

**Deputy City Manager's Office Report to
Priorities and Finance Committee
2016 December 13**

**ISC: UNRESTRICTED
PFC2016-0853
Page 1 of 4**

PROGRESS REPORT UPDATE - STAGE GATING, CAPITAL AND CONTINGENCY

EXECUTIVE SUMMARY

This report provides a response to the questions posed by Council on 2016 July 25 regarding report TT2016-0578.

Specifically, during the discussion regarding RouteAhead and questions raised regarding the Southwest Bus Rapid Transit (BRT), Council requested a progress report and recommendations related to the use and reporting of project estimates, contingency and changes to the capital budgeting process including Council's approval. The progress report and recommendations can be found in Attachment 1.

ADMINISTRATION RECOMMENDATION(S)

Administration recommends that Council:

Direct the Administration to continue its work regarding the implementation of a capital budgeting process that aligns to the stage gating, project risk management, estimation and contingency standards and report back to the Priorities and Finance Committee prior to the end of December 2017.

PREVIOUS COUNCIL DIRECTION / POLICY

In its meeting on 2016 July 25 when discussing item TT2016-0578, "RouteAhead Rapid Transit Corridors Update and Response to Public Questions on the SW BRT", Item 6 of Council's motion directed Administration to:

- “ . Report back with recommendations to Council through the Priorities and Finance Committee with a progress report no later than 2016 December 31 with:
- a) Changes to the City's capital budgeting process, including but not limited to consideration of Class 1-5 cost estimating process;
 - b) Criteria used to rank capital projects;
 - c) Criteria for determining the appropriate contingencies for projects; and
 - d) The Council approval process in relation to cost estimates, contingencies, budgets and scope changes.”

BACKGROUND

The continuous improvement of infrastructure investment and project management practices has been the topic of past review and recent discussion with Council. For instance, in 2011 a number of internal audits and Notices of Motion identified further improvements for the practice of project management, including:

1. Audit Committee report AC2011-54, "16th Avenue North Urban Corridor,"
2. Audit Committee report AC2011-60, "Fire Department Facilities Construction,"
3. Notice of Motion NM2011-33, "Improvements to the Project Management Process,"
4. An amendment to LPT2011-99, "West LRT – Project Update and Completion Plan"

In addition to items one and two above, the Corporate Project Management Centre (CPMC) was directed by the Audit Committee and Council to establish the Corporate Project

**Deputy City Manager's Office Report to
Priorities and Finance Committee
2016 December 13**

**ISC: UNRESTRICTED
PFC2016-0853
Page 2 of 4**

PROGRESS REPORT UPDATE - STAGE GATING, CAPITAL AND CONTINGENCY

Management Framework (CPMF). On 2015 March 17, Administration presented its final report to the Priorities and Finance Committee (PFC) outlining the various deliverables that were developed to meet the audit and Notice of Motion requirements. This included the development of standards and practices for estimating and contingency.

Administration provided a status update regarding the continual improvement of project management practices to Council on 2015 September 14 in report C2015-0484, "Green Sheet Response, Project Management on City Projects". The direction received from Council was that: "Administration continue with improvements to the Corporate Project Management Framework, including implementation of value management, stage gating and a more comprehensive approach for quality management for capital projects."

Council has also approved The Corporation's Capital Infrastructure Investment Strategy at its meeting on 2015 November 25. This document sets the foundation for the establishment of enterprise wide infrastructure management and will serve as the basis for new capital budget processes and practice development.

INVESTIGATION: ALTERNATIVES AND ANALYSIS

The improvement of infrastructure and project management maturity is an evolutionary journey that requires a careful and thorough approach. For a complex organization the size of The City of Calgary, improving business maturity is a change that requires time to do it right. Calgary has successfully started that journey.

While Administration is continuing to improve its project management maturity, it is also building on these successes by establishing an enterprise wide approach to infrastructure investment management, namely Infrastructure Calgary (IC). Administration's ultimate goal is to continue to move beyond simple compliance with project management standards and capital budgeting to creating value in the community through infrastructure investment.

As directed by Council regarding report C2015-0484, Administration is in the process of implementing internal project management and infrastructure investment practices, including the adoption of a Stage Gate methodology. Stage Gate is a trademarked method (by Stage Gate International) used by leading project management organizations to manage project risk. More specifically, the approach is used to release project funds as a project progresses through various "gates". Individual business units within The Corporation are at various phases of implementation of stage gating. For instance, the Water Utility, Waste & Recycling Services and Facilities Management have already implemented a stage gate process that aligns to the CPMF standard.

Attachment 1 of this report provides additional detail regarding the process and practices that Administration has completed as a result of Council's direction, including the criteria used to develop the appropriate levels of contingency for projects.

As a next step, IC will work with the CPMF Steering Committee and Finance to establish new capital budgeting processes. It will make recommendations to Council accordingly prior to the end of 2017 and the start of the next business planning and budgeting cycle.

Deputy City Manager's Office Report to
Priorities and Finance Committee
2016 December 13

ISC: UNRESTRICTED
PFC2016-0853
Page 3 of 4

PROGRESS REPORT UPDATE - STAGE GATING, CAPITAL AND CONTINGENCY

Stakeholder Engagement, Research and Communication

The following provided input and assistance into the development of this report:

- Managers within the CPMF Steering Committee;
- Infrastructure Calgary and its members within the Senior Management Team;
- Members of the Administrative Leadership Team, and;
- External project management professionals, including Stage Gate International.

Strategic Alignment

This report aligns with the CPMF program plan as approved by Council in early 2012, the Strategic Leadership Plan, the Infrastructure Investment Strategy approved by Council in July of 2016 and goals and objectives of Action Plan 2015-2018

Social, Environmental, Economic (External)

Social

There are no social implications as part of this work.

Environmental

There are no environmental implications as part of this work.

Economic (External)

In addition to internal project management practice and infrastructure investment improvements, Administration is exploring innovative ideas that will increase The City's percent capital spend, decrease the "time to market" and inspire leveraged community value investments as part of the economic resiliency work currently underway.

Financial Capacity

Current and Future Operating Budget:

This work can be completed within current budget allocations.

Current and Future Capital Budget:

This work can be completed within current budget allocations.

Risk Assessment

The major risks associated with this program are:

- resource constraints could result in slowing or stoppage of the IC and CPMF programs;
- resistance to change may be encountered from project managers, management teams and others; and

Having the appropriate program charter and effective governance as well as a change management and communications plan in place is the key to mitigating these risks.

REASON(S) FOR RECOMMENDATION(S):

The recommendation supports Administration's ongoing work to develop a comprehensive and value added project management and infrastructure investment approach for The Corporation.

Deputy City Manager's Office Report to
Priorities and Finance Committee
2016 December 13

ISC: UNRESTRICTED
PFC2016-0853
Page 4 of 4

PROGRESS REPORT UPDATE - STAGE GATING, CAPITAL AND CONTINGENCY

ATTACHMENT(S)

1. Response to Question 6 of TT2016-0578, Progress Report: Changes to the Capital Budget Process

Response to Question 6 of TT2016-0578 Priorities and Finance Committee, 2016 December 14

Progress Report: Changes to The City's Capital Budgeting Process

The Corporate Project Management Framework and Infrastructure Calgary
12/14/2016

Response to Question 6 of TT2016-0578 Progress Report: Changes to The City's Capital Budgeting Process

This attachment provides a progress report regarding the items raised during the discussion at the Transportation and Transit Standing Policy Committee for the "RouteAhead Rapid Transit Corridors Update and Response to Public Questions on the SW BRT, TT2016-0578, specifically question 6 as follows;

- "6. Direct Administration to report back with recommendations to Council through the Priorities and Finance Committee with a progress report no later than 2016 December 31 with:
- a) Changes to the City's capital budgeting process, including but not limited to consideration of Class 1-5 cost estimating process;
 - b) Criteria used to rank capital projects;
 - c) Criteria for determining the appropriate contingencies for projects; and
 - d) The Council approval process in relation to cost estimates, contingencies, budgets and scope changes."

6a) and 6d) Changes to The City's capital budgeting process, including consideration of class 1-5 cost estimating, and the Council approval process:

Background & Status:

Since 2010, and as part of the Corporate Project Management Framework (CPMF), Administration has been working to establish numerous mandatory standards and practices for capital projects. On 2015 September 14, the CPMF provided a status update to Council regarding the development and continual improvement of project management practices within The City.

As a result of the above status update, Council directed Administration to develop a standard and practice for stage gating for capital projects as part of the CPMF. In addition, many business units are working to improve cost estimating practices.

"Stage Gate" is a trademarked method (by Stage Gate International) used by leading project management organizations to manage project risk. More specifically, the approach is used to release project funds as a project progresses through various "gates." As the project manager or sponsor demonstrates that the necessary level of due diligence has been completed for that specific stage in the project's development, the stage gate committee members allow the project(s) to formally progress to the next stage. Thus, as a project progresses, the project manager obtains better cost and schedule estimates, reducing the size of contingency and improving the ability to manage project risk. Figure 1 at the end of this attachment illustrates the five stage gates that have been recommended by Stage Gate International and approved by the CPMF Steering Committee.

The CPMF Steering Committee approved a new Stage Gate Standard in Q3 of 2016 and new standards for Estimating, Contingency and Scheduling and Project Risk Management,

Response to Question 6 of TT2016-0578 Progress Report: Changes to The City's Capital Budgeting Process

which are discussed further in section 6c). Refer to Figure 1 and Table 1 for excerpts of these standards.

Analysis:

The Stage Gating, Project Risk Management and the EC&S Standards work in concert to better manage project risk and form a foundation for a new capital budget process. These Project risk Management and EC&S standards will become mandatory in early 2017. The CPMF will be working with Infrastructure Calgary and the various Departments to develop implementation plans for stage gating in 2017.

Infrastructure Calgary (IC) recognizes the value that the stage gating approach offers and its links to project delivery, infrastructure investment and the capital budget approval process.

It is currently working with the CPMF Steering Committee to develop implementation plans accordingly.

Individual business units within The Corporation are at various phases of implementation of stage gating. For instance, Facility Management has already implemented a stage gate process which aligns to the CPMF standard. It is important to note that the Water Utility and Waste & Recycling Services are currently implementing a risk-based layered contingency approach as part of recommendations made through the Water Resources – Zero Based Review. It is intended that this advanced approach to contingency management, once implemented, will provide guidance and lessons learned to future enhancements to contingency management for The City. In addition, Infrastructure Calgary is working to establish its role as part of the stage gating approach in order to prioritize and recommend infrastructure investment for Council approval as part of the capital budgeting process.

As previously noted, the Corporate Project Management Centre (CPMC), on behalf of IC, is currently working with each department to develop an implementation plan for stage gating. The CPMC and IC are also working with Finance to develop linkages to the capital budgeting process and to define the Council approval process, including the identification of when Council approval occurs in the stage gating process. Further work is required on these processes. Administration will report back to committee by 2017 December.

Risks:

- The implementation of stage gating practice is a significant change to how The City manages and governs its capital projects. Implementation plans within each business unit are being designed to mitigate the risk of change.

Recommendation:

**Response to Question 6 of TT2016-0578 Progress Report:
Changes to The City's Capital Budgeting Process**

Administration recommends that IC work with the CPMF Steering Committee and Finance to continue the implementation of a capital budgeting process that aligns to the stage gating risk management and estimating and contingency standards.

6b) Criteria used to rank capital projects:

Background & Status:

In 2012, the Administrative Leadership Team required that each Infrastructure Investment Plan (sometimes referred to as "IIPs") have a set of criteria that it use to prioritize infrastructure investment. Typically, the criteria are based upon the Triple Bottom Line, but the weighting (i.e. level of importance) of the criteria relative to one another is decided upon by the General Manager. It is also left to the General Manager responsible for each IIPs to approve the specific criteria within that portfolio, to communicate the results with Council and the public and to use the content as input to the business planning and capital budgeting process.

In November of 2015 the Deputy City Manager presented an Infrastructure Investment Strategy and outlined the establishment IC.

Analysis:

Since then, IC has been working to address the needs of Calgarians through increasing the quality and velocity of capital investment through the Capital Infrastructure Investment Strategy. Progress to date was highlighted in C2016-0863 as part of Mid Cycle Adjustments. One of IC's focus areas for 2017 is identifying criteria and a process to prioritize investments across the various Infrastructure Investment Plans in line with the Strategy.

Risks:

- The implementation of enterprise portfolio management is a significant change to how The City manages and governs its infrastructure investment.

Recommendation:

Administration recommends that IC continue to develop criteria and a process to prioritize infrastructure investment at the enterprise level as well as a program charter including a risk mitigation and change management plan.

6c) Criteria for determining the appropriate contingencies for projects:

Background & Status:

Aligned with good project management practice, The City of Calgary establishes contingency funding within each program or project in order to manage project risk.

Response to Question 6 of TT2016-0578 Progress Report: Changes to The City's Capital Budgeting Process

Early on in a project's development, there are many unknowns that may exist related to that project's scope, cost and schedule. At the beginning of the project very little detail is known so the estimate is based on good judgment and/or experience. As the project evolves, the project definition increases and more accurate estimates can be produced.

Every project has risks and opportunities. Risks and opportunities may result in cost increases/decreases, performance issues or safety concerns. The impact of an identified risk may not be fully known at the time an estimate is prepared. Development of contingency necessitates the evaluation of a risk/opportunity and its impact on the project resources, specifically costs. Sufficient resources would then be allocated as contingency.

In 2012, the CPMF Steering Committee approved a standard to define and guide the practice of creating estimates and the use of contingency. As of Q3 of 2016, the CPMF Steering Committee reviewed and approved a new standard for EC&S. This standard is aligned to internationally recognized standards for cost estimation (American Society of the International Association for Testing and Materials, ASTM E2516-11).

Analysis:

The specific criteria for determining the appropriate contingencies for projects are found in the CPMF Estimating, Contingency and Schedule Standard as well as the emerging CPMF Project Risk Management Standard. These standards are available to the public on the CityOnline website or upon request.

The levels of project classification are as follows:

- Class 5 estimate – Order of Magnitude
- Class 4 estimate – Conceptual Design
- Class 3 estimate – Preliminary Design
- Class 2 estimate – Detailed Design
- Class 1 estimate – Final Design/Pre-Tender

It is important to note that contingency is only applied to projects that have a Class 3 to Class 1 cost estimates.

The following key points should be considered when assigning contingency:

- Contingency shall not be used to address project changes outside the original description (performance, schedule and cost) of the project in the approved project plan.
- It is the responsibility of the project manager and project sponsor to determine whether or not there are contingencies within unit rates, lump sums, and cash allowances or within line items such as design, construction or project contingency.

In addition to the above, and as a project progresses, a risk may not have materialized into

Response to Question 6 of TT2016-0578 Progress Report: Changes to The City's Capital Budgeting Process

an issue. A risk that no longer exists does not require contingency. The contingency is then released by the project. The timing of the release of unused contingency should be identified by the project manager and project sponsor.

As part of the continual improvement of project management and infrastructure investment practices, it was identified that there was an opportunity to improve project estimates when creating a capital project business case. With the pending implementation of stage gating practice, along with the Estimating, Contingency and Schedule/Risk Management standards and improvement of project estimation techniques in the business units, it is expected that Council will see more consistency in cost estimates and contingency use.

Risks:

Risks identified with respect to estimating and contingency include:

- Current budget approval processes require “a single number” and do not align to the project management practice of providing a range estimate.
- When communicating a range estimate, either for cost or schedule, it is often the lowest value that is remembered by key stakeholders. For instance, if a project is estimated to range between \$1 million to \$3 million, the lower value of \$1 million is often remembered as the project cost.

Recommendation:

Administration recommends that IC work with the CPMF Steering Committee and Finance to continue the implementation of a capital budgeting process that aligns to the stage gating, risk management and estimation and contingency standards. Infrastructure Calgary and the CPMF Steering Committee will also develop a program implementation plan including a risk mitigation and change management plan.

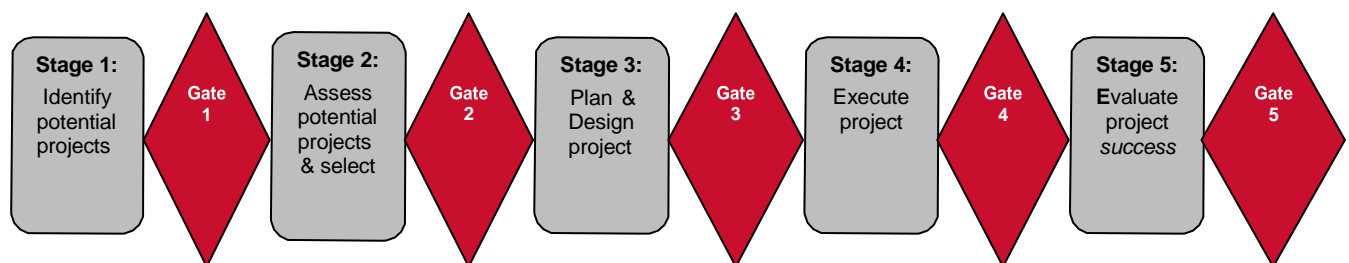


Figure 1 City of Calgary Stage Gate Approach

**Response to Question 6 of TT2016-0578 Progress Report:
Changes to The City's Capital Budgeting Process**

Table 1 City of Calgary Estimation and Contingency Standards

Estimation	
Class 5 Order of Magnitude	<ul style="list-style-type: none"> • Generally prepared based on very limited information and often based on judgment and/or experience • Expected variance is -50% to +100% • Developed to understand the magnitude of the costs involved in achieving the project
Class 4 Conceptual Design	<ul style="list-style-type: none"> • Generally prepared based on conceptual or feasibility studies, considering project options and known constraints • Expected variance is -30% to +50% • Developed to aid in defining the detailed project scope
Class 3 Preliminary Design	<ul style="list-style-type: none"> • Generally prepared based on preliminary design information. At this stage project assumptions and constraints have been defined and detailed design is underway • Expected variance is -20% to +30% • Developed to verify project scope and establish the basis for project cost/schedule control
Class 2 Detailed Design	<ul style="list-style-type: none"> • Generally prepared based on detailed design information. At this stage detailed design has advanced • Expected variance is -15% to +20% • Developed to verify project scope and establish the basis for detailed project cost/schedule control
Class 1 Final Design / Pre- Tender	<ul style="list-style-type: none"> • Generally prepared based on final design information. At this stage, detailed design is complete. • Expected variance is -10% to +10%. • Developed based on finalized project scope, to confirm the sufficiency of funding for the project prior to tender and/or project execution. • Provides the basis/background necessary for detailed negotiation and cost reconciliation with any bidder and/or contractor.
Contingency	
<ul style="list-style-type: none"> • Project contingency for cost estimates shall be based on project risk assessment in accordance with the Project Risk Management Standard and the result should be represented as a percentage of the total cost estimate. • Contingency shall be designated at Class 3 to Class 1 estimates. • Projects shall report the use of contingency dollars as defined in the Progress Reporting Standard. • Unused contingency dollars shall be released at an appropriate time as identified in the project Cost Management Plan in accordance with the Project Plan Standard. • Projects shall not use contingency dollars to address project changes as defined in the Project Change Control Standard. 	