

**OFFICE OF
THE CITY AUDITOR**

REPORT

PROJECT MANAGEMENT OF TRANSPORTATION INFRASTRUCTURE AUDIT

March 1, 2022

Report Summary

BACKGROUND

In 2017, the Integrated Infrastructure Services (IIS) department implemented the Project Development and Delivery Model to improve the project delivery of infrastructure projects. The City's approved 2019-2022 total capital investment in transportation infrastructure assets is \$761 million on assets such as roads, interchanges, bridges and bike lanes.

IIS is responsible for building and rehabilitating City infrastructure assets. Within IIS these branches play key roles in delivering projects:

- The Infrastructure Planning and Design Branch manages the project from the strategy phase which includes the conceptual design through to the conclusion of preliminary design.
- Infrastructure Delivery Branch manages the project from the conclusion of preliminary design and the budget approval process including the detailed design and build phase .

AUDIT OBJECTIVES¹ AND SCOPE

The objectives of the audit were to determine if IIS is:

1. Evaluating transportation infrastructure delivery programs.
2. Managing transportation infrastructure projects within budget, schedule, and desired quality.

The scope of this is limited to transportation infrastructure projects such as roads, interchanges, bridges and bike lanes. Infrastructure such as LRT, facilities, and neighborhoods are not in scope of this project.

¹ We conducted this engagement in conformance with the Institute of Internal Auditors' *International Standards for the Professional Practice of Internal Auditing*. Please refer to Appendix 1 for the Scope of the audit.

WHAT WE FOUND

IIS has effectively evaluated the transportation infrastructure delivery program through development of a branch business plan that identified outcomes aligned to the city's strategic plan. IIS also developed business cases with defined outcomes for major capital projects which are updated annually to ensure the project outcomes are aligned with corporate outcomes. IIS conducts ongoing inspections to assess the condition of the city's infrastructure inventory which is regularly reported.

IIS has implemented an effective system to manage city transportation infrastructure projects. A standardized project management methodology is used to manage major projects. Standardized controls are used by project managers to manage project budgets, schedules and quality. Project managers within the Infrastructure Delivery Branch, consistently monitor, communicate, and report on project budgets, schedules and quality.

Unlike the project budget and schedule, IIS has not established measures for quality of projects and, therefore, cannot report externally on project quality.

RECOMMENDATION(S)**Recommendation 1**

We recommend that the Infrastructure Delivery Branch develop and report on performance measures for quality of transportation infrastructure projects.

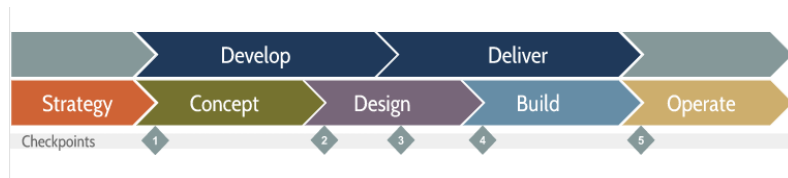
WHY THIS IS IMPORTANT

Measuring, setting targets, and reporting on quality performance is important to transparently disclose the City is receiving good value and holding internal staff and external consultants and contractors accountable.

Background

PROJECT MANAGEMENT

In 2017, IIS implemented the Project Development and Delivery Model (PDDM) to improve the project delivery of infrastructure projects. Currently, all major City projects follow the PDDM methodology.



Stages

- Strategy stage: plan to achieve the project goals
- Concept stage: analysis of proposed project scope
- Design stage: process to create new asset description
- Build stage: tendering, evaluation, contract award
- Operate stage: asset is operating under intended use.

The department created the Project Management Reference Guide (PMRG) to improve the delivery of capital construction projects by providing standardized project management processes and tools. The PMRG combines the City's practices with the Project Management Institute's Project Management Body of Knowledge (PMBOK).

TRANSPORTATION INFRASTRUCTURE ASSETS

The following is a December 31, 2020 estimate of quantity and replacement value of transportation infrastructure assets.

Infrastructure Type	Quantity	Unit of Measure	Replacement Value(\$millions)
Roads	61,977	Lane Kilometers	9,614
Bridges	241,198	Square Meters	1,862
Active Modes (Sidewalks/Bike lanes)	5,568	Kilometers	1,995

ROLES AND RESPONSIBILITIES Two branches within IIS are responsible for the development and delivery of City transportation infrastructure.

The Infrastructure Planning and Design Branch manages projects from the conceptual design through to the conclusion of preliminary design. This branch is responsible for assessing and reporting on city infrastructure conditions and assigning preliminary capital budgets for transportation infrastructure projects. This branch also develops and updates business cases with defined outcomes for all major capital projects.

The Infrastructure Delivery Branch manages transportation infrastructure projects through detailed design and build phases. The Infrastructure Delivery Branch business plan is aligned to the city's vision and goals identified in Connect Edmonton (Edmonton's Strategic Plan 2019-2028). The Branch primarily advances Connect Edmonton's goal of Regional Prosperity by accommodating goods and people movements. The business plan is updated annually based on Council's strategic objectives and corporate priorities.

Recommendation 1: Measures of Quality

RECOMMENDATION

We recommend that the Infrastructure Delivery Branch develop and report on measures for quality of transportation infrastructure projects.

KEY FINDINGS

The Infrastructure Delivery Branch has established effective controls to manage project budgeting, scheduling and quality of transportation infrastructure projects.

The branch regularly measures and externally reports on project budgets and schedules. However, unlike the project budget and schedule, the branch has not identified quality measures and is not reporting on project quality.

PROJECT BUDGETING, SCHEDULING AND QUALITY CONTROLS

We conducted five project reviews with IIS project managers within the Transportation Infrastructure Delivery section and observed good budget, scheduling and quality controls including:

Budgeting

- On-site city inspectors completed quantity reports to verify work completed by the contractor.
- Project managers reconciled quantities to invoices submitted by contractors.
- Project managers used a cost tracking spreadsheet to track project actual costs versus budget.
- Project managers reviewed city-generated progress reports to reconcile contractor billings.
- IIS leadership reviewed monthly project budget reports.

- Budget information linked to the city's Building Edmonton webpage which informs citizens on the costs of city projects.

Scheduling

- Project managers and the contractor developed and agreed to a full project schedule with milestones.
- Project managers held weekly progress meetings with the contractor to discuss the project progress.
- IIS instituted site occupancy and lane closure clauses into contracts, to incentivize or penalize contractors for project schedule performance.
- IIS leadership reviewed monthly project schedule reports.
- Schedule information linked to the city's Building Edmonton webpage which informs citizens on the progress of city projects.

Quality

- City Design and Construction Standards were applied on all projects.
- An on-site inspector was assigned to projects and performed quality assurance reviews.
- IIS project managers and the contractor held weekly meetings to discuss project quality issues.
- IIS and the contractor met after construction to inspect the work and identify project deficiencies.

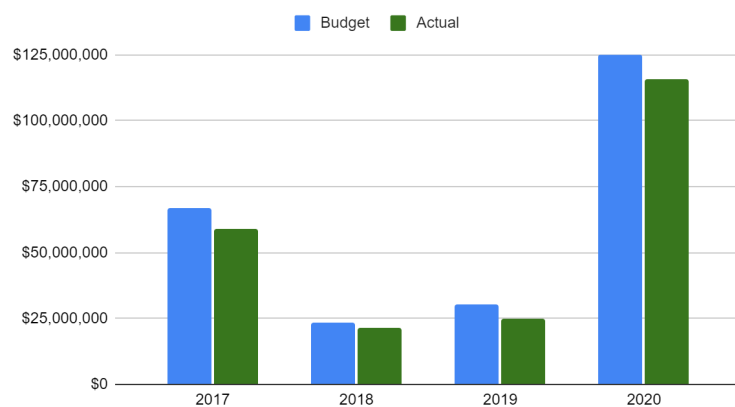
BUDGET AND SCHEDULING PERFORMANCE MEASURES

IIS is measuring, monitoring and reporting on the performance of project budgeting and scheduling.

Budgeting

Between 2017 and 2020, IIS delivered 42 stand alone transportation infrastructure projects, budgeted at \$246 million. Total project spend was below project budgets for each year as shown in the chart.

Total Project Spend by Year

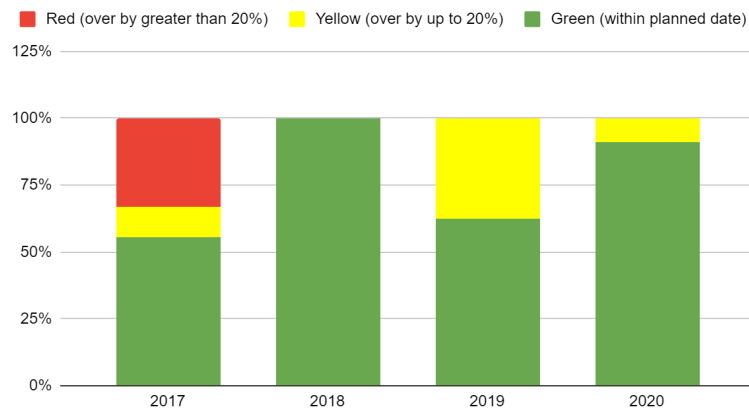


IIS delivered these projects at a combined total of \$24.2 million under budget. Twelve of these projects were delivered \$5.3 million over budget, but these budget variances were offset by thirty projects that were delivered \$29.5 million under budget.

Scheduling

Similarly, the performance of project scheduling has improved from 2017 to 2020 as shown in the chart. From 2018 to 2020, no project delivered was greater than 20% over schedule. In 2020, 86% of projects were completed on schedule.

Project Schedule



QUALITY PERFORMANCE MEASURES

The Infrastructure Delivery Branch has not developed measures for reporting project quality. Without established measures for quality, the branch cannot set targets, measure and report on project quality performance similarly to the project budgets and schedules.

Through industry research we have identified inspection deficiencies or positive counts which is a technical quality measure. Management could consider this measure as a potential project quality measure in developing future measures.

WHY THIS IS IMPORTANT

Measuring, setting targets, and reporting on quality performance is important to ensure the City is receiving good value and holding IIS, consultants, and contractors accountable.

RECOMMENDATION MANAGEMENT RESPONSE

We recommend that the Infrastructure Delivery Branch develop and report on measures for quality of transportation infrastructure delivery projects.



Responsible Party

Branch Manager, Infrastructure Delivery Branch

**Accepted by Management****Management Response**

Administration accepts this recommendation.

Administration holds quality paramount in executing transportation infrastructure projects. The City has construction specifications and design details that outline the minimum requirements for quality on our projects. Quality requirements are actively monitored through a robust Quality Assurance testing program.

Administration will research and evaluate possible quality measures that aid in the oversight and delivery of our transportation infrastructure program.

June 30, 2022

Administration will report on those quality measures as part of Administration's overall Enterprise Performance Management program (EPM).

December 31, 2022

**Implementation Date**

December 31, 2022

ACKNOWLEDGEMENT

The OCA thanks the IIS Department, in particular, management and staff of the Infrastructure Delivery Branch and Infrastructure Planning and Design Branch for their cooperation during the audit.

Appendix 1 – Audit Scope

Although the IIS Department is responsible for a variety of infrastructure projects, this audit focussed on the delivery of rehabilitation transportation infrastructure projects (2017- 2020) including:

- Collector and Arterial Roads
- Bridges and interchanges
- Active transportation such as bike lanes
- Streetscape Enhancements

As a result, the following were out of the scope of this audit:

- Facilities, LRT, and neighborhood renewal
- Projects not completed before 2020