Project Delivery Review and Cost Estimating

Infrastructure and Water Services Department
Asset Management Services
City of Ottawa

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Project Delivery Review and Cost Estimating

Background

Infrastructure projects generally proceed in a number of stages that extend from the initial need identification through to completion of construction. The project budget is developed at each stage of the project using the best information available at the time. At the early stages, the available information is limited and therefore the estimate cannot be developed to a high level of accuracy. With each follow-on stage of project refinement, successively more information becomes available, and the accuracy level of the budget estimate increases.

The main focus of the Project Delivery Review addresses the need to define a standardized cost estimate classification system that will indicate the class of cost estimate, associated contingencies and level of accuracy at various stages.

In 2026, the Project Delivery Review refined and updated the estimation practice adopted in the 2013 Project Delivery Review and offers a broader view of project cost estimation for City construction projects, infrastructure planning and financial planning tasks.

Projects delivered by Infrastructure Services fall into the following two categories:

1. Renewal Projects

Asset Management Services within Infrastructure and Water Services Department, in addition to managing the City's municipal, buildings and parks infrastructure, is responsible for coordination of the overall capital program. Asset Management Services is responsible for the early stages of renewal programs for most municipal infrastructure, buildings and parks, and local improvement projects including need identification, planning, and scoping. Renewal programs are developed in consultation with various client departments.

Asset Management Services is also responsible for completing cost estimates for long range planning purposes and at early stages of project delivery for assets under their responsibility. Typically, funding will be secured to undertake the design stage and/or property acquisitions prior to requesting funding to complete construction. This allows a more detailed construction cost estimate to be prepared after the design stage and improves the ability to complete the project scope within allocated budgets, and schedules.

The renewal capital programs developed by Asset Management Services are detailed in Project Charters that define the scope of the recommended renewal strategy for each project in the capital program.

The Project Charters are then transferred to the Infrastructure Services Design and Construction branches for project delivery.

Ongoing consultation occurs with the various branches of Infrastructure Services to ensure consistency of scoping, scheduling, estimates and implementation of projects.

The need identification, planning, functional design/scoping and environmental assessment stages for growth/expansion, traffic management, mobility and strategic initiative projects are typically undertaken by other client groups. The extent of work undertaken at this conceptual or planning level varies from client department to client department and for municipal projects compared to buildings/parks projects.

A Project Development Process chart is provided in Attachment 1. It shows the key project stages and project handover from the client departments to Infrastructure Services at the transition between the project planning and project implementation phases.

The Project Delivery Manual Document Library (on SharePoint) provides guidance for project initiators, including instructions on obtaining support if needed in the early stages of the project.

2. Growth Projects

A Project Charter was developed to formalize the Project Handover stage for these projects and to document the scope and other key information about the project at time of transfer to the Design and Construction branches. The Project Charter is prepared by the client department and sent to Asset Management Services for review. When Asset Management Services has reviewed the Project Charter, it is then sent to the Design and Construction branches to initiate the design and construction stage.

Before handover and throughout the project implementation, Infrastructure Services keeps the client departments informed on the status of the project and on key issues as they arise.

Projects initiated through special stimulus funding programs would also be managed by following the processes as outlined in this document.

Infrastructure Services Design and Construction Branches

The design and construction of most capital projects is carried out by the following branches in Infrastructure Services:

- Design and Construction Municipal
    - Responsible for municipal infrastructure within the public road right-of-way such as roads, active transportation facilities (sidewalks, cycle tracks, multi-use pathways), bridges, culverts, transit, sewers, watermains, and traffic

management.
    - Client departments are Infrastructure and Water Services, Transit Services, Public Works, Planning, Development and Building Services and Strategic Initiatives.

- Design and Construction Facilities

    - Responsible for municipal infrastructure located outside the public road right-of-way on city-owned lands. These projects include buildings (administrative facilities, fire stations, paramedic facilities, libraries, long-term care facilities, pools/arenas/community centres) as well as parks.
    - Client departments are Recreation, Cultural and Facility Services, Ottawa Public Library, Public Works, Transit Services, Police Services, Ottawa Public Health, Emergency and Protective Services, Community and Social Services, Strategic Initiatives, and other departments.

- Design and Construction Water Facilities

    - Responsible for buildings and facilities that support water services such as treatment plants and pumping stations.
    - Client department is Infrastructure and Water Services.

- Stand-alone landmark projects, such as Lansdowne Park or Ādisōke, can prompt the creation of a temporary design and construction branch

Project Initiation

The City of Ottawa's Project Delivery Manual outlines the vISion process for Charter Intake, Review, Charter Readiness Review, and Approval, ensuring a structured and transparent approach to project initiation (vISion is project managment software). The Project Delivery Manual refers to these established steps within vISion. At a high level, the process begins with Charter Intake by Project Intake Unit, where initial project information is submitted and reviewed for completeness. Following intake, a Project Manager is assigned, and collaborative reviews between the Project Manager, Project Intake team, and the Initiator occur to refine the charter. This iterative process continues until the charter achieves "Charter Readiness" status, confirming alignment on scope, schedule, and budget. Once readiness is confirmed, the charter is formally approved within vISion and transferred to Infrastructure Services for implementation, ensuring accountability and consistency across all project deliveries.

The critical aspects of the project are explained below:

1. <u>Scope</u>

The scope of the project, including all related coordinated works, must be clearly defined and shown on functional design drawings or sketches, concept plans and

included in the Project Charter at the time of Project Initiation. It must show the project limits and the extent of individual components to be constructed, expanded, or replaced. It must also provide and describe all available information relevant to the project including links to all project reports or background data including consultation with the public or approval agencies. It is important that coordination opportunities be assessed at early stages to ensure efficient and effective overall delivery.

2. Schedule

Approximate schedules may have been developed by the client departments at the planning and functional design stages. However, these schedules must be clearly identified as being approximate for planning purposes only and must be reviewed with IS prior to making public commitments. This guide recognizes that there is insufficient data available to determine the time required for preliminary and detailed design, tendering, contract award and construction of the project. In addition, the timing of the budgetary approvals required to permit those activities is generally not defined at this point.

3. Budget

This report deals with the implementation cost of the project, including all costs up to and including the completion of the construction or renewal of the facility. Implementation cost is one component of the overall whole life cost of the facility. Other whole life costs such as financing, operating, and maintaining need to be considered when developing the business case for the project and determining its priority, and these other costs are outside the scope of this report.

4. Quality

The Infrastructure Services Project Charter Guide establishes quality in project delivery by embedding structured processes and clear expectations aligned with City's Quality Management principles. By defining detailed scope requirements, objectives, and standardized templates for milestones, budgets, and risk identification, the document ensures consistency and accuracy across projects. It promotes stakeholder engagement through approval protocols and RACI matrices, reducing ambiguity and fostering accountability. Additionally, the inclusion of explanatory notes, supporting documentation checklists, and change-control mechanisms reflects a proactive approach to quality assurance and quality control, ensuring that deliverables meet agreed standards and stakeholder needs throughout the project lifecycle.

Classification System

Cost estimate classification systems exist in the industry to define the certainty of the cost estimate at different stages. The following are the definitions used by the City:

A. Class A Estimate: Pre-Tender - A detailed estimate based on complete contract

documents for tendering.

B. Class B Estimate: Design Level Estimate - An estimate based on design completed to a preliminary to detailed level, after site investigations and studies have been completed.

C. Class C Estimate: Planning Level Estimate - A ballpark estimate prepared based on functional requirements/functional design/environmental assessments with limited site information, used for planning purposes.

D. Class D Estimate: Conceptual Level Estimate - A rough order-of-magnitude estimate used for comparison purposes between alternative solutions that have been prepared on the same basis.

Clients are responsible for planning and conceptual work related to the project and therefore will typically undertake the Class C and D estimates. Infrastructure Services is responsible for design and construction, and therefore undertakes the Class A and B estimates. The Project Charter submitted by the client departments to Asset Management Services will contain the appropriate Class C or D estimate, and Asset Management Services will coordinate a review of that estimate as part of the intake process.

A method of accounting for the level of certainty in a budget estimate is to adjust the value of the contingency at the early stages, when knowledge and details are lower the use of a higher contingency allowance is appropriate to account for and cover those unknowns. At the later stages, when design has progressed and more information is available the use of a lower contingency is appropriate

Estimates at the various stages range from using historical data for similar works at the early stages to detailed estimates using unit prices from Construction Cost Management System data, previous contracts and/or Hanscomb cost estimating data at the later stages.

A capital cost estimate classification system is shown in a table in Attachment 2 and shall be adopted for all projects to ensure consistent methods of estimating. This table identifies the contingency allowance that must be included in added to the overall project budget estimates at various stages of projects to align with the level of knowledge, risk and information available.

For Class A estimates, a detailed estimate is based on complete contract documents, allowing for a high level of accuracy. Class B estimates are based on design completed to a preliminary or detailed level, following site investigations and studies, and typically include a contingency allowance of 10 percent to 20 percent. Class C estimates are ‘ballpark’ figures prepared for planning purposes, using functional requirements and limited site information, with contingencies ranging from 20 percent to 30 percent. Class

D estimates are rough order-of-magnitude figures based on historical costs for similar work, and require the highest contingency allowance of 40 percent to 50 percent to account for the conceptual nature of the design.

It should be noted that the contingency allowance is to mitigate for uncertainty, such as unforeseen site conditions or elements within the approved scope. Contingency is not intended to cover costs of major additions or revisions to the project scope. Adjustments arising from scope changes or new work are not to be drawn from contingency funding and should be accompanied with corresponding increase in both funding and schedule.

A description of the various components that should be included in a project cost estimate is provided in Attachment 3. The cost for each component is calculated as a percentage of the Construction Cost Estimate. Estimators familiar with the project select a percentage from a recommended range based on various factors such as, but not limited to, project size, risk assessment, duration, site knowledge and complexity. Similar to contingencies, percentages outside of the range may also be used depending on the unique project needs or conditions. Recommended ranges for cost components vary by project category, as detailed in Attachment 5, and are incorporated into the cost estimating templates available on SharePoint.

For the Public Art cost component, refer to the City's Public Art Policy for guidance on the applicable projects that require allocation of funds to commission public art.

Budget estimates prepared in a given year and subsequently used in a future year should be adjusted to account for inflation since the initial estimate. These adjustments should use inflation rates provided by Financial Services so that estimates reflect costs in current-year dollars.

Project Risks

In alignment with the City of Ottawa's Enterprise Risk Management Framework, project cost estimates must incorporate risk considerations to ensure informed decision-making and financial resilience. The Enterprise Risk Management principles of identifying, assessing, and mitigating risks are reflected in the application of contingency within estimates. Known risks, such as geotechnical conditions or phasing of implementation, are quantified through specific contingency percentages, while unknown or emergent risks are captured under a general contingency allowance. Together, these components form the total contingency, providing a structured approach to manage uncertainty and support the City's commitment to proactive, systematic risk management across all infrastructure projects.

There are several risks common among projects which can have substantial impacts on project costs. For these categories of projects, risk factors can be identified and quantified as 'known' contingencies. The overall contingency value, representing the remaining 'unknown' risks and uncertainty, would then be reduced accordingly. The

identification of common risk factors also provides the means to independently track the costs associated with these factors and refine the cost estimate, improving the level of confidence in subsequent estimates.

The common construction risk factors and how they can be applied are provided in Attachment 4. Over time, the City will develop guidance for additional construction risk factors, including construction risk factors for other project categories

Cost Estimating Templates

Microsoft Excel templates have been developed to assist in the cost estimating process. The recommended ranges of cost components are based on an analysis of completed projects. It should be noted that these cost estimating templates were prepared as a guide only and they are not expected to replace an estimator's experienced judgement.

Project Implementation

The Infrastructure Services Design and Construction branches will deliver the project in accordance with the IS Project Delivery Manual. Asset Management Services and the client departments will be notified of changes to the project budget, scope, or schedule. The final project stages will frequently include a commissioning stage, and then a handover of the project to the operating client department. The operating client department is responsible for identifying budget requirements related to operation of the constructed facility.

Moving Forward

In addition to the adoption of the cost estimate classification system shown in Attachments 2 and 3, all reports to Committee and Council and future budget documents must utilize the proposed system for reporting on project costs.

Based on the PDR, endorsed by City Council:

1. In cases where an estimate of Whole of Life Costs is required for building related infrastructure, it will be calculated as the Net Present Value of the entire project over a 50-year period, and include:

    - Land Purchase and Acquisition
    - Facility Design and Construction Costs (Construction Estimate to Class D level)
    - Financing Costs
    - Operating Costs
    - Life Cycle and Planned Capital Renewal Costs
    - Planned Improvement Costs

- Demolition and Site Cleanup Costs
- Disposal Costs

2. Reports to Committee/Council and budget documents should clearly indicate the class of estimate being provided. Estimates should be provided in current year dollars with appropriate contingency in accordance with the Guide.

3. Estimates for the Long-Range Financial Plan Transportation Master Plan, Infrastructure Master Plan or Development Charge Background study and Bylaw planning are typically Class C or D level and should be in current year dollars, including the appropriate contingency allowance.

4. Project budgets are to be adjusted by the client department to reflect current cost estimates including inflationary increases.

Supporting Documentation

- Attachment 1 – Project Delivery Review (PDR)
- Attachment 2 – Capital Cost Estimate Classification System
- Attachment 3 – Capital Cost Estimate Components
- Attachment 4 – Construction Risk Factors
- Attachment 5 - Recommended Ranges for Cost Components by Project Category