project	2022	
Victoria Ave Watermain Replacement	2022	
Windsor Sanitary Replacement Project	2022	
2533 Margate Easement - Sanitary Replacement Project	2023	
Lincoln Utility Replacement Project	2023	
Dalhousie Sanitary Sewer Replacement	2024	
Meadow Place Storm/Surface Upgrades	2024	
Oliver Street Water Main Replacement Phase 1	2024	
Runnymede Utility Upgrade Project	2024	
Topp Avenue Utility Upgrades (In progress)	2024	
Cadboro Bay and Thompson (In progress)	2024	
Oliver Street Water Main Replacement Phase 2	2025	**9 to 10 km** of underground infrastructure upgrades planned for 2025. *subject to change
Estevan Avenue Storm and Outfall - Phase 1	2025	
Currie Rd Sanitary Replacement	2025	
Florence Rd Sanitary Replacement Design	2025	
McNeill Utility Replacements	2025	
Exeter, Ripon, and Norfolk Road Watermain Project - Humber Catchment	2024-2025	
Uplands Sewer Separation - Humber Catchment	2024-2025	
Active Transportation Projects McNeill Avenue Traffic Calming Henderson Neighbourhood Bikeway Haultain-Henderson Neighbourhood Bikeway Oak Bay – Beach Drive Neighbourhood Connection	2025	

Staff are actively working on capital projects with contractors, consultants and District staff to improve various parts of the District's infrastructure system to mitigate the issues identified in the State of the Infrastructure Report 1 of 2. At the time of this report, Staff have estimated that projects started **in 2024 and planed for 2025 will result in approximately 9 to 10 km of water, sanitary sewer, and stormwater infrastructure upgrades, in addition to the active transportation projects being executed across the District. The utility projects presented in Table 8 slated for completion in 2025 are subject to change: dependent on project timelines and if projects get re-prioritized.**

Some projects initiated in 2024 have been delayed starting until 2025 due to either federal regulatory permitting such as the Estevan Avenue storm main replacement project or navigating impacts to District's parks/fields such as the Currie Road sanitary sewer replacement project due to technical challenges navigating a preferred sanitary sewer alignment due to depths and sub-surface conditions. There are a significant number of projects that Staff are advancing at the same time and Staff are doing the best job they can to execute projects on time and on budget.

An annual Engineering Capital Works plan will be presented in February 2025, similar to the work done in 2024 to provide rationale for why projects were selected and to provide Council an understanding of the number of projects Staff are planning to advance in 2025.

Delivery of increased capital project output on projects requires careful planning, increased communication with stakeholders, and ensuring Staff are well-supported to prioritize projects. A risk analysis was completed for capital project delivery.

Table 9: Risk Analysis for Capital Project Delivery

Description and Impacts	Likelihood	Consequence	Risk Score	Risk Level
Competing Priorities	5	4	20	Very High
The capital program has many competing priorities, which makes prioritizing infrastructure projects inherently challenging due to the interplay of various factors described in this report (active transportation routes, legislation, regulatory requirements, maintenance issues, development pressures, stakeholder engagement and interests, etc.). This is a critical risk for the District because invariably as one project gets prioritized another one gets de-prioritized.				
Contractual Disputes	3	4	12	High
Due to the number and value of external contracts, there is an increased probability that contractual disputes or issues increase. This is a very high risk to the District because it results in project delays, increased costs to the District, and/or potential legal issues.				
Budgets	4	4	16	Very High
Staff have seen a rise in costs in contracting and consulting companies to deliver infrastructure projects. This is a very high risk to the District because it means that initial budget estimates for longer term projects may no longer be sufficient by the time the project reaches its later stages.				
Workload Capacity of Staff	3	4	12	High
Staff are doing the best job they can to manage multiple projects at one time, however, due to the complexity and experience required to manage projects there is a high risk of negative project outcomes, which include project delays, increased stress and burnout in Staff, and increased costs and need to outsource "project specialists" to advise on complex infrastructure projects.				

There are also three engineering positions which remain unfilled which is affecting capacity to undertake more projects.
Overall Risk Level/Score = 15 (Very High Risk)
Significant/very high risk to health, safety, operations, or environment or potential for substantial impact on property. Urgent action needed to mitigate risk.

Recommendations

Upon review of the capital project delivery requirements for the District, Staff intend on **prioritizing the development of a 5-year capital plan** to address the multitude of risks identified in the initial report and to communicate long-term capital projects and the benefits to the community in addition to the ongoing practice of providing Council an overview of the annual capital works plan as part of budget presentations annually. The intention of laying out a capital plan is to balance the various factors that make project prioritization difficult and to communicate to Council early about why decisions are being made to address various infrastructure issues across the District, from asbestos cement mains, addressing hydraulic capacity concerns in the network, etc.

To address the rise in potential contractual disputes, Staff are working on **improving procurement practices and additional training for contract management,** specifically targeting MMCD (Master Municipal Construction Documents) contracts to improve understanding of contract terms, to mitigate risks associated with contractual disputes, and to better improve overall project execution to manage complex projects.

To address the high risk associated with costs rising to deliver infrastructure projects, **Staff are exploring alternative funding sources, such as grants and new technologies** that may have cost-saving measures to ensure that long-term projects remain within budget despite projected cost escalations, such as inflation. In addition to this, **further strategic planning is needed with Finance to plan for budgeting of capital expenditures and to review potential sources of funding** available to the District, this could include utility rate increases, taxation modelling, and partnering with other municipalities, such as Victoria or Saanich.

To balance workload capacity requirements and expectations for staff required to fulfill a multitude of roles and responsibilities on linear and non-linear infrastructure projects from project planning, procurement, design, tendering, and construction **a "Project Manager's Manual" is being developed by Staff to improve project outcomes, to provide better clarity for Staff working on complex infrastructure projects** and to ensure that Staff have the right processes, templates, and resources available to them to administer a growing portfolio of capital projects for the District.

Financial Impact

Financial considerations for capital project delivery are still under review and increases to utility rates may be amended in the future.

Timeline/Process/Next Steps

Engineering is still operating below full capacity due to unfilled positions within the team, and this continues to impact Staff's ability to deliver capital projects at the rate the District expects. Staff are working on recruitment of these vacant positions to bolster the District's ability to increase capital output.

Conclusion

The purpose of this State of the Infrastructure Report is to produce recommendations and options for Council that focus on operational and maintenance considerations for the purposes of mitigating potential vulnerabilities within the District's infrastructure network, and reducing risk and claims until the Capital replacement programs can be built out.

Maintenance management is key to meeting regulatory and industry standards, ensuring that the useful life of assets is maximized, and that risk is minimized. The District requires a software-based solution in order to track maintenance activities and be able to schedule maintenance work. The current memory and paper-based method is not an effective way of managing a proactive program. This gap is rated as a very high risk to achieving an effective maintenance program. Work has started to review software and to scope out an implementation plan in concert with the implementation of a corporate Asset Management approach. In the meantime, steps are being taken to capture date in spreadsheets so that it is ready for transfer to a new program.

Through a review of the District's maintenance programs with our consultant, it is clear that there are serious gaps when measured against regulatory and industry standards. This exposes the District to significant risk of outages, property damage, flooding and claims. In the past year, we have seen examples where this has occurred in other jurisdictions but also within Oak Bay itself. More skilled staff are required to deal with the worst of these shortfalls. The analysis is ongoing and there will be a further presentation about any other shortfalls in the balance of the maintenance functions that the District is responsible for. The risk analysis is very high, indicating the importance of addressing these areas soon.

The Capital program delivery is important in dealing with infrastructure deficiencies and parts that are beyond their useful life and are causing issues. Council previously committed to increased funding and staffing in recognition of the need to accelerate this program. Through modeling, condition assessments and maintenance records, staff have been working towards a comprehensive long term planning strategy while increasing the project output each year. A new influence that is coming to light is the impact of legislated housing supply which will drive us to focus on areas that may not have been a priority in our planning. Increasing our output of projects is at high risk due to a variety of factors as outlined in this report, but one key area is staffing. Currently there are three vacant engineering positions which is limiting our capacity for undertaking more projects. Staff are committed to completing and presenting a 5-year Capital Plan and a Long-Term Capital Plan along with our annual project list. These will involve working with Finance to show

funding sources. Staff have been, and will continue to develop standards, templates and procedures to simplify and streamline our planning and construction processes.

Overall, staff are making progress on defining and developing both the maintenance and capital programs. We are committed to keeping Council informed of our progress, challenges and needs to provide strong programs in the most efficient ways possible.

Appendix A: Risk Analysis Framework

A risk analysis framework was developed by Staff to communicate risks within this State of the Infrastructure Report.

Risk Score/Level	Description
Critical (20 to 25)	Imminent danger to health, safety, operations, or environment or potential for severe impact on property. Immediate action required.
Very High (12 to 19)	Significant/very high risk to health, safety, operations, or environment or potential for substantial impact on property. Urgent action needed to mitigate risk.
High (10 to 12)	High risk to health, safety, operations, or environment or potential for substantial impact on property. Urgent action needed to mitigate risk.
Moderate (4 to 9)	Moderate risk to health, safety, operations, or environment or potential for impact on property. Requires attention and timely mitigation measures.
Low (1 to 3)	Low risk to health, safety, operations, or environment or minimal impact on property. Monitoring recommended.

Risk Analysis		Consequence				
		1 (Negligible)	2 (Marginal)	3 (Moderate)	4 (Major)	5 (Severe)
Likelihood	5 (Most Likely to happen)	Moderate 5	High 10	Very High 15	Critical 20	Critical 25
	4 (Very likely)	Moderate 4	Moderate 8	High 12	Very High 16	Critical 20
	3 (Possible)	Low 3	Moderate 6	Moderate 9	High 12	Very High 15
	2 (Remote)	Low 2	Moderate 4	Moderate 6	Moderate 8	High 10
	1 (Improbable)	Low 1	Low 2	Low 3	Moderate 4	Moderate 5

Risk = Consequence x Likelihood