City of Calgary Infrastructure Review

Final Report

May 6, 2025

EY

**Shape the future
with confidence**

May 6, 2025

City of Calgary
800 Macleod Trail SE,
Calgary AB T2G 2M3

Dear Corrie Smillie,

We have completed our Final Report to conduct a review of the Corporate Asset Management Plan (CAMP) and Asset Management Policy (AM Policy), specifically focusing on asset management documentation, practices, and processes, as well as the identification of critical infrastructure, decision-making processes, and investment prioritization. This Final Report outlines the findings of the review. It includes tasks completed to May 8, 2025. We have completed the Final Report as per our engagement agreement/program plan. Our services May 8, 2025, were performed in accordance with our engagement agreement, dated January 27, 2025, and our procedures were limited to those described in that agreement, and any subsequent written and agreed changes.

The procedures summarized in our Final Report do not constitute an audit, a review or other form of assurance in accordance with any generally accepted auditing, review, or other assurance standards, and accordingly we do not express any form of assurance.

Consistent with our engagement agreement, the Final Report is intended solely for the information and use of The City of Calgary and is not intended to be and should not be used by anyone other than these specified parties.

We appreciate the cooperation and assistance provided to us during our work. We would be grateful if you would indicate your acceptance of the Final Report below. If you have any questions, please call Shane Thompson at +1 587 582 1623.

Sincerely,

Shane Thompson, P.Eng., CEM, MBA
Partner, EY Canada
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EY

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1. Executive Summary

1.1 Background and Objectives

The City of Calgary ("City") retained Ernst & Young (EY) to review its Asset Management Program after recognizing the need for an independent review of its Corporate Asset Management Plan (CAMP) and Asset Management Policy (AM Policy). The Scope of EY's review aimed to assess asset management documentation, practices, and processes, focusing on the identification of critical infrastructure, decision-making processes, and investment prioritization. The primary objective was to evaluate current methodologies for identifying critical infrastructure and the decision-making processes for asset reinvestment, ultimately providing actionable insights and opportunities for improvement.

1.2 Project Approach

Our approach involved an examination of relevant documentation and materials, complemented by twenty stakeholder interviews with participants from various departments and levels of the organization, including Administration, the Executive Leadership Team (ELT), and City Council. We employed a four-step methodology consisting of (1) initiation and discovery, (2) stakeholder interviews, (3) gap analysis and insights, and (4) findings and recommendations, leveraging our proprietary asset management excellence model adapted from the international standards of asset management (ISO 55001) and the Institute of Asset Management's (IAM) frameworks. This holistic approach allowed us to gather insights into current asset management practices, particularly regarding critical infrastructure identification and reinvestment processes.

1.3 Summary of Key Findings and Recommendations

The review yielded several key findings. Firstly, the City of Calgary has a well-established Asset Management Program, with varying levels of maturity across the organization, and a reasonable understanding of defined roles and responsibilities, considering the somewhat recent organizational realignment (2021). EY identified opportunities for improved collaboration and further clarification of roles and responsibilities across the City of Calgary's service lines. Additionally, the current asset management documentation, while detailed, could benefit further if it were consistently adopted across administration, as well as a more integrated reporting and documentation system. Furthermore, the integration of climate and sustainability considerations into asset management processes could be enhanced to support City of Calgary's ambition to be a leading municipality for resilient asset management.

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Based on the documents and information reviewed, the following proposed actions are provided for consideration:

Alignment of Strategic Priorities Within Administration, Council, and Community
Enhance collaboration across service lines and clarify roles and responsibilities to align with community needs and strategic goals, acknowledging asset management as 'the coordinated activities of an organization to realize value from assets' as defined by ISO 55000.

Build upon Customer Levels of Service (LoS) Performance Metrics
Further develop standardized metrics to better understand community expectations, prioritize investment both within and across service lines, and enhance service delivery.

Establish a Consistent Criticality Criteria Framework
Develop a standardized criticality assessment framework to improve the identification of critical infrastructure and inform prioritization of budget allocation decisions.

Enhance Integrated Reporting to Optimize Asset Information and Data
Create an enhanced, integrated asset data, information and reporting system to improve data-driven decision-making.

Improve Integration of Corporate Finance into the Asset Management System
More timely and integrated approach to investment needs identification and prioritization to allow for improved forecasting of capital, maintenance, and operating budgets including City resource implications and requirements.

Implement Criticality Analysis for Budget Allocation
Incorporate asset criticality into the budget allocation process to prioritize funding for high-critical assets, increasing resource use and maximizing return on investment.

Enhance the AM Policy and Overall Framework
Revise the AM Policy to improve stakeholder awareness for the asset management framework aimed at promoting cross-functional collaboration.

Improve Integration of Climate Change and Sustainability Considerations
Embed climate risk assessments and sustainability criteria earlier in the asset management system to enhance resilience.

Increase Investment in Training and Capacity Building
Implement a training strategy with competency assessments, tailored programs, mentorship, and feedback to enhance asset management and improve organizational effectiveness.

Enhance Enterprise Risk Management (ERM)
Refine the central risk register by incorporating a dual-focus framework for evaluating likelihood and consequence, enhancing risk communication and informed decision making.

Our recommendations aim to build upon the City of Calgary's well established asset management practices, ultimately leading to improved service delivery, enhanced public trust, and a more sustainable approach to managing municipal assets and services. The implementation of these recommendations will require careful planning, governance, stakeholder engagement, and continuous review and improvement to ensure alignment with the City's strategic objectives and community needs.

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2. Introduction

2.1 Project Objectives and Scope

2.1.1 Project Background and Rationale for This Review

The City of Calgary Audit Committee identified the need for an independent review of its Corporate Asset Management Plan (CAMP) and Asset Management Policy (AM Policy). This review focused on asset management documentation, practices, and processes, as well as the identification of critical infrastructure, decision-making processes, and investment prioritization.

This report presents the final findings of the review, including a thorough assessment of the CAMP, AM Policy, and related asset management documentation. It is intended for outlining the approach for identifying critical infrastructure and the decision-making process related to asset reinvestment. Notable insights and opportunities for improvement were identified.

2.1.2 Key Objectives

The key objective of this review is to assess the current methodologies for identifying critical infrastructure and the decision-making processes for asset re-investment, providing notable insights and actionable opportunities for improvement.

2.1.3 Methodology

We employed an analytical approach to review asset management practices at the City of Calgary, focusing on the CAMP and the AM Policy, but also examining other relevant documentation and materials, as well as conducting stakeholder interviews. We leveraged our proprietary asset management excellence model, adapted from ISO 55001 and the IAM Conceptual Asset Management Model, along with insights from EY's Global Government and Infrastructure team, to identify any potential opportunities for consideration within the documentation, frameworks, systems, and processes.

Figure 1: IAM's Conceptual Asset Management Framework & EY's Asset Operational Excellence Model
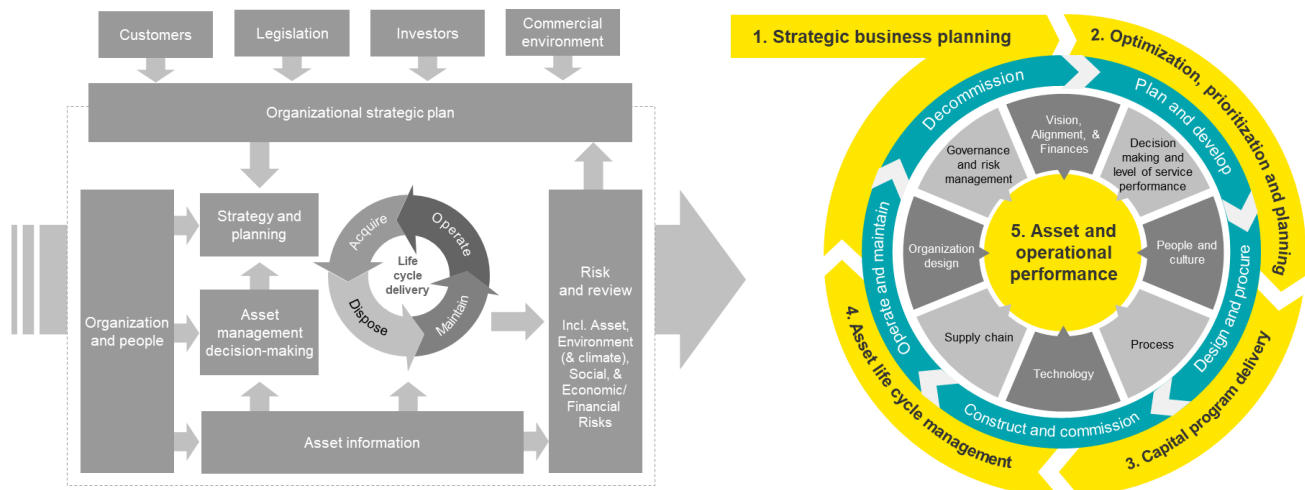
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This holistic approach focused on collating insights into current asset management practices, particularly with respect to critical infrastructure identification and investment identification and prioritization processes. This also included review of the risk management process and understanding of risks and responsibilities leveraging EY's Asset Management Risks and Responsibilities Hierarchy.

Figure 2: EY's Asset Management Risks and Responsibilities Hierarchy

Risks		Responsibilities
Corporate risk	Corporate organization management	Supporting organisational objectives
Investment risk	Asset portfolio management	Portfolio ROI, compliance and sustainability
Management risk	Asset systems/network management	System control, cost and risk control
Asset and service risk	Individual asset management: Managing assets over their lifecycle	Asset efficiency and effectiveness

2.1.4 Approach and Timelines

The approach involved a review of relevant documentation and information, complemented by twenty interviews with participants from Administration, ELT, and Council. This review followed a four-step process: initiation and discovery, stakeholder interviews, gap analysis and insights, and findings and recommendations, which are detailed below.

Figure 3: Timeline and Approach

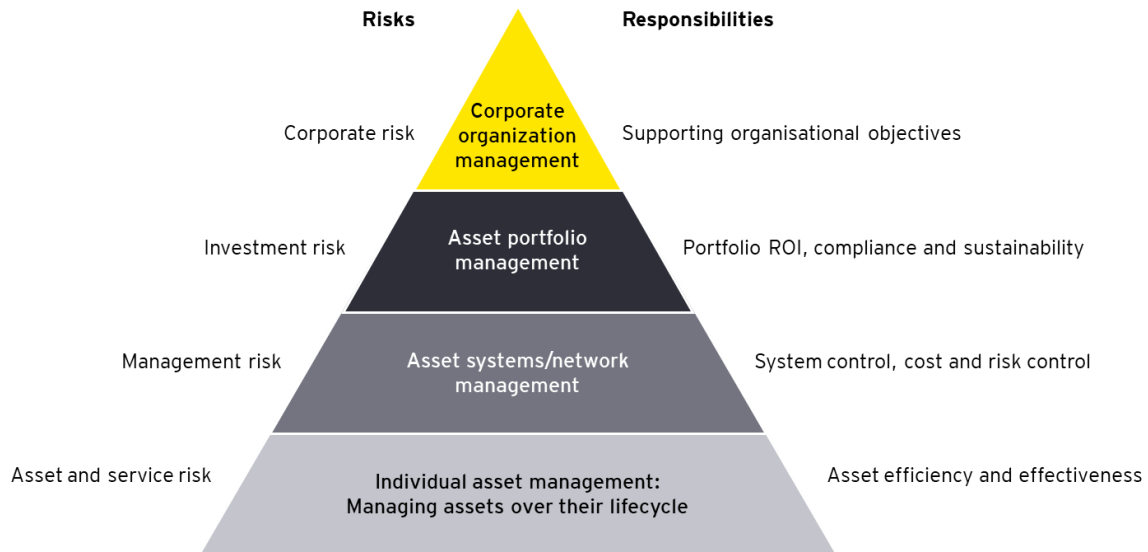|	Step 1: Initiation and discovery	Step 2: Stakeholder interviews	Step 3: Gap analysis & insights	Step 4: Findings & recommendations
Duration	5 weeks	5 weeks	5 weeks	4 weeks
Task	Project alignment and review of relevant documentation, benchmarked against industry best practices.	Confidential stakeholder interviews to understand the current state, risks and opportunities.	Analyze methodology evolution since the 2020 Infrastructure Status Report and conduct gap analyses.	Finalize findings and recommendations.
Details	Review corporate organizational structure, roles & responsibilities, asset management processes, investment & budget planning, decision-making framework, and other applicable documentation.	Interview discussions to follow ISO55001 AMS requirements to identify potential risks and opportunities with respect to asset and service delivery, critical infrastructure and risks, and level of service performance.	Gap assessment against ISO55001, document review and interviews will identify enhancement recommendations for consideration.	Gap assessment, insights, and recommendations will be documented in a prioritized road map for implementation consideration.

2.1.5 Exclusions and Limitations

Exclusions include, but may not be limited to:

- An in-depth financial analysis of current asset management expenditures or a comprehensive audit of financial records related to asset management.
- Conducting additional assessments of asset conditions, only relying on information and documentation provided by the City.
- Comprehensive implementation of recommendations. While this report provides actionable recommendations, the focus is solely on assessment and recommendations.
- A formal audit of compliance with all relevant regulations and standards.

Limitations include, but may not be limited to:

- Data and documentation provided by the City may include data gaps or inconsistencies which may affect the accuracy of the assessment.
- Insights gathered from stakeholder interview participants, which may not fully represent the perspectives of all City of Calgary stakeholders.
- Current asset management practices at the time of review. The desired future state will need to be agreed upon internally at the City, as changes in organizational structure, priorities, other initiatives, or external factors may influence relevance over time.
- Recommendations and insights may not be directly applicable to other municipalities or organizations due to differing contexts, structures, and asset management frameworks.

2.2 Document Review

We requested documentation from the City of Calgary to understand the current state of asset management practices and processes, with a particular emphasis on municipally mandated critical infrastructure identification and reinvestment. The City has developed an asset management framework (Figure below), aligned to ISO 55001, and includes a number of documents that supports the framework.

Our review encompassed the CAMP, AM Policy, service line-specific Asset Management Plans (AMPs), critical infrastructure documentation, and prioritization process documentation, among others, to gain additional context (see Appendix A for a detailed breakdown of the reviewed documents).

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2.2.1 Stakeholder Interviews

This engagement aimed to understand the current asset management processes and practices across the organization. Over five weeks, we conducted twenty interviews (notes were recorded anonymously) to develop insights and trends into the asset management system. The interview questions were developed aligned to ISO 55000 set of standards and aimed to gather information on the following topics (see Appendix B for detailed interview questions):

1 Introduction

Understanding individual roles and responsibilities, team interactions with asset management activities, and primary contacts during role execution.

2 Context of the Organization

Overview of the City's vision for asset management and service delivery, including alignment with specific service line approaches.

3 Stakeholder Needs and Expectations

Exploring the integration of stakeholder needs into asset management, service delivery, and the incorporation of performance criteria in management approaches.

4 Scope of Asset Management

Understanding the use and reference of key documents, asset lifecycle support, criticality assessment, decision-making frameworks, and investment prioritization processes.

5 Leadership

Examining the designation of asset management champions, communication standards, leadership messaging, policy reinforcement, and clarity of roles and responsibilities within the organization.

6 Support and Planning

Assessing resource adequacy, competency, information needs, standardization, and risk management.

7 Performance Evaluation

Evaluating the effectiveness of asset management, continual performance, and the consideration of predictive actions.

This approach provided a holistic view of the organization and valuable insights into current practices, particularly regarding critical infrastructure identification and reinvestment processes.

2.2.2 Stakeholder Interviewee Selection Criteria

After developing our stakeholder interview approach, we collaborated with the Audit Committee to select a representative sample of interview participants from various departments. This included individuals with diverse roles and responsibilities at different levels within the organization, allowing us to better understand current asset management processes and practices. The table below summarizes the departments represented during the stakeholder interview phase.

Figure 4: City of Calgary Asset Management Framework
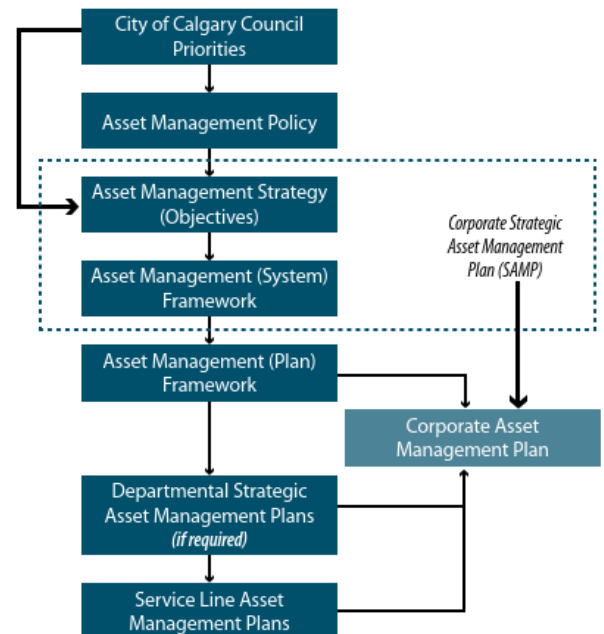
Table 1: Summary of Interviewed Departments

Department
City Council
Executive Leadership Team
Corporate Planning and Financial Services
Infrastructure Services
Operational Services including: ▪ Water Services ▪ Calgary Transit ▪ Mobility ▪ Facility Management
Planning and Developmental Services

3. Interview Insights and Observations

Through our series of twenty stakeholder interviews with participants from City Council, ELT, Corporate Planning and Financial Services, Infrastructure Services, Operational Services, and Planning and Developmental Services, we have gathered and synthesized key insights aligned with our interview topics as described below.

3.1 Interview Insights

3.1.1 Introduction

Understanding individual roles and responsibilities, team interactions with asset management activities, and primary contacts during role execution.

Relevant Insights:

The re-organization that took place in 2021 led to the creation of new roles and the reassignment of existing roles to new departments across the organization. Our interviews found that the City has made significant progress in defining roles and responsibilities, and that most departments have a reasonable understanding of the interrelationships and functions across administration.

Additionally, the development of a matrix organization has supported improved communication and collaboration across different departments, business units, and services. This structure has enhanced interactions and teamwork within the organization, and additional opportunities exist for further growth and improvement. Some areas will continue to evolve, with additional change management activities seen as beneficial to further improve collaboration and alignment across Administration. The value of these enhancements will help support a more cohesive and integrated approach to achieving the City's mission and goals.

3.1.2 Context of the Organization

Overview of the City's vision for asset management and service delivery, including alignment with specific service line approaches.

Relevant Insights:

The City's vision for asset management and service delivery was a frequent raised topic during our interviews and is outlined in key documents such as long-term service line plans. Most interview participants acknowledged the presence of strategic plans and priorities. They also recognized the potential for better alignment between service line teams and broader initiatives, which could elevate visibility across service lines.

Optimizing and improving the communication of strategic priorities and information from Administration to the ELT, Council, and the community, was highlighted as a valuable opportunity. There is a wealth of data and information available to support strategic priorities and decision-making. By refining the timeliness, information, and method of communication, the impact of these insights could be significantly enhanced.

3.1.3 Stakeholder Needs and Expectations

Exploring the integration of stakeholder needs into asset management, service delivery, and the incorporation of performance criteria in management approaches.

Relevant Insights:

Our interviews identified that there is consistent acknowledgment of the importance of understanding and meeting the needs and expectations of both customers and Council. This includes addressing concerns related to levels of service, prioritizing asset maintenance, and investment strategies. Many interview participants highlighted the potential for improving communication and transparency with the public. Enhancing the reporting of information to the ELT and Council can also unlock new avenues for growth.

Furthermore, our interviews revealed opportunities to bridge gaps in customer levels of service and meeting customer expectations, with an emphasis on technical levels of service rather than customer-focused metrics. By shifting focus to more customer-centric metrics, we can achieve a balanced approach that considers both technical and public needs. Better communication of risks and associated impacts was acknowledged, especially when discussing reducing levels of investment and the subsequent implications on long-term levels of service.

To improve decision-making, interview participants stressed the importance of timely and accurate data. Enhanced communication regarding investment priorities, clearer reporting of risks, and a more integrated approach to aligning customer expectations with technical service levels were identified as areas of opportunity to significantly support decision makers. Increased transparency and reporting to the ELT and Council are steps that can significantly enhance informed decision-making. Embracing these opportunities sets the stage for a more proactive and responsive management approach.

3.1.4 Scope of Asset Management

Understanding the use and reference of key documents, asset lifecycle support, criticality assessment, decision-making frameworks, and investment prioritization processes.

Relevant Insights:

The current asset management documentation within the organization includes significant detail and is generally seen as beneficial to Administration. The interview participants revealed varying levels of familiarity with the asset management framework, and documents such as the AM Policy, CAMP, and Infrastructure Status Report (ISR). These documents undergo periodic revisions, ensuring they remain relevant and useful, although the timing is not always consistent. Most service lines conduct asset condition assessments, which are vital for maintaining infrastructure. However, there are still opportunities to fill in data gaps and enhance the comprehensiveness of these assessments.

With respect to critical infrastructure identification, the current approach primarily focuses on asset condition, rather than a combination of multiple criteria. There is an opportunity to incorporate additional assessment criteria, such as level of service requirements, single point of failure, asset condition, and service criticality. The investment prioritization process considers several criteria and appears to take a holistic approach to capital prioritization. This process is currently being updated, presenting a chance to refine and improve it further.

From a financial standpoint, it was noted that involving Finance more closely in the capital investment process could strengthen the connection between capital growth and the necessary operating budgets. By improving the quality and timeliness of information submitted to Finance, decision-makers can be better supported in aligning investments with best practices.

The budget process, which starts over a year before submission, is seen as time-intensive, often diverting resources from daily responsibilities. Streamlining this process, clarifying expected budgets, and utilizing data from previous cycles more effectively could create significant opportunities for efficiency and improved outcomes.

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3.1.5 Leadership

Examining the designation of asset management champions, communication standards, leadership messaging, policy reinforcement, and clarity of roles and responsibilities within the organization.

Relevant Insights:

Leadership is centred on establishing trust within the organization and ensuring that the work performed aligns with the City's overall strategic priorities. This includes promoting collaboration among departments, addressing challenges, and strengthening relationships. The significance of strategic planning and aligning efforts with the City's priorities was emphasized. Additionally, it was recognized that there is an opportunity to enhance relationships across the Administration, improving alignment and clarity of roles and responsibilities. Some areas of ambiguity remain regarding asset ownership responsibilities, where certain assets and services overlap.

3.1.6 Support and Planning

Assessing resource adequacy, competency, information needs, standardization, and risk management.

Relevant Insights:

Given the recent reorganization and realignment, the reallocation of roles within the organization has brought about varying levels of expertise within service lines, aligned to specific assets and services. While this is expected in such a large-scale change, it presents an opportunity to foster cross-service capacity across the Administration. As previously highlighted, several service lines have developed more mature processes than others, indicating a chance to boost collaboration and consistency in sharing best asset management practices throughout the organization. Promising efforts have begun to heighten this consistency across all service lines in data collection, management, analytics, software, and tools. Further standardizing and aligning data strategies presents a significant opportunity to elevate efficiency throughout the asset management process, maximizing the potential for streamlined operations and improved outcomes.

3.1.7 Performance Evaluation

Evaluating the effectiveness of asset management, continual performance, and the consideration of predictive actions.

Relevant Insights:

Our evaluation found that the City of Calgary has good practices in asset management but also identified areas for improvement. Currently, each service line monitors and reports on its own KPIs and metrics. While technical levels of service appear to be well-developed, there is an opportunity to enhance and develop customer levels of service to better meet customer expectations and provide better evaluation of levels of service across all service lines. This would potentially improve investment prioritization by evaluating all services lines against a somewhat common criteria, thereby enhancing the understanding of service performance which would then identify where the focus for investment should occur.

Benchmarking against other Canadian municipalities is already underway, and expanding these efforts consistently across the organization could result in valuable insights. Additionally, while lookbacks and lessons learned are performed in some areas, increasing the frequency of these activities could further enrich the organization's knowledge base. Establishing formal capacity-building initiatives and sharing best practices, as highlighted by interview participants, would be a significant step forward, fostering a culture of continuous improvement and collaboration within the Administration.

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3.2 Current Assessment

3.2.1 Key Strengths

Our review found that the City of Calgary possesses several important strengths in its asset management practices, which have played a notable role in the City's success in achieving effective and efficient asset management maturity.

1 ● Comprehensive Monitoring and Reporting

Each service line within the City of Calgary diligently monitors and reports on its Key Performance Indicators (KPIs) and metrics. This well-established framework ensures a high level of transparency and accountability in asset management processes. The technical levels of service are especially well-developed, laying a strong foundation for evaluating asset performance.

2 ● Mature Technical Processes

Several service lines have developed mature processes that are consistent and aligned with leading practices. This maturity in technical processes ensures reliability and efficiency in the City's asset management practices, which in turn supports better decision-making and resource allocation.

3 ● Standardization Efforts

The City of Calgary is actively working on standardizing data collection, management, analytics, software, and tools across all service lines. These standardization efforts are vital for enhancing the efficiency and effectiveness of asset management processes, leading to a more cohesive and streamlined approach.

4 ● Benchmarking and Continuous Improvement

The City of Calgary benchmarks its practices against other Canadian municipalities. While there is room for improvement in consistency, the existing benchmarking efforts provide valuable insights into the City's performance relative to its peers. The City also conducts lookbacks and lessons learned exercises, though ad-hoc, to gain insights and drive continuous improvement in asset management practices.

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5 Commitment to Enhancing Consistency

The City of Calgary is committed to enhancing the consistency of asset management processes across the organization. This commitment reflects a proactive approach to addressing disparities and ensuring a uniform standard of practice across all service lines.

6 Strategic Investment Prioritization

The City of Calgary recognizes the importance of developing customer levels of service to better meet customer expectations and improve investment prioritization. By evaluating service lines against a common criterion, the City can identify areas that require focused investment, optimizing resource allocation and improving service delivery.

7 Recognition of Best Practice and Capacity Building

The City relaunched an internal Asset Management Course last fall, along with the Asset Management Community of Practice Event, to build asset management capacity and share best practices throughout the city. These initiatives lay the groundwork for future efforts aimed at fostering a culture of excellence and innovation in asset management. The City views these initiatives as a valuable foundation and an opportunity to further enhance asset management practices.

In summary, EY's review found that the City of Calgary's asset management practices are marked by comprehensive monitoring and reporting, mature technical processes, ongoing commitments and activities towards consistency and continuous improvement, strategic investment prioritization, and a recognition of the importance of best practices and capacity building. These strengths have collectively contributed to the City's ability to effectively manage its assets and deliver high-quality services to its residents. The identified key strengths also indicate the City of Calgary's preparedness, willingness, and investment for implementing further improvements.

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3.2.2 Maturity Assessment Scale

Each item was reviewed and rated against the Institute of Asset Management's Maturity Scale for Asset Management, from levels of Innocent to Excellence based on a comparative review of leading practices. A rating will indicate where the City of Calgary ranks for each document or process reviewed (Documentation), alongside a secondary rating measuring Implementation. This scale used is described below:

Table 2: Maturity Scale

|	Category	Documentation	Implementation
Maturity Level	**0 – Innocent**	No formal documentation or processes exist.	There is no evidence of a commitment recognizing the need for formal documentation or processes.
	1 – Aware	No formal documentation, processes are not defined or written down, but there is an identification of the need for it.	There is an identification of the need for defined formal processes. Asset management practices are ad-hoc and lack consistency.
	2 – Developing	Documentation is in place and processes are somewhat defined. Processes are defined but may lack detail or consistency.	Some awareness of key documentation and formal processes exists, but implementation is limited.
	3 – Competent	Documentation is in place. Processes are defined with base level systemic and consistent alignment with ISO 55000 requirements.	Some awareness of key documentation and formal processes exists, but implementation is inconsistently applied across the organization.
	4 – Optimizing	Comprehensive documentation, including formal process documentation. Documentation may indicate minimal inconsistencies. Regular reviews and updates occur.	Practices are consistently applied across the organization, with regular reviews and updates. Training and awareness programs are in place. Asset Management practices are aligned with the City of Calgary's objectives and operating context.
	5 – Excellence	Documentation and formal processes exceed ISO 5500 standards, with comprehensive frameworks in place demonstrating leading practices and maximum value from asset management.	Collaboration across departments is maintained, and best practices are actively shared and aligned with the City of Calgary's objectives and operating context. Continuous improvement is embedded in the culture with regular benchmarking against industry standards.

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3.2.3 Current State Maturity Rating

Overall, the Maturity assessment indicates that the City of Calgary is in the Competent to Optimizing stages across both Documentation and Implementation knowledge areas with an average Documentation score of 3.4/5 and an average Implementation score of 2.6/5.

As a municipality, it is appropriate for the City of Calgary to strive for an Optimizing (Level 4) rating on the IAM Asset Management framework, rather than aiming for the highest level of Excellence (Level 5). Achieving an Optimizing rating signifies that the municipality has established comprehensive asset management practices that are consistently applied and regularly reviewed, allowing for continuous improvement and adaptation to changing circumstances. According to the IAM, "an Optimizing organization demonstrates a commitment to continual improvement and the ability to adapt to new challenges, while still recognizing that perfection is not always attainable or necessary" [1]. This perspective emphasizes the importance of practical, sustainable progress in asset management, while aligning with the realities and resource constraints often faced by municipalities such as the City of Calgary.

Figure 5: Current State Maturity Rating

Current State Maturity Rating
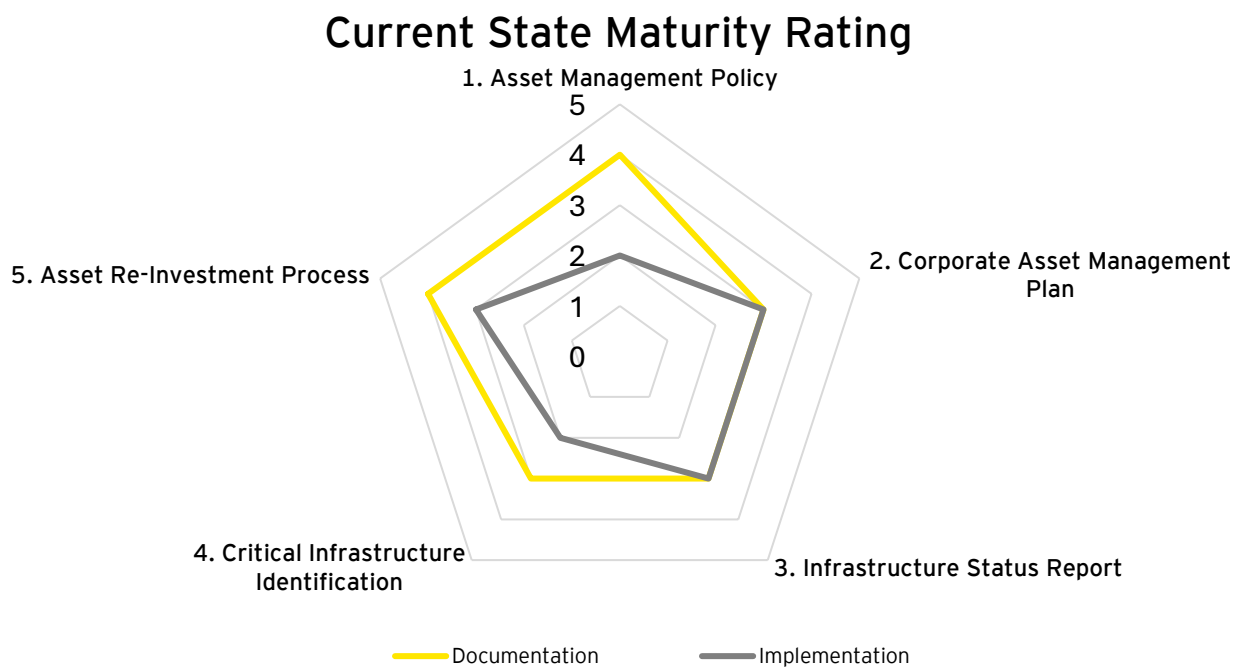
Maturity Scale

0 Innocent	1 Aware	2 Developing	3 Competent	4 Optimizing	5 Excellence

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3.3 Detailed Observations and Gap Analysis

The documents and processes have been reviewed and detailed using the following structure, with each review item presented in individual sections by function (Sect. 4-8).

Title & Summary
Provides information about the item reviewed; if it is a document, it includes details such as the document owner, distribution, intent, and latest revision, and it summarizes the document or process reviewed

Implications
Possible consequences of a given finding within the insights displayed above.

Maturity Rating
Each item reviewed is rated against the Institute of Asset Management's Maturity Scale for Asset Management, from levels of Innocent to Excellence based on a review of leading practices. A rating will indicate where the City ranks for each document or process reviewed.

Supporting Insights
Key information discovered via document review and stakeholder interviews

Leading Practices
Provides details from case examples seen in the public and private sector. Illustrates organizations who have done the element well, and how they did it.

4. Review of the Asset Management Policy (AM Policy) and Corporate Asset Management Plan (CAMP)

4.1 Overview of the AM Policy

Document Owner: Asset Management Planning

Distribution: All Administration departments, specifically Infrastructure Services and Operational Services, ELT, and Council

Intent: Provide AM Policy requirements that must be adhered

Revision: 2024 (Subject to review every four years)

Summary: The AM Policy, approved by ELT, establishes a comprehensive framework for managing the City's infrastructure assets. Its primary purpose is to set the principles and guidelines for City departments to effectively manage and maintain their assets, ultimately enhancing efficiency, resilience, risk management, compliance, sustainability, and stewardship. The policy emphasizes the importance of providing safe and inclusive neighbourhoods and advocates for continuous improvement in alignment with Council priorities. The AM Policy aligns with ISO 55001 standards, encouraging a holistic lifecycle perspective that integrates planning, acquisition, operation, maintenance, renewal, and disposal of assets. It mandates adherence from all City employees, including those in the Calgary Police Service, with non-compliance potentially resulting in corrective actions. Additionally, the policy delineates roles and responsibilities across the organization, underscoring the collaborative effort required to sustain effective asset management practices.

4.1.1 Observations for Consideration

Documentation score: 4/5

Implementation score: 2/5

Supporting Insights
▪ The AM Policy outlines the consequences of non-conformance in Section 7; however, specific consequences are not defined. During interviews, several participants expressed unawareness regarding the implications of non-conformance and indicated no knowledge of previous non-conformance issues.   ▪ The AM Policy has been updated in 2010, 2016, and 2024. While the AM Policy is currently under review and update, it does not specify the required frequency of these reviews within the document.   ▪ The Executive Leadership Team (ELT) has endorsed the AM Policy, and roles and responsibilities are clearly outlined within the document. The Policy emphasizes cross-functional collaboration and seamless information sharing. Some service lines collaborate effectively with other service lines and business units, while others exhibit limited collaboration. Greater sharing of information and data would enhance asset management practices and consistency across the organization and increase alignment with ISO 55000 regarding data and information sharing.   ▪ The AM Policy adheres to ISO 55000 standards as it outlines the purpose, objectives, and commitment to continuous improvement, and aligns with other organizational policies. However, gaps in communication to stakeholders have been identified. Several stakeholders mentioned

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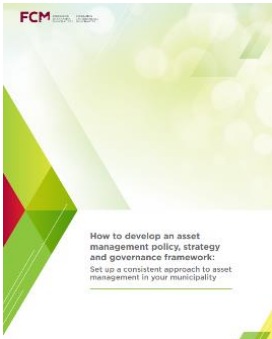
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they were unaware of the Policy and were unfamiliar with the terminology, roles, and responsibilities outlined within the document, such as "Asset Stewards."	

Implications

- Limited awareness of the Policy may result in inconsistent application and understanding among stakeholders, potentially leading to non-compliance with established guidelines and responsibilities.
- Missing a formal review cycle may result in outdated policies that do not reflect current industry standards, such as ISO 55000, or the evolving needs of the organization and community.
- Reinforcing the significance of the Asset Management Policy and the consequence of non-compliance is essential to ensure consistent practices across the organization and maintain compliance.

Leading Practice Examples

Consequences of Non-Compliance

City of Brampton has outlined the consequences of non-compliance with its Strategic Asset Management Policy to ensure staff understand the potential implications. These consequences include:

- Ineligibility for ongoing and future Provincial/Federal grants.
- Risks associated with investing in safe and reliable infrastructure.
- Conflicting investment priorities.
- Capital plans that do not align with identified asset management needs [1].

Communication

The City of Windsor developed a one-page document outlining the key contents of the AM Policy to communicate efficiently with stakeholders. This document is readily accessible on the City's website, ensuring that all interested parties can easily find and understand the essential elements of the policy [2].

4.2 Overview of the CAMP

Document Owner: Asset Management Planning.

Distribution: All Administration departments, specifically Infrastructure Services and Operational Services, ELT, and Council, and made publicly available.

Intent: Provide asset management guiding principles.

Revision: 2022 (Published every four years)

Summary: The 2022 CAMP serves as a guiding document that consolidates asset management information across City of Calgary service lines and is well aligned to the ISO AM standards. Its primary purpose is to provide AM guidance relating to the current state of

municipal assets, enabling comparisons across service lines, asset conditions, criticality, maintenance and service levels in relation to community needs and strategic priorities.

Utilizing the 2020 ISR, the CAMP evaluates Calgary's infrastructure portfolio, identifying trends in asset health, service performance, and funding needs. It highlights the City's infrastructure funding gap and presents strategies to manage resource limitations, such as prioritizing high-risk infrastructure, adjusting service levels, and exploring alternative funding sources. Additionally, the CAMP provides a framework for comparing the relative condition and criticality of assets across different service areas, helping decision-makers assess where investments will have the greatest impact on service continuity, community well-being, and risk mitigation.

Beyond financial considerations, the CAMP integrates risk management, climate resilience, and long-term sustainability planning into asset management practices. As an evolving document, it ensures that infrastructure decisions remain aligned with Calgary's economic, environmental, and social landscape, while supporting the development of the City's long-range financial plan and future service budgets.

4.2.1 Observations for Consideration

Documentation score: 3/5

Implementation score: 3/5

Supporting Insights
- The CAMP addresses external factors under two service lines. During our interviews, a central risk register containing risks that could potentially affect the City's operations was frequently mentioned. However, our documentation review did not reveal a framework for evaluating external factors that may impact asset management.   - The CAMP acknowledges the role of service owners and the importance of addressing the interests of both the Council and Calgary citizens, however the document does not specifically outline a process for prioritizing these needs.   - The CAMP primarily focuses on technical levels of service, which are internal metrics used to assess the quality and reliability of assets. The CAMP employs a performance rating scale, utilizing colors such as green, yellow, and red, to indicate the performance of each service line. Customer service levels, which are tracked using input from Calgary citizens (the "customers"), are described inconsistently within the document and may not align with customer expectations. This area appears to be a focus for future phases of work, as outlined in the CAMP.   - Throughout stakeholder interviews, it was mentioned that the CAMP was not used a decision-making tool, rather a reporting tool for City wide assets. Where as the ISR is used to assist Council approve the budget before the next four-year budget.   - The CAMP document is updated every 4 years. The document is revised after the ISR, which is described in the next section.
Implications
- Inconsistent risk assessment across service lines may lead to challenges in addressing external threats and opportunities. This inconsistency could also affect resource allocation based on prioritization, impacting overall effectiveness.   - The City could face increased vulnerability to external threats, which may potentially result in operational inefficiencies and higher costs. Additionally, strategic misalignment may occur, potentially hindering the achievement of long-term objectives.

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- Conflicting priorities and expectations may arise, leading to misaligned decision-making. This situation could create difficulties in meeting service level targets and strategic goals.
- There may be a misaligned understanding of overall service performance, as customer expectations are not quantitatively measured and reported. Consequently, the City may not align with customer service expectations, which could lead to potential service gaps and issues with customer trust.

Leading Practice Examples

Annual Updates

The City of London (Ontario) uses its Corporate Asset Management Plan (CAM Plan) to inform the multi-year budgeting process. The CAM Plan undergoes an annual review to reflect changes in local infrastructure, levels of service, budget changes, and to monitor any changes to the 10-year infrastructure gap to inform decision-makers. [3]

Customer Levels of Service

According to Ontario legislation, O. Reg. 588/17, community and technical levels of service metrics for core assets are required. The City of London incorporates both metrics for each service. Each service develops these metrics through standardized customer values across the City, aligning with corporate levels of service objectives and long-term plans. The infrastructure gap is displayed to maintain current levels of service and proposed levels of service. [3]

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5. Review of the Infrastructure Status Report (ISR)

5.1 Overview of the Infrastructure Status Report

Document Owner: Asset Management Planning

Distribution: ELT, City Council, Capital Planning and Business Services, Finance, Service Owners, and made publicly available.

Intent: Serves as a guide for City Council to make informed infrastructure investment decisions ahead of the development of 2023-2026 service plans and budgets.

Revision: 2020 (reviewed and revised each budget cycle, four-year intervals)

Summary: The 2020 ISR serves as a critical reporting and communication document that provides a comprehensive overview of City-owned infrastructure assets. Produced every business cycle, the report is intended to serve as a vital resource for City Council and ELT assess infrastructure investment needs and identify short- and long-term risks. The report serves as a guide for City Council to make informed infrastructure investment decisions ahead of the development of the 2023-2026 service plans and budgets. The ISR also served as a precursor to the 2022 CAMP.

The primary objective of the ISR is to evaluate the state of municipal infrastructure, estimate current replacement values, and identify funding gaps that must be addressed to ensure long-term service delivery. The 2020 report provides an updated inventory of City-owned assets for each service line. It also introduces key developments in asset management, such as aligning infrastructure data with service lines, incorporating natural infrastructure, and integrating energy consumption metrics into asset planning.

By compiling asset information from multiple business units, the ISR supports the development of strategic asset management practices that balance financial constraints, risk management, and service level expectations. It highlights the growing infrastructure funding gap and emphasizes the need for proactive investment strategies to address maintenance, renewal, and expansion needs.

5.2 Observations for Consideration

Documentation score: 3/5

Implementation score: 3/5

Supporting Insights
- The ISR highlights key areas such as the infrastructure gap for the City, the current replacement value (CRV), and the physical condition of each service line's assets.   - The ISR does not necessarily benchmark the changes against the last version of the report to show how the condition of assets are changing overtime.   - The document could measure customer levels of service performance across service lines, including funding gaps and disparities, the growth of assets within a service line, and corresponding resource requirements for maintenance. It could also address decreased funding in certain service lines compared to previous years.   - This additional detail may enhance the understanding of each service line and the corresponding customer levels of service performance. It could help provide the ELT and City Council with additional insights for improved decision-making and better communicate the implications and

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risks of varying levels of investment on short- and long-term levels of service, as well as future capital investment needs (10+ years).

Implications
▪ The level of detail and information within the ISR may result in ELT and Council not fully grasping the risks and impacts on service performance, infrastructure gaps, which may complicate the development of prioritized strategies.

Leading Practice Examples	
	Year over Year Data
	Implementation of a comprehensive asset management framework that includes regular performance benchmarking against previous reports allows municipalities to track changes in asset conditions over time, facilitating informed decision-making regarding maintenance and investment priorities.
	The City of Toronto's asset management framework incorporates historical data analysis to assess infrastructure conditions over time, including impacts of growth, enabling better alignment of funding with current and future service delivery needs. [4]
	Integration of Customer Levels of Service (LoS) Metrics into the ISR
	By measuring and reporting on LoS across various service lines, municipalities can better understand community expectations and the implications of funding gaps. The City of Vancouver incorporates community feedback into their asset management processes, ensuring that infrastructure investments are closely aligned with public needs and priorities. [5]
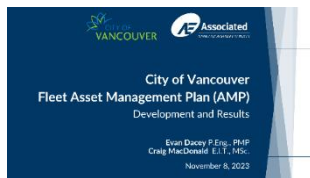
6. Review of Critical Infrastructure Identification

6.1 Current Process for Identifying Critical Infrastructure

Based on the documentation and information reviewed, as well as the interviews conducted, it appears that the current process for identifying critical infrastructure is decentralized. Each service line generally develops its own specific approach to identifying critical assets, leading to variations in asset condition and criticality assessments, which are performed by each service line and monitored by the respective business unit. The Calgary Emergency Management Agency (CEMA) collaborates with these service lines to co-create risk assessments for key local infrastructure across the City. While CEMA provides valuable guidance and risk support, there remains limited cross-service line collaboration, which hinders the standardization of the identification process for critical infrastructure.

Typically, there appears to be two stages in identifying critical infrastructure. The first stage involves performing a criticality assessment of the service line assets. Criticality is generally defined as the relative service risk of an asset, assessed to determine which assets are identified as a priority to minimize service failure. Service lines have their own scales to assess criticality, but as outlined in the CAMP, they typically follow a similar 1 to 5 scale, with 1 being the least critical (no impact on service) and 5 being the most critical (catastrophic impact on service). Service lines then rank their assets on a similar scale to understand asset criticality. While this process is outlined in the CAMP, this was not typically reflected in service line-specific AMPs or other documentation, based on what documentation was provided as part of this review.

The second stage involves assessing the condition of the service line's assets. To understand various asset conditions within a service line, condition assessments are conducted. These assessments are carried out by service line asset management representatives, engineers, or third parties, depending on the service line. The frequency of the condition assessments varies by service line and can be quarterly, bi-annual, annual, or sometimes longer. Asset condition is rated similarly to criticality, following a scale of 1 to 5, with 1 indicating that the asset is in excellent condition and 5 indicating that the asset has severe defects or is in 'Critical Condition.' While this process appears to be more mature in some service lines, other service lines would benefit from additional asset data. This may be in part due to limited budgets and resources with respect to the number of condition assessments, or limited data entry from a previous, historical assessment where the data was not uploaded into the asset management system. As a result, the condition of some assets remain unknown, and the service line assumes the condition of an asset, based on the approximate age of the asset to support adequate maintenance efforts.

Most service lines appear to primarily focus on asset condition to determine asset criticality. Most service line-specific AMPs, or associated documentation, doesn't clearly articulate how criticality assessments are conducted within their service line. It was acknowledged that developing a criticality framework to be adopted within each service line, that provides some flexibility to consider service line-specific nuances, would improve alignment and identification of what assets and services are critical to the City. A list of critical assets by service line, or a City-wide criticality assessment, was not provided.

The CAMP provides guidance for condition and criticality scores to be multiplied together to produce a risk rating on a scale from 1 to 25. Criticality and condition profiles are used to monitor and manage risk effectively. Assets with a high criticality ranking are maintained in better condition, while assets with very low or low criticality may be allowed to deteriorate to a lower condition grade.

While the CAMP provides guidance for these calculations, we did not observe service line-specific scales to rank both condition and criticality. It was noted that service line-specific metrics measure asset condition over time and are adjusted based on asset condition assessments when they are conducted.

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6.2 Observations for Consideration

Documentation score: 3/5

Implementation score: 2/5

Supporting Insights
- Each service line appears to have their own process for identifying critical infrastructure, conducting asset condition assessments, risk management, and developing asset management strategic priorities.   - Due to budget and resource constraints, several service lines indicated some limitations with respect to data required to better support asset management practices. Some service lines are not as advanced in their asset-related data and do not have complete asset condition data across their asset portfolio. While this situation is not uncommon, there is an opportunity to improve asset data to help improve identification of critical infrastructure and investment prioritization.

Implications
- Limited alignment across service lines may create inconsistencies in the identification of critical infrastructure process and asset management processes.   - Varying levels of data availability, management, and analytics of may result in funding allocation inefficiencies based on asset data assumptions.

Leading Practice Examples
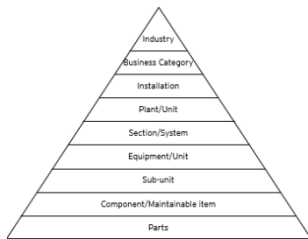
Factor	Low (1-3)	Medium (4-7)	High (8-10)
Safety Risk	Minor impact	Some risk	Severe risk
Production Impact	Minimal	Moderate	Major loss
Cost Impact	Low	Medium	High
Regulatory Concern	Compliant	Some risk	Non-compliance

Defined Criticality Criteria Across the Organization

According to the University of New Mexico Albuquerque, Organizations should implement a hierarchical asset inventory system that enhances asset management beyond traditional financial frameworks. Maintenance management systems, aligned with international standards for the collection and exchange of reliability and maintenance data (ISO 14224), provide detailed asset registries, including type, function, location, and maintenance history.

A multi-criteria scoring framework should evaluate asset criticality, considering safety, operational impact, financial implications, and regulatory risks. High-criticality assets require predictive maintenance, while medium and low-criticality assets may utilize condition-based or preventive strategies. Regular reviews of criticality scores are essential to adapt to changes in asset conditions and external factors, such as community needs and environmental regulations.

Organizations should create a prioritization framework or risk response plan based on criticality scores, identifying risk tolerance levels and effective mitigation options. GIS can help visualize high-concentration areas of critical assets, facilitating stakeholder discussions. Establishing a threshold criticality score can guide funding decisions for inspections and repairs. [6]

7. Review of Asset Re-Investment Decision Making Process

7.1 Current Process for Prioritizing Asset Re-Investment

The current asset re-investment process appears to be a fairly structured approach and involves multiple steps to help ensure that investments align with community and Council priorities, and strategic goals. The following section outlines the process as informed by reviewed documentation and stakeholder interviews:

The budget creation process typically begins more than a year before the start of the next 4-year budget cycle. Each of the 61 service lines initiate the process by identifying their specific needs and forecasting operating and capital budgets. This development is informed by:

- Discussions within their respective service line
- Reviewing asset condition assessments
- Analyzing service demand and growth
- Utilizing technical levels of service
- Conducting customer engagement surveys to assist needs identification

Following the budget development, each service line submits its budget request through an established intake framework. This request is then reviewed and prioritized by the Capital Planning and Business Services business unit.

A steering committee comprised of representatives from various service lines and departments, assesses the prioritization criteria in collaboration with the Capital Planning and Business Services department. These criteria are established and weighted to ensure alignment with City priorities and capital investment drivers. The framework categorizes projects according to their necessity, impact, and alignment with strategic goals. The following categories are used to assess and prioritize investments:

1 **Required**

   Investments are prioritized based on their necessity to fulfill legal obligations from provincial or federal legislation, compliance with environmental protection regulations, and adherence to agreements and contracts for future cycles. Additionally, these investments must meet health and safety standards.

2 **Reduces Risk**

   Investments that reduce risk focus on critical assets essential for preventing service disruptions. These investments should be completed or substantially completed within the four-year business cycle, ensuring that they meet minimum levels of service and comply with legal, health, and safety standards.

3 **Economic Resilience**

   Economic resilience is enhanced through investments that stimulate job creation and economic growth. Projects that support sustainable economic diversification and attract and retain investment and talent are prioritized. Furthermore, enhancements that contribute to an increase in gross domestic product (GDP) are also considered.

4 Social Resilience

Social resilience is fostered by initiatives that promote equitable outcomes for all community members. Investments that remove barriers for underserved groups and advance truth and reconciliation with Indigenous Peoples are prioritized. Additionally, projects that improve community participation and access to services are essential.

5 Climate and Environment

Investments aimed at addressing climate and environmental concerns are prioritized based on their potential to reduce climate risks and enhance resilience. Projects that contribute to the reduction of greenhouse gas (GHG) emissions, protect, restore, or construct natural infrastructure, and minimize resource consumption and waste generation are key focus areas.

The results of this prioritization are presented to the steering committee for evidence-based decision-making. This facilitates informed discussions regarding budget allocations across service lines.

The budget recommendations from the steering committee are then presented to ELT for final review and adjustments and subsequently presented to Council for approval. During this stage, Council engages with service lines to request clarifications and answer questions, and negotiations may occur between service lines and Council to increase or decrease budgets. After this step, the Council approves the service plans and budget for the forthcoming budget cycle.

7.2 Observations for Consideration

Documentation score: 4/5

Implementation score: 3/5

Supporting Insights
▪ Each service line appears to have its own process for initially identifying needs and developing the budget for each cycle, ahead of their submission.
▪ Service lines submit their budgets using a standard intake form to Capital Planning and Business Services, however some fields within the form are often incomplete, or are provided with varying levels of detail. Consistent levels of detail in these fields are required to assist the Capital Planning and Business Services business unit to effectively prioritize investments.
▪ Some service lines appear to receive funding based on somewhat subjective criteria, rather than customer level of service requirements, identified based on level of service performance gaps. Without a more consistent framework for measuring customer levels of services across service lines, some service lines may be more effective in justifying a unique business case based on various factors, such as economic, social, or potentially political considerations.
Implications
▪ Varied integration with Finance in the capital budgeting process may lead to inconsistent risk assessment across service lines and presents opportunity to address external or internal threats. Align CAPEX and OPEX.
▪ Varying levels of investment detail may result in suboptimal decision making.
▪ Limited framework for decision making may lead to misdirected budget allocations, reducing trust and confidence in the budgeting process.

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Leading Practice Examples

Category	Description	Example Impact by Function
Public Safety Impact	Consequences of failure on human life and safety.	• Fire station equipment failure delays emergency response. • Water treatment failure leads to public health risk.
Service Disruption Impact	Effects on essential service delivery.	• Police communication system failure impacts crime response. • Wastewater plant failure leads to environmental violations.
Regulatory & Legal Compliance	Risk of legal penalties, fines, or lawsuits.	• Non-compliance with fire code leads to shutdown. • Drinking water quality violations result in heavy fines.
Financial Consequences	Cost of failure, repair, or replacement.	• HVAC failure in government buildings leads to high repair costs. • Replacing aging fire trucks is capital-intensive.
Likelihood of Failure	Based on asset age, condition, and historical reliability.	• Old water mains have a higher breakage rate. • Police fleet maintenance logs show frequent breakdowns due to performance demands on vehicles.
Redundancy & Contingency Options	Availability of backup systems or alternatives.	• Redundant fire stations may mitigate response delays. • No backup for wastewater pumps means high failure risk.

Asset	Department	Criticality Score	Recommended Budget Action
Fire Truck Fleet (Aging)	Fire Services	95 (High)	Immediate funding for replacement.
Wastewater Pumping Station	Water/Wastewater	90 (High)	Upgrade to avoid regulatory risk and avoid service outages.
Police Radio Communication	Police	85 (High)	Upgrade critical systems.
HVAC System (City Hall)	Facilities	50 (Medium)	Postpone replacement; monitor condition.
Parks Irrigation System	Facilities	35 (Low)	Minimal funding; defer upgrades.

Using Criticality Analysis for Budget Allocation

From past asset management work we used the following methodology for using criticality analysis for budget allocation. Given the varying operational priorities and risks inherent in each service line, a structured criticality framework facilitates efficient budget allocation, thereby enhancing public service reliability and safety.

Define a common criticality criterion that apply across departments while accommodating specific nuances. This approach allows for a comprehensive assessment of City functions, enabling relative rankings based on importance. A weighted scoring model is utilized, assigning different weights to factors according to strategic priorities for each function.

Following the scoring process, assets are classified into High, Medium, and Low Criticality categories, with high-criticality assets receiving priority funding. Budget allocation also considers funding sources and constraints, such as legislative requirements that limit certain funds to specific functions, as well as the distinction between operational and capital budgets. Furthermore, cost-benefit analyses are employed to determine the optimal return on investment for repairs, upgrades, or replacements.

This thorough methodology maximizes the effectiveness of investments while addressing the unique needs of each service area.

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8. Additional Observations for Consideration

Due to our holistic approach, we have identified four additional gaps from our review. These gaps are described below:

Additional Insights
▪ City Council was previously more engaged prior to the reorganization, allowing them to stay informed about administrative changes and service line needs. Councillors expressed a desire to see asset conditions in their Wards for informed decision-making, which is currently not in place.
▪ The recent reorganization shifted roles within the City, leading to varying competency levels across service lines. Documentation reviews indicated opportunities for capacity building and competency identification within these lines.
▪ Asset management documentation is limited to specific service lines, with no central repository available. Establishing a central repository could enhance the sharing of best practices and improve efficiencies.
▪ While climate and environmental factors are considered in asset reinvestment decisions, there is an opportunity to integrate these aspects earlier in the process. Embedding climate and sustainability within service lines can aid in budget needs identification and promote projects that enhance the resilience of City of Calgary assets and services.

Implications
▪ Limited engagement may affect the Council's ability to support asset management initiatives and align with City priorities, potentially leading to gaps in critical information about asset conditions, funding needs, and emerging challenges.
▪ The reorganization presents a valuable opportunity for the City to enhance capacity and overall performance through training and development, helping to reduce the risk of financial losses associated with asset management, which can lead to inefficiencies and increased operational costs.
▪ Decentralized data repositories might result in some inefficiencies, fragmented information, and challenges in accessing important data, which could create compliance risks and influence the organization's ability to manage assets consistently.
▪ Not integrating climate and sustainability considerations earlier in asset management processes may lead to missed opportunities for achieving City-wide sustainability goals, potentially resulting in higher long-term costs, less efficient resource allocation, and regulatory challenges.

Leading Practice Examples	
	Holistic Asset Management Framework The City of Melbourne (CoM)'s Asset Plan 2021-31 adopts an integrated approach to asset management aligned with ISO 55001 standards. This includes comprehensive planning that considers the entire lifecycle of assets, from acquisition to disposal, ensuring that all decisions are made with a long-term perspective. Engaging with the community is vital to CoM's strategy; the City actively seeks input from residents and local organizations to shape asset management priorities while investing in extensive training and development programs that encourage continuous learning in asset management practices. A centralized asset management information system further enhances efforts, allowing for better tracking of asset conditions and performance

	metrics across departments, increasing transparency and leading to more informed decision-making.
	Additionally, the City of Melbourne's holistic approach prioritizes sustainability goals by integrating climate risk assessments and promoting green infrastructure, making its assets more resilient to the impacts of climate change while aligning with Melbourne's long-terms strategic goals. [7]

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9. Recommendations

To help guide our recommendations, we have used the Institute of Asset Management (IAM) 6-box Model framework. The six groupings in the framework below represent primary areas of an organizations capability and has been used to provide guidance on the asset management system. Using the six groupings, we have organized the recommendations into these six groups: strategy and planning, asset management decision making, life cycle delivery, asset information, organization and people, and risk and review [8]. We acknowledge that IAM has updated the 6-box model to the 10-box model with their latest revision in 2024 [9]; however, we have opted to leverage the 6-box model as it aligns more effectively with the City's organization.

Figure 6: IAM's Anatomy of Asset Management Framework

Group 1 – Strategy & Planning

1. Asset management policy
2. Asset management strategy & objectives
3. Demand analysis
4. Strategic planning
5. Asset management planning

Group 2 – Asset Management Decision-Making

6. Capital investment decision-making
7. Operations & maintenance decision-making
8. Lifecycle value realisation
9. Resourcing strategy
10. Shutdowns & outage strategy

Group 3 – Life Cycle Delivery

11. Asset management policy
12. Asset creation & acquisition
13. Systems engineering
14. Configuration management
15. Maintenance delivery
16. Reliability engineering
17. Asset operations
18. Resource management
19. Shutdown & outage management
20. Fault & incident response
21. Asset decommissioning & disposal

Group 4 – Asset information

22. Asset information strategy
23. Asset information standards
24. Asset information systems
25. Data & information management

Group 5 – Organisation & people

26. Procurement & supply chain management
27. Asset management leadership
28. Organisational structure
29. Organisational culture
30. Competence management

Group 6 – Risk & review

31. Risk assessment & management
32. Contingency planning & resilience analysis
33. Sustainable development
34. Management of change
35. Asset performance & health monitoring
36. Asset management system monitoring
37. Management review, audit & assurance
38. Asset costing & valuation
39. Stakeholder engagement

Source: An Anatomy of Asset Management, 2015. The Institute of Asset Management (IAM)

Following these groupings, the recommendations follow the following structure:

Title
A high-level statement that encompasses the recommendation.

Current State
A summary of the current practices at the City.

Interview Comments
Direct interview quotes that back up each of the recommendations.

Action Plan
High-level steps for implementing the recommendation.

Applies to
An "X" will indicate the recommendation related to a specific document or process reviewed.

Recommendation Details
Key information discovered via document review and stakeholder interviews.

Benefits of Recommendation
An overview of the common benefits to the organization if the recommendation is implemented.

9.1 Strategy & Planning Recommendations

Recommendation 1		
Alignment of Strategic Priorities within Administration, Council, and Community		
Applies to		
☐ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☒ All AM Related Processes and Practices
Current State		
The City demonstrates alignment in its management of roles and responsibilities, effectively overseeing key operations and implementing a new asset management system. The use of a matrix organization and a dedicated committee fosters collaboration across departments, focusing on risks and strategic resourcing. Additionally, the City prioritizes investment in infrastructure through detailed condition assessments and community engagement, which aligns well with public needs. However, there is an opportunity for improvement in aligning corporate strategic priorities and ensuring consistency across		

service lines, as well as enhancing the line of sight within and across departments to further strengthen overall effectiveness.

What We Heard from Interviewees

"Clarifying roles and responsibilities can be done by centralizing certain functions. For example, all service coordinators can sit within one group and use the same tools and strategies."

"One of the main challenges is the alignment of priorities across departments and communicating the importance of services to Council and the public."

Recommendation Details

To improve the alignment of strategic priorities within the City, it is essential to enhance collaboration across service lines and clarify roles and responsibilities (R&Rs) related to asset ownership. This approach aligns with the ISO 55000 definition of asset management: 'the coordinated activities of an organization to realize value from assets.' By improving communication of expectations within Administration and across Council and the community, the City can ensure that overlapping assets and services are effectively managed. Regular engagement with City Council will facilitate better information flow and strengthen alignment with strategic priorities, ultimately leading to more cohesive decision-making and improved service delivery.

Action Plan

1. **Conduct a Stakeholder Assessment:** Identify key stakeholders across service lines to understand their roles, responsibilities, and areas of overlap in asset ownership. Integrate findings with the asset register to highlight areas needing clarity.
2. **Facilitate Collaborative Workshops:** Organize workshops to engage stakeholders in discussing R&Rs, improving communication, and fostering collaboration across service lines.
3. **Develop and Communicate Clear Guidelines:** Create guidelines outlining expectations for asset ownership and management. Disseminate these to stakeholders and ensure alignment with the asset register to resolve ownership gaps.
4. **Establish Communication and Alignment with City Council and the Community:** Implement consistent communication channels between Administration, City Council, and the community. Schedule regular meetings with City Council to update them on priorities, gather feedback, and ensure alignment with community needs and the asset register.

Benefits of Recommendation

- Improved Stakeholder Collaboration: By clarifying roles, responsibilities, and expectations, and fostering communication through workshops and guidelines, service lines can work together more effectively, reducing overlaps and ensuring smooth asset management.
- Regular engagement with City Council and the community, coupled with a detailed asset register, ensures alignment of strategic priorities with community needs. This promotes transparent decision-making and clearer ownership responsibilities.

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Recommendation 2
Enhance the AM Policy and Overall Framework

Applies to

☒ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☐ All AM Related Processes and Practices

Current State
The AM Policy has received positive endorsements from the ELT and emphasizes clear roles and responsibilities, fostering cross-functional collaboration and information sharing among some service lines. While the policy has been updated periodically and aligns with ISO 55000 standards, there are gaps in stakeholder awareness and communication regarding the implications of non-conformance and specific terminology. Enhancing information sharing and establishing a more defined asset management framework could further strengthen consistent asset management practices across the organization.

What We Heard from Interviewees
"Enhancing collaboration across service lines can be achieved by setting up service teams within each service line and creating mechanisms to share good practices and identify synergies."
"The communication of policies and the corporate asset management plan is a crucial part of the infrastructure management process. The teams engage with the community through surveys to gauge sentiment on infrastructure priorities and communicate with the Council about the investment gap and the long-term implications of underfunding."

Recommendation Details
To ensure that the City of Calgary's AM Policy and relevant documents are both well-understood and continuously relevant, and cross functional collaboration a dual approach is recommended. By implementing a comprehensive stakeholder engagement program that educates all parties on the policy's implications and compliance requirements. Additionally, a clear communication strategy will be established to ensure consistent messaging across service lines, promoting cross-functional collaboration through dedicated task forces. A more defined asset management framework will be developed to clarify roles and responsibilities, while a monitoring system will be put in place to evaluate compliance and effectiveness. These initiatives will collectively strengthen asset management practices and improve stakeholder awareness within the organization.

Action Plan

1. **Stakeholder Engagement Program:** Develop a comprehensive engagement program to educate stakeholders about the AM Policy, its implications, and the importance of compliance. This includes workshops, and drafting one page document summaries that clarify specific terminology and non-conformance implications.
2. **Enhanced Communication Strategy:** Establish a clear communication strategy that ensures consistent messaging about the AM Policy across all service lines. Utilize various channels such as newsletters, intranet updates, and team meetings to disseminate information and gather feedback.
3. **Cross-Functional Collaboration Initiatives:** Foster cross-functional collaboration by creating task forces or committees that include representatives from different service lines. This will promote information sharing and collective problem-solving, ensuring that all perspectives are considered in asset management practices.

4. **Defined Asset Management Framework:** Develop a more structured asset management framework that outlines specific roles, responsibilities, and processes. This framework should be easily accessible and regularly updated to reflect changes in policy or best practices.

5. **Monitoring and Evaluation:** Implement a system for monitoring compliance with the AM Policy and evaluating its effectiveness. Regular assessments can help identify areas for improvement and ensure that stakeholders remain informed and engaged.

Benefits of Recommendation

- Enhanced clarity around accountability will lead to more consistent enforcement of the AM Policy, reducing instances of non-compliance.
- Improved tracking and monitoring will enable proactive management of compliance issues, minimizing risks associated with non-conformance.

9.2 Asset Management Decision Making Recommendations

Recommendation 3

Establish a Consistent Criticality Criteria Framework

Applies to

☐ AM Policy	☐ CAMP	☐ ISR
☒ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☐ All AM Related Processes and Practices

Current State

Currently, each service line has its own process for identifying critical assets, conducting asset condition assessments, managing risks, and developing its strategic priorities. However, due to budget and resource constraints, some service lines face limitations in the data and resources necessary to support effective asset management practices. Some service lines are more advanced in their criticality assessments than others. While this situation is not uncommon, it has identified an opportunity to create consistent criticality criteria and develop a centralized asset register across the city to enhance decision-making.

What We Heard from Interviewees

"There is ongoing work to improve the process of identifying critical infrastructure, including the development of a standardized prioritization standard. This is still in progress and needs to be refined."

Recommendation Details

To enhance asset management within the City, it is essential to begin with a comprehensive asset inventory based on a hierarchical view of the assets being managed. Once the asset registry is established, a multi-criteria scoring framework should be developed to evaluate asset criticality based on safety, operational impact, financial consequences, regulatory risks, redundancy, and risk ranking. This framework will enable effective prioritization of maintenance strategies, ensuring that high-criticality assets receive the necessary attention for improved reliability and performance.

Action Plan

1. **Conduct Asset Inventory:** Perform a comprehensive inventory of all assets, categorizing them based on a hierarchical structure.

2. **Establish Data Standards:** Define data standards for asset information, ensuring consistency in how asset details are recorded and maintained across service lines.
3. **Develop Scoring Framework:** Create a multi-criterion weighted scoring system to evaluate asset criticality, incorporating safety, operational impact, financial consequences, regulatory risks, and redundancy.
4. **Facilitate Stakeholder Workshops:** Organize workshops with key stakeholders from each service line to assess assets against the scoring framework and established risk rankings.
5. **Continuous Improvement:** Establish a schedule for periodic reviews and updates of the criticality analysis, utilizing condition assessments and real-time data to inform decision-making.

Benefits of Recommendation

- By identifying high-criticality assets, the City can allocate resources more effectively, ensuring that maintenance strategies are aligned with asset importance.
- Prioritizing high-criticality assets will lead to improved reliability and safety, reducing the risk of asset failures and associated consequences.

Recommendation 4

Implement Criticality Analysis for Budget Allocation

Applies to

☐ AM Policy	☐ CAMP	☐ ISR
☒ Critical Infrastructure Identification Process	☒ Asset Re-Investment Process	☐ All AM Related Processes and Practices

Current State

The current asset re-investment process is well-structured, involving multiple steps to ensure that investments align with community and Council priorities, as well as strategic goals. Each of the 61 service lines actively participates in identifying needs and forecasting budgets, informed by asset condition assessments, service demand analysis, and customer engagement surveys. While the prioritization framework effectively categorizes projects based on necessity, risk reduction, economic and social resilience, and environmental impact, there is an opportunity to enhance communication and integrate criticality into the existing criteria to better align budget allocation with asset needs.

What We Heard from Interviewees

"There is a need for more transparency and direct communication about the implications of not investing in infrastructure. There is also a need to improve the way information is communicated to decision-makers, as they may not fully understand the complexities of certain service lines."

Recommendation Details

To enhance the budget allocation process, it is recommended to incorporate a category and weighting for asset criticality. By creating a common criticality criteria and scoring model, as outlined in Recommendation #3, assets can be ranked and classified into High, Medium, and Low Criticality categories. High-criticality assets will receive priority funding, while medium- and low-criticality assets will be addressed as budgets allow. This risk-based approach ensures that funding is allocated effectively, considering legislative requirements, operational versus capital budgets, and cost-benefit analyses to maximize return on investment. Additionally, by prioritizing critical assets, the municipality can better support growth initiatives, ensuring that essential infrastructure is adequately funded to meet the

demands of a growing population and evolving community needs. This proactive strategy will facilitate sustainable development and enhance the City's capacity to respond to future challenges.

Action Plan

1. **Develop Criticality Criteria:** Create a standardized criticality criteria and scoring model to evaluate assets across all service lines.
2. **Classify Assets:** Score and classify assets into High, Medium, and Low Criticality categories based on the established criteria.
3. **Integrate Criticality into Budget Process:** Add a category and weighting for criticality into the existing budget allocation process to prioritize funding.
4. **Assess Funding Sources and Constraints:** Identify available funding sources and any constraints, such as legislative requirements or operational versus capital budget considerations.
5. **Implement Lifecycle Cost Analysis:** Use lifecycle cost analysis to evaluate the best return on investment for repairs, upgrades, or replacements of assets.

Benefits of Recommendation

- High-criticality assets receive funding first, ensuring that the most important needs are addressed promptly.
- A structured approach to budget allocation enhances the efficiency of resource use, aligning spending with strategic priorities.

Recommendation 5

Improve Integration of Corporate Finance into the Asset Management System

Applies to

☐ AM Policy ☐ CAMP ☐ ISR

☐ Critical Infrastructure Identification Process ☒ Asset Re-Investment Process ☐ All AM Related Processes and Practices

Current State

The current budgeting process for each service line demonstrates a proactive approach to identifying needs and developing budgets ahead of submission. However, greater consistency could be achieved by having the Finance department support service lines earlier in the process, during both the needs identification and budget creation processes. Additionally, gaps exist in the standard intake form, where incomplete fields and varying levels of detail can hinder effective prioritization by the Capital Planning and Business Services business unit. Furthermore, it appears enhancements could be made to better align capital, maintenance, and operational budgeting, with broader corporate budgets, especially with respect to City resourcing implications and future requirements.

What We Heard from Interviewees

"Each service line identifies their capital needs or investment needs and prioritizes. This information is then fed up to the Capital Planning and Business Services business unit, who meets with the service owners network to discuss their needs across the different business units."

Recommendation Details

Enhancing the integration of the asset reinvestment process with the Finance department can significantly support effective asset reinvestment. By fostering collaboration between Service line Asset

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Management Representatives and Finance teams, the City can ensure that budget allocations are informed by comprehensive financial analyses and align with overall financial strategies. A consistent framework for measuring service levels and integrating financial insights will enhance decision-making, improve risk assessments, and ultimately build trust and confidence in the budgeting process.

Action Plan

1. **Establish Cross Functional Teams:** establishing a cross functional tea comprising of service line asset management representatives and Finance team members to enhance collaboration during the budget build up process.
2. **Create Joint Budget Planning Workshops:** Organize workshops that bring together representatives from both business units to collaboratively develop budget proposals, ensuring that asset reinvestment needs are clearly articulated and that the intake form inputs are well understood.
3. **Develop Shared Communication Channels:** Implement shared communication platforms (e.g., SharePoint) to facilitate real-time information sharing and updates throughout the budget process.
4. **Define Clear Roles and Responsibilities:** Clearly outline the roles and responsibilities of each team member involved in the budget process to ensure accountability and streamline collaboration between the Asset Management and Finance teams.
5. **Implement Feedback Loops:** Establish mechanisms for gathering feedback from both teams after the budget process to identify areas for improvement and enhance future collaboration efforts.

Benefits of Recommendation

- Enhanced collaboration ensures that budget allocations are based on comprehensive financial analyses, aligning with overall financial strategies.
- A standardized budget submission process reduces inconsistencies and streamlines the budgeting cycle, facilitating more effective prioritization of investments.

9.3 Life Cycle Delivery Recommendations

Recommendation 6
Build upon Customer Levels of Service (LoS) Performance Metrics

Applies to

☐ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☒ All AM Related Processes and Practices

Current State

Technical levels of service are well developed and measured across each service line, and some service lines have incorporated customer levels of service metrics to understand customer expectations and satisfaction. While the technical levels of service are established, some gaps remain in measuring customer levels of service across all service lines.

What We Heard from Interviewees

"Customer level of service is being developed to clearly define the value exchange at the customer level and align the service delivery strategy accordingly."

"Customer engagement is crucial for understanding service expectations and ensuring that the services provided align with those expectations."

"There is a need for a more standardized approach to defining and measuring customer level of service across all service lines."

Recommendation Details

Integrating customer LoS metrics into the City's service lines consistently is essential for aligning infrastructure investments with community expectations. By measuring and reporting both technical and customer LoS, the City can gain valuable insights into the implications of funding gaps and service performance. This comprehensive view will enable the City to better understand how effectively it is meeting the needs and expectations of its residents and will help prioritize future investments in infrastructure and services.

Action Plan

1. **Determine Consistent Metrics:** Engage with residents through surveys or working sessions to identify consistent metrics linked to Calgarians' values (e.g., Accessibility, Cost Efficiency, Customer Satisfaction, Environmental Stewardship, Reliability, Safety, and Scope).
2. **Identify Key Metrics per Service Line:** Establish specific metrics for each service line that align with the consistent metrics derived from Calgarians' values.
3. **Develop Data Collection Methods:** Create standardized data collection methods that are consistent across the organization for both technical and customer LoS data across service lines.
4. **Create a Reporting Framework:** Develop a framework for regularly reporting LoS metrics to stakeholders, including City Council and the community, to enhance transparency and accountability.
5. **Utilize Data for Decision-Making:** Analyze the collected data to identify funding gaps and service performance issues, using this information to inform future infrastructure investments and service improvement

Benefits of Recommendation

- Regular reporting of LoS metrics will enhance accountability to stakeholders and foster trust within the community regarding the City's commitment to service improvement.
- Integrating customer LoS metrics will provide a clearer picture of how well the City is meeting resident expectations, leading to more informed decision-making.

9.4 Asset Information Recommendations

Recommendation 7
Enhance Integrated Reporting to Optimize Asset Information and Data

Applies to

☐ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☒ All AM Related Processes and Practices

Current State

There is a wealth of data and information available to support strategic priorities and decision-making at the City, particularly through asset condition assessments conducted across service lines. However, there

are gaps in the consistency of data collection among service lines, and information is often siloed within each service line. Data is submitted to the ISR and CAMP, allowing for reporting every four years; however, there is a desire within the organization for more frequent reporting and dashboards to provide up-to-date asset information.

What We Heard from Interviewees

"There is a need to tell a more holistic story that ties everything together, from The City's vision to the annual budget. This would involve improving data management and analytics to better support decision-making."

Recommendation Details

3A. Data Collection and Management: To enhance asset information management, it is recommended to establish a centralized repository for asset data and information. For documents, this would entail creating a SharePoint site, and for asset data, setting up a data warehouse to consolidate all asset data across the organization, enabling seamless integration of data currently collected by service lines into a unified system. Additionally, guidelines should be implemented for consistent and frequent data retrieval to ensure that the centralized repository remains updated and reliable. Together, these initiatives will provide a robust framework for enhanced asset management and serve as a benchmark for future updates and more frequent revisions to the infrastructure status report.

3B. Reporting: After establishing a central repository and data warehouse, the City can utilize dynamic reporting tools such as PowerBI to empower both Council and Administration to make more informed decisions. This capability will enable an increase in the frequency of the ISR from every four years to annually, providing the ELT and Council with more up-to-date and accurate asset data. The CAMP will continue to serve as a comprehensive document that details information prior to the budget process. Additionally, dynamic reporting will enhance visibility into asset conditions based on specific criteria, such as by City Ward or service line.

Action Plan

1. **Assess Current Data Management Practices:** Conduct a comprehensive review of existing data collection, management, and reporting practices across all service lines.
2. **Design and Implement the Centralized Repository and Data Warehouse:** Design and set up the SharePoint site and data warehouse, ensuring seamless integration, and provide training for staff on the new systems.
3. **Develop Guidelines for Data Collection and Retrieval:** Create standardized guidelines for data collection, management, and retrieval to ensure consistency across all service lines.
4. **Integrate Dynamic Reporting Tools:** Integrate dynamic reporting tools like Power BI with the centralized repository and data warehouse, and train Council and Administration on their use for informed decision-making.
5. **Establish a Review and Update Process:** Create a process for regularly reviewing asset data and reporting mechanisms. This should include revising the ISR from every four years to annually, ensuring ELT and Council receive timely and accurate information for decision making.

Benefits of Recommendation

- Centralized data allows for more informed asset management decisions, benchmarking which will enhance overall operational efficiency.
- Dynamic reporting capabilities through tools like Power BI provide clear visibility of asset conditions, enabling enhanced communication.

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9.5 Organization and People Recommendations

Recommendation 8
Increase Investment in Training and Capacity Building

Applies to		
☐ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☒ All AM Related Processes and Practices

Current State

The recent reorganization within the City of Calgary has fostered increased collaboration through a matrix structure, but it also presents challenges related to varying competency levels among staff due to personnel transfers. To address this, the City has relaunched an internal Asset Management Course and hosted the Asset Management Community of Practice Event, aimed at building capacity and sharing best practices. These initiatives not only lay a solid foundation for enhancing asset management practices but also promote a culture of excellence and innovation throughout the organization. This presents an opportunity to expand the existing programs and increase investment in training and capacity building to ensure that all employees are equipped with the necessary skills and knowledge to thrive in their new roles.

What We Heard from Interviewees

"In terms of training and competency, there is a program in place to help people get up to speed with their new roles, but it is described as a 'work in progress'."

"The reorganization involved various services and departments, with strategic guidance provided through the board of directors and seven directors. However, the transition to a matrix organization has not been fully realized yet, with some elements still functioning in a hierarchical manner."

Recommendation Details

To build upon the internal initiatives underway at the City such as the Asset Management Course and Community of Practice Event, it is recommended the City should implement a comprehensive training strategy. This strategy should include competency assessments, tailored training programs, and mentorship opportunities to equip all employees with the necessary skills for success. Additionally, establishing a feedback loop for employees to share experiences will enhance the culture of excellence and innovation in asset management, ultimately strengthening overall organizational effectiveness.

Action Plan

1. **Conduct Competency Assessments**: Evaluate current employee skills and identify gaps to tailor training programs effectively.
2. **Develop Tailored Training Programs**: Create tailored training programs or leverage existing web-based learnings that address the identified needs, focusing on skills and knowledge required for each service line.
3. **Establish Mentorship Opportunities:** Pair experienced employees with those that are in a new roles or service lines to foster knowledge sharing and professional growth.
4. **Implement Feedback Mechanisms:** Create channels for employees to provide input on training effectiveness and share their experiences.

5. **Evaluate Training Effectiveness**: Establish metrics to assess the effectiveness of training initiatives and make adjustments as necessary to improve outcomes.

Benefits of Recommendation

- Investing in training and development fosters a culture of growth, may lead to increased job satisfaction and retention rates among staff.
- Targeted training programs will equip personnel with the skills and knowledge needed to excel in their new roles, improving overall performance.

9.6 Risk and Review Recommendations

Recommendation 9

Enhance Enterprise Risk Management (ERM)

Applies to

☐ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☒ All AM Related Processes and Practices

Current State

The City has established a foundational approach to ERM, demonstrating a commitment to identifying and communicating risks associated with investment decisions. However, there is an overemphasis on likelihood rather than consequence, leading to inconsistent risk assessments across service lines. This inconsistency may hinder the City's ability to effectively address external threats and opportunities, impacting resource allocation and overall effectiveness.

What We Heard from Interviewees

"There are challenges in ensuring that everyone in the organization, including the Council, understands the implications of different decisions on risk. There is a need for more transparency and understanding of risk management at all levels of the organization."

Recommendation Details

To enhance the alignment of ERM, it is recommended that the City of Calgary refine its existing corporate risk register by incorporating a comprehensive framework for evaluating both likelihood and consequence. This framework should facilitate better communication of risks and their implications on short- and long-term levels of service, as well as future capital investment needs, ensuring that all stakeholders are informed and prepared to make data-driven decisions.

Action Plan

1. **Conduct a Comprehensive Review of the Corporate Risk Register:** Evaluate the current corporate risk register to identify gaps in the assessment of consequences alongside likelihood, and maintaining the appropriate level of detail to better understand risks. Engage stakeholders to gather insights on how the register is currently utilized and areas for improvement, including how service-line level risk is communicated up through ELT and Council, and at what level of administration are decisions made to manage risk.

2. **Enhance the Risk Evaluation Framework:** Develop a framework that emphasizes the assessment of both likelihood and consequence in the existing risk register. Provide clear guidelines for integrating this dual-focus framework into the risk management processes.

3. **Improve Communication Strategies:** Implement strategies to effectively communicate risks and their implications to stakeholders, particularly regarding investment levels and service impacts. Organize training sessions to ensure staff understand the importance of comprehensive risk communication and the new evaluation framework.

4. **Integrate External Factors into Risk Assessments:** Establish protocols for evaluating external factors that may impact asset management and incorporate these into the centralized risk register. Ensure that the updated register reflects a holistic view of risks, including those arising from external influences.

5. **Monitor and Review the Risk Management Process:** Regularly monitor the effectiveness of the enhanced risk register and evaluation framework, making adjustments as necessary based on feedback and outcomes. Conduct periodic reviews to ensure alignment with organizational goals and to continuously improve the risk management process.

Benefits of Recommendation

- Improved alignment of risk management practices will enhance the City's ability to proactively address external threats and opportunities, leading to more informed decision-making.
- Refining the centralized risk register to include a dual-focus evaluation framework will facilitate better communication of risks, ensuring that all stakeholders understand the implications of varying levels of investment on service delivery and future capital needs.

Recommendation 10

Improve Integration of Climate Change and Sustainability Considerations

Applies to

☐ AM Policy	☐ CAMP	☐ ISR
☐ Critical Infrastructure Identification Process	☐ Asset Re-Investment Process	☒ All AM Related Processes and Practices

Current State

The City has integrated climate and sustainability considerations into the budget allocation process by having an allocated category towards Climate and Environment considerations. However, there is an opportunity to integrate these considerations earlier in the asset management process to enhance budget needs identification and promote projects that bolster resilience.

What We Heard from Interviewees

"There is concern about the long-term sustainability of the City's current approach, there might be challenges in the future."

"To overcome the cost challenges, we engage the environmental group for additional funding to implement more environmentally friendly solutions."

Recommendation Details

Integrating climate and sustainability considerations earlier in the asset management processes can help the City of Calgary enhance the resiliency of its assets and services. By embedding these factors into the

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need's identification and budget-building phases, the City of Calgary can ensure that investments not only address current infrastructure needs, but also contribute to long-term sustainability goals.

Action Plan

1. **Develop guidelines for incorporating climate risk assessments and sustainability:** Develop guidelines and criteria into the asset reinvestment decision-making process, ensuring that these factors are considered from the outset.
2. **Conduct training sessions:** Develop and conduct training sessions for service line representatives on how to evaluate projects through a climate and sustainability lens, emphasizing the importance of these considerations in asset management.
3. **Establish a framework:** Develop a framework identifying and prioritizing projects that have positive environmental impacts, such as reducing greenhouse gas emissions or enhancing natural infrastructure.

Benefits of Recommendation

- Early integration of climate and sustainability considerations will lead to more informed investment decisions that align with the City's long-term sustainability goals.
- Projects that prioritize environmental resilience will enhance the City's ability to adapt to climate change impacts, ultimately benefiting the community and reducing future costs.
- Improved alignment with sustainability objectives will foster greater public trust and support for asset management initiatives.

10. Implementation

10.1 Implementation Considerations

When implementing the recommendations, the City of Calgary must prepare for several key considerations to ensure success.
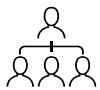
Governance

Incorporate a roles and responsibilities framework, such as a DARCI framework (Decision-Maker, Accountable, Responsible, Consult, Inform), to identify the right individuals to lead change transformation, clearly defining roles and responsibilities for implementation. By establishing a DARCI framework, which should typically include a Sponsor/Steering Committee for oversight, the City will help identify the right level of leadership and team required for successful implementation.

Resource Availability

Resource availability is crucial. This includes not only financial resources but also human capital and technological support. It is essential to assess whether the necessary resources are in place before moving forward with any recommendation.

Stakeholder Engagement

Engaging stakeholders early in the process can provide valuable insights and help to address any concerns, fostering a sense of ownership and collaboration. By involving stakeholders from the outset, the City can ensure that the recommendations are aligned with community needs and expectations.

Training Needs

As new processes and frameworks are introduced; staff will require training to adapt effectively. This will not only enhance their skills but also ensure that everyone is on the same page regarding the new practices. A well-trained workforce is essential for the successful implementation of any new initiative.

Monitoring and Evaluation

Monitoring and evaluation mechanisms should be established from the outset to define clear metrics for success. The City of Calgary can leverage these mechanisms to track progress and make adjustments as needed. Regular evaluations will help identify areas for improvement and ensure that the implementation remains aligned with strategic goals.
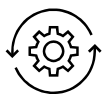
Flexibility

The implementation plan should be adaptable to accommodate feedback and changing circumstances, allowing for continuous improvement throughout the process. Being open to adjustments will enable the City of Calgary to respond effectively to unforeseen challenges and opportunities that may arise during implementation.

10.2 Prioritization Criteria

To effectively prioritize the shortlisted recommendations, EY developed several criteria and completed a preliminary evaluation of each recommended action for consideration. The City should re-validate the preliminary prioritization to ensure it aligns to other related initiatives and the broader priorities of Administration and Council. The following decision criteria was applied for consideration:

- Alignment with Strategic Priorities: The extent to which the recommendation supports the City's strategic goals and objectives, including those of Administration, Council, and the community.
- Impact on Service Delivery: The potential of the recommendation to improve service delivery, enhance public safety, and ensure the reliability of municipal assets.
- Ease of Implementation: The ease of implementing the recommendation within existing resources, including time, budget, and staff capacity.
- Stakeholder Engagement: The degree to which the recommendation promotes collaboration and engagement with stakeholders, including City Council, administration, and the community.
- Risk Mitigation: The ability of the recommendation to address identified risks, such as those related to climate change, operational inefficiencies, or compliance issues.
- Cost of Implementation: The amount of costs associated with the implementation.

Table 3: Recommendation Prioritization Framework

Recommendation / Criterion	Strategic Alignment	Impact on Service Delivery	Ease of Implementation	Stakeholder Engagement	Risk Mitigation	Cost of Implementation	Overall Priority
1. Alignment of Strategic Priorities within Administration, Council, and Community	H	H	M	H	H	M	H
2. Build upon Customer Levels of Service (LoS) Performance Metrics	H	H	M	M	H	M	H
3. Establish a Consistent Criticality Criteria Framework	H	H	M	M	H	M	H
4. Enhance Integrated Reporting to Optimize Asset Information and Data	H	H	M	M	H	M	H
5. Improve Integration of Corporate Finance into the Asset Management System	H	H	M	M	H	M	H
6. Implement Criticality Analysis for Budget Allocation	H	H	M	M	H	M	H
7. Enhance the AM Policy and Overall Framework	H	H	M	H	M	M	M
8. Improve Integration of Climate Change and Sustainability Considerations	H	H	M	M	H	M	M
9. Increase Investment in Training and Capacity Building	M	M	H	H	M	L	M
10. Enhance Enterprise Risk Management (ERM)	M	M	M	M	H	M	M

Legend

🟩 High Priority: Recommendations that align strongly with strategic goals, these recommendations should be prioritized for immediate action.

🟨 Medium Priority: Recommendations that have moderate alignment with strategic goals. These should be addressed after high-priority recommendations are implemented but still warrant attention.

🟥 Low Priority: Recommendations that may have limited impact or alignment with strategic goals, or present challenges. These may be considered for future phases or as resources allow.

10.3 Implementation Journey

Below is an indicative three-year asset management journey focusing on the different enabling dimensions, short-term opportunities, and long-term considerations for the City. Long-term considerations require further exploration by the City of Calgary. These timelines are indicative and based on experience with similar projects; however, they will require adjustment based on further validation of long-term priorities, stakeholder availability, investment, and available support, among other factors. This timeline illustrates a potential journey for the City of Calgary to move toward its desired future state in asset management maturity.

Figure 7: Implementation Roadmap

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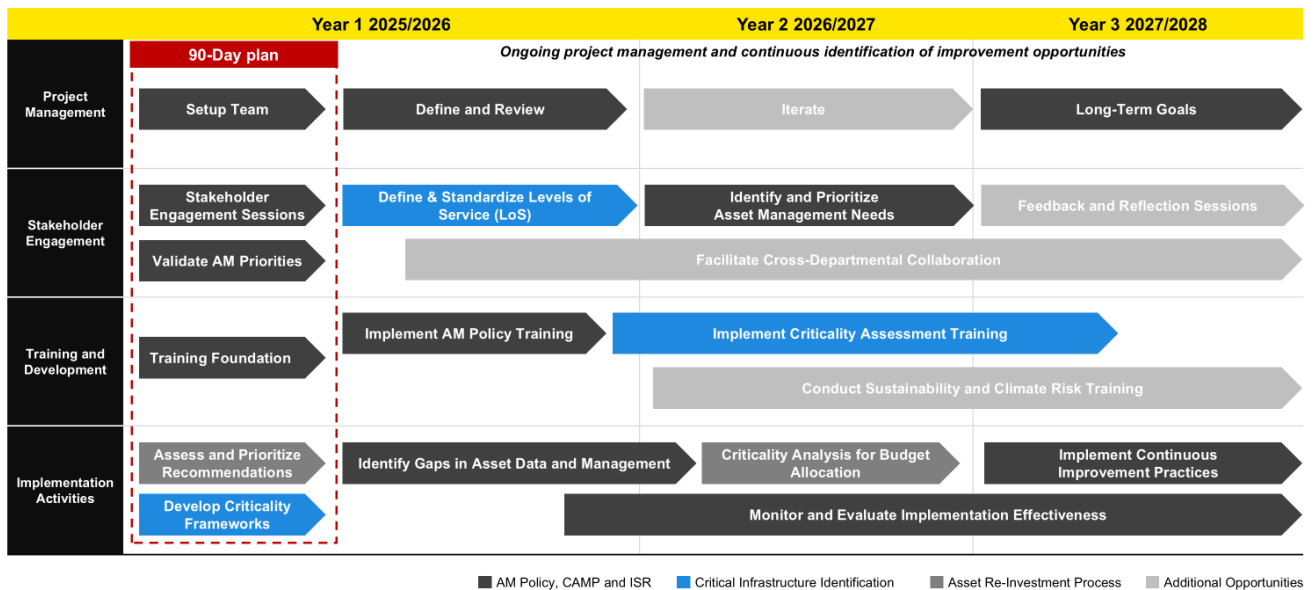
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Appendix A: Documentation Provided

Document Reference	Description
AIP Management Guideline	Outlines project management compliance, due diligence, documentation, risk assessment, and continuous improvement within Calgary Transit's Transit Service Systems.
Asset Management Administration Policy	Contains the purpose, policy statement, legislative authority, roles and responsibilities, and consequences.
Asset Management Guidelines	A comprehensive document outlining corporate documents, asset management principles, and the state of asset management at the City of Calgary.
Bridges and Structures Asset Management Plan	Contains the asset overview, condition assessments, operational maintenance, level of service, asset management strategies, and resource planning.
Calgary Transit Asset Management Level of Service Customer Commitment	Outlines Calgary Transit's customer level of service metrics, including Safe, Reliable, Helpful, Informative, Easy to Use, and Clean.
Calgary Transit Asset Management Levels of Service Summary	Details Calgary Transit customer levels of service (LoS) for each service area, outlining customer LoS measures, targets, and areas of opportunity.
Calgary Transit Asset Management Plan	Includes the state of good repair for Calgary Transit, asset planning methodology, levels of service, infrastructure status, investment needs and financing, and next steps.
Calgary's Asset Management Strategy	Defines asset management at the City of Calgary, including principles and elements of an effective asset management plan.
Capital Infrastructure Investment Drivers and Criteria	Outlines the capital infrastructure investment drivers, including support for the delivery of the City's services, fostering great neighbourhoods, ensuring equitable outcomes, and more.
Corporate Asset Management Plan (CAMP)	Expands on the Infrastructure Status Report (ISR) and outlines each service line's asset condition trend, asset condition, current replacement value (CRV), asset investment needs, as well as practices and improvement strategies.
Drinking Water Asset Management Maturity Assessment Report	Presents the results of the asset management maturity assessment for the City of Calgary's Water Utilities Portfolio.
Drinking Water Strategic Management Plan (AMP)	Outlines the long-term strategy for managing assets in the Drinking Water service line – Document is in draft.
Facilities Management – Recreation Sustainment Recommendations - DRAFT	Provides recommendations from building condition assessments (BCAs) and estimated costs for each recreation facility requiring repairs, replacement parts, or demolition, supporting the development of the Facility Management budget.

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Document Reference	Description
Facilities Management - Roads Sustainment - DRAFT	Provides recommendations from building condition assessments (BCAs) and estimated costs for each Roads facility requiring repairs, replacement parts, or demolition, supporting the development of the Facility Management budget.
Facilities Management - Sustainment Recommendations – DRAFT	Provides recommendations from building condition assessments (BCAs) and estimated costs for each Facility Management facility requiring repairs, replacement parts, or demolition, supporting the development of the Facility Management budget.
Facilities Management - Calgary Fire Department Sustainment Recommendations - DRAFT	Provides recommendations from building condition assessments (BCAs) and estimated costs for each Fire Department facility requiring repairs, replacement parts, or demolition, supporting the development of the Facility Management budget.
Facilities Management - Parks Sustainment Recommendations – DRAFT	Provides recommendations from building condition assessments (BCAs) and estimated costs for each Parks facility requiring repairs, replacement parts, or demolition, supporting the development of the Facility Management budget.
Facility Management Asset Management Monthly Report	Monthly Asset Management Report providing metrics such as facility condition, total recorded assets in EAM, average building condition from Building Condition Assessments, and other key metrics.
Facility Management Lifecycle Investment Management Audit	Report from the City Auditor's Office assessing the effectiveness of Facility Management's lifecycle costs, controls over building condition assessments, the risk framework for identifying critical assets, and prioritization criteria.
Facility Management Service Plan	Provides an overview of Facility Management, customer survey results, performance metrics, and goals for 2023–2026.
ImagineCALGARY Plan for Long Range Urban Sustainability	Calgary's 100-year vision and goals with targets, developed in 2007 and incorporating input from 18,000 Calgarians.
Infrastructure Services Organizational Chart	Infrastructure Services Organizational Chart.
Infrastructure Status Report (2020)	Report outlining the status of city-owned assets and identifying short- and long-term infrastructure risks.
Integrated Risk Management Administrative Guidelines	Includes the purpose, leadership statement, guidelines, and the Corporate Integrated Risk Management Framework.
Integrated Risk Management Policy	Includes the policy statement, purpose, definition, applicability, and procedures for managing risks and reporting to Council.
ISO 55000: 2024 Asset Management Vocabulary, overview and principles	Presents a comprehensive asset management framework, offering an overview of principles and guidelines.

Document Reference	Description
ISO 55001: 2024 **Asset Management - Asset management system – Requirements**	Establishes standards for asset management, including leadership, stakeholder engagement, risk assessment, continuous performance evaluation, and alignment with organizational goals, among other key standards.
ISO 55002: 2018 **Asset Management - Management Systems - Guidelines for the Application of ISO: 55001**	Outlines the application of ISO 55001 by emphasizing context recognition, stakeholder engagement, and sustainable value creation through effective practices.
Mobility AM Maturity Assessment Report	Presents the results of the asset management maturity assessment for the City of Calgary's Mobility Portfolio.
Mobility Asset Condition Information	Includes graphs depicting pavement condition, mobility asset condition, and other metrics to illustrate changes over time.
Mobility Asset Inventory Report – 2023	Outlines the asset type per subservice line and displays the unit of measure and changes in units from 2022.
Operational Services Organization Structure	Operational Services Organizational Chart.
Pavement Asset Management Plan	Outlines the state of pavement assets, levels of service, asset management strategy, and plan improvement and monitoring.
Rail Systems Communications Asset Management Plan	Currently under development, outlining the state of assets, risk profile, management strategies, and improvement planning.
Service Investment Process- Capital Prioritization Criteria 2023-2024	Details the 2023 to 2023 service plans and budgets, including community indicators and performance measures, and description and purpose of each service line.
The City of Calgary - Organizational Structure 2025	City of Calgary Organizational Chart 2025.

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