



City of Ottawa

LRT Stage 3 Procurement Options Analysis and Project Governance Best Practices

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Le présent rapport a été préparé dans le seul but d’aider la Ville d’Ottawa à examiner ses options d’approvisionnement pour la phase 3 du projet O-Train. La méthodologie utilisée est conçue pour évaluer qualitativement les options d’approvisionnement potentielles. Une analyse quantitative détaillée, des évaluations des risques et un exercice de sondage du marché devraient être effectués avant qu’un modèle d’approvisionnement final ne soit sélectionné. Ce rapport n’est pas destiné à être diffusé ou publié. KPMG n’assumera aucune responsabilité à l’égard des pertes subies par la Ville d’Ottawa ou d’autres parties à la suite de la circulation, de la publication, de la reproduction ou de l’utilisation de ce rapport contrairement aux dispositions du présent paragraphe.

Executive Summary

The O-Train is a light rail transit (“LRT”) system in Ottawa, operated by OC Transpo. The O-Train system is currently composed of the Confederation Line, which runs east to west, and the Trillium Line, which runs north to south. Due to the size of the envisioned system, the construction has been separated into multiple stages. Stage 1 of the O-Train system included the construction of the first 13 stations of the Confederation Line. Stage 2 of the O-Train system is an extension to the existing Confederation (West and East) and Trillium (South) lines, including 44 km of rail and 24 new stations.

As it looks to expand the O-Train further with Stage 3, the City of Ottawa (the “City”) is taking steps to learn from local and Canadian procurements and improve upon its own local procurements. Stage 3 of the O-Train (the “Project”) will be an extension to the existing Line 1 O-Train Confederation line west into Kanata and south into Barrhaven. The extension of the existing Confederation Line 3 west into Kanata would go from the Stage 2 LRT terminus at Moodie Drive to a new terminus at Hazeldean Road. The Line 3 extension proposes a fully segregated LRT facility, 8 new transit stations, new Park and Ride facilities at Hazeldean and Palladium Stations, and an expansion of the approved Moodie Light Maintenance and Storage Facility. The extension of the existing Confederation Line 1 south into Barrhaven, a distance of approximately 10 km, would also be a fully segregated facility which includes seven LRT stations from Baseline Station to Barrhaven Town Centre. Three would be new, elevated stations and four would be converted from the existing BRT stations to LRT stations. A Train Storage and Servicing Facility (“TSSF”) for storing and performing light service on eight trains will be built adjacent to the LRT line near the existing Greenbank Road/VIA Rail crossing. The recommended plan also includes the construction of three new bridges over the VIA Rail line at Woodroffe Avenue, the Southwest Transitway and Fallowfield Road, to address safety concerns, a bus-to-rail transfer terminal and a 250-spot park-and-ride at the Barrhaven Town Centre. The project would also provide new and improved facilities for pedestrians and cycling along the corridor.

KPMG has been mandated by the City to review and present best practices for future light rail or similar linear infrastructure procurements in order to achieve transparency, integrity, value for money, openness, fairness, competition, and accountability, and suggest procurement options and governance frameworks for Stage 3. This report focuses on reviewing procurement options in the context of the City’s existing Design-Build-Finance-Maintain contracts as part of a Stage 3 expansion and recommends preferred procurement options accordingly. It also presents best practices for governance of large-scale procurements, including the interrelationship between technical and engineering teams, legal advisory support, procurement management teams, evaluation committees, steering committees, executive decision-makers and elected officials, and recommends a preferred governance model.

Six potential procurement options were selected based on the Project scale and scope, market capacity, timing constraints, complexity, and implementation requirements. A workshop with the City was held to perform the qualitative analysis of the selected six procurement options

based on a set of criteria derived from the Project's scope and procurement objectives. The qualitative analysis was intended to differentiate these selected procurement options in order to arrive at three preferred procurement options for the procurement of the Project: Early Contractor Involvement ("ECI"), Design-Build ("DB"), and Design-Build-Finance ("DBf").

It is necessary to set up the right project governance structure for the organization, which will allow an entity such as the Ottawa City Council to maintain control while ceding day-to-day responsibility to management. Whatever the structure, it also needs to take a lifecycle approach, rather than just being in place for construction. Governance begins at the earliest planning phase of a project and continues through implementation and ultimately into operations. A lifecycle approach is recommended to help ensure that project objectives and risks cover the entire life of the project and not only its implementation. A comprehensive internal governance model is essential for managing decision-making with respect to the Project in accordance with the following overarching best practice principles:

- Ensure a single point of accountability at each level for the success of the Project to enable clarity of leadership and timeliness of decision-making;
- Be clear in setting objectives, and define trade-offs between objectives, to help support aligned decision-making;
- Ensure a degree of separation between project governance and corporate governance; interface and integration should be considered;
- Use a line-of-sight variation reporting feature so that the Executive Steering Committee has sufficient, accurate and timely information to make responsive and informed decisions;
- Enable efficient and effective project decision-making through clear unambiguous delegations of authority and ensure the right targeted people are involved (e.g., effective use of sub-committees);
- Minimize layers of the governance structure (increasing flatness) to influence the ability to escalate issues quickly; and
- Align internal stakeholders around their role and support required for the Project.

This report contains preliminary analysis of potential delivery models for consideration for Stage 3. The City will undertake further analysis, including quantitative analysis, confirming the Project objectives, possible funding sources, as well as potentially updating the Business Case for the Project given the uncertainties caused by the COVID-19 pandemic before finalizing procurement options for the Project.

Sommaire exécutif

L'O-Train est un service de train léger sur rail ("TLR") à Ottawa qui est opéré par OC Transpo. L'O-Train est actuellement composé de la Ligne de la Confédération, orientée d'est en ouest, ainsi que de la Ligne Trillium, se déployant du sud au nord. Considérant la taille du réseau envisagé, la construction a été séparée en différentes étapes : l'Étape 1 a été mise en service en 2019 et l'Étape 2 est actuellement en construction. L'Étape 2 est une prolongation des lignes Confédération (est-ouest) et Trillium (sud-nord) existantes, incluant un total de 44 km de voies ferrées et 24 nouvelles stations.

Alors qu'elle prévoit de poursuivre l'expansion de l'O-Train avec l'Étape 3, la Ville d'Ottawa (la " Ville ") prend des mesures pour tirer des leçons des approvisionnements locaux et canadiens et pour améliorer ses propres approvisionnements locaux. L'Étape 3 de l'O-Train (le " projet ") consistera en un prolongement de la Ligne 1 existante de la Confédération de l'O-Train vers l'ouest à Kanata et vers le sud à Barrhaven. Le prolongement de la Ligne 3 existante de la Confédération de l'O-Train à l'ouest de Kanata ira du terminus du TLR de l'Étape 2 à Moodie Drive jusqu'à un nouveau terminus à Hazeldean Road. Le prolongement de la Ligne 3 propose une installation de TLR entièrement séparée, huit nouvelles stations, de nouveaux parcs-o-bus aux stations Hazeldean et Palladium, et un agrandissement du *Moodie Light Maintenance and Storage Facility*. Le prolongement de la Ligne 1 actuelle de la Confédération vers le sud jusqu'à Barrhaven, sur une distance d'environ 10 km, serait également une installation entièrement séparée qui comprendrait sept stations de TLR entre la station Baseline et le centre-ville de Barrhaven. Trois nouvelles stations seraient surélevées et quatre seraient converties en stations de TLR à partir des stations de transport en commun rapide par autobus existantes. Une installation de remisage et d'entretien des trains ("TSSF") pour l'entreposage et l'entretien léger de huit trains sera construite à côté de la ligne de TLR, près du passage à niveau actuel de Greenbank Road/VIA Rail. Le plan recommandé prévoit également la construction de trois nouveaux ponts au-dessus de la ligne VIA Rail à l'avenue Woodroffe, au Southwest Transitway et au chemin Fallowfield, afin de répondre aux préoccupations en matière de sécurité, d'un terminal de correspondance autobus-rail et d'un parc-o-bus de 250 places au Barrhaven Town Centre. Le projet prévoit aussi de nouvelles installations aménagées pour les piétons et les cyclistes le long du corridor.

La Ville a confié à KPMG le mandat d'examiner et de présenter les meilleures pratiques pour les futurs approvisionnements en rails légers ou en infrastructures linéaires similaires en vue d'assurer la transparence, l'intégrité, le rapport qualité-prix, l'ouverture, l'équité, la concurrence et la responsabilité, et de suggérer des options d'approvisionnement et des cadres de gouvernance pour l'Étape 3. Le présent rapport examine des options d'approvisionnement dans le contexte des contrats actuels de conception, de construction, de financement et d'entretien de la Ville dans le cadre d'une expansion de l'Étape 3 et identifie les options d'approvisionnement privilégiées. Il présente également les meilleures pratiques en matière de gouvernance des approvisionnements majeurs, y compris l'interrelation entre les équipes techniques et d'ingénierie, le soutien juridique, les équipes de gestion des approvisionnements,

les comités d'évaluation, les comités directeurs, les décideurs exécutifs et les représentants élus, et recommande un modèle de gouvernance.

Six options potentielles d'approvisionnement ont été sélectionnées en fonction de la portée et de la taille du projet, de la capacité du marché, des contraintes de temps, de la complexité et des exigences de mise en œuvre. Un atelier avec la Ville a été organisé afin d'effectuer l'analyse qualitative des six options d'approvisionnement sélectionnées sur la base d'un ensemble de critères dérivés de la portée du projet et des objectifs d'approvisionnement. L'analyse qualitative visait à différencier les options d'approvisionnement sélectionnées afin d'en retenir trois pour la réalisation du projet : l'implication anticipée de l'entrepreneur ("ECI"), la conception-construction ("DB") et la conception-construction-financement ("DBF").

Il serait opportun de voir à mettre en place une gouvernance de projet qui assurera au Conseil municipal d'Ottawa le contrôle tout en déléguant un certain niveau d'autonomie des activités quotidiennes à l'équipe de direction de projet. Quelle que soit la structure, cette gouvernance doit s'appliquer durant tout le cycle de vie du projet plutôt qu'uniquement lors de la construction. Ainsi, la gouvernance commence dès la première phase de planification d'un projet et se poursuit tout au long de la réalisation jusqu'à l'exploitation. Une approche fondée sur le cycle de vie est recommandée pour garantir que les objectifs et les risques du projet couvrent toute sa durée de vie. Un modèle de gouvernance est essentiel pour assurer une prise de décision en conformité avec les exigences du projet et les meilleures pratiques suivantes :

- Assurer un point unique d'imputabilité à chaque niveau afin d'assurer une clarté dans les responsabilités et une rapidité dans la prise de décisions;
- Fixer clairement les objectifs et établir un ordre de priorité, afin de mieux orienter la prise de décision;
- Assurer une indépendance entre la gouvernance du projet et la gouvernance de l'entreprise ; les interfaces et l'intégration doivent être considérées;
- Mettre en place des mécanismes de reddition de comptes afin que le comité directeur dispose d'informations suffisantes et adéquates lui permettant de prendre des décisions informées et en temps opportun;
- Permettre une prise de décision rapide et efficace grâce une délégation d'autorité claire et veiller à ce que les bonnes personnes soient impliquées (utilisation efficace des sous-comités par exemple);
- Réduire les niveaux dans la structure de gouvernance (une structure plus aplatie) afin d'améliorer la capacité à faire remonter les problèmes rapidement; et
- Aligner les parties prenantes internes sur leur rôle et leur soutien dans la réussite du projet.

Ce rapport contient une analyse préliminaire des modèles de livraison potentiels à prendre en considération pour l'Étape 3. Avant de finaliser les options d'approvisionnement du projet, la Ville entreprendra une analyse plus approfondie, y compris une analyse quantitative, sur les objectifs du projet, les sources de financement possibles, ainsi que la mise à jour éventuelle du dossier d'affaires du projet compte tenu des incertitudes causées par la pandémie de COVID-19.

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1. Context

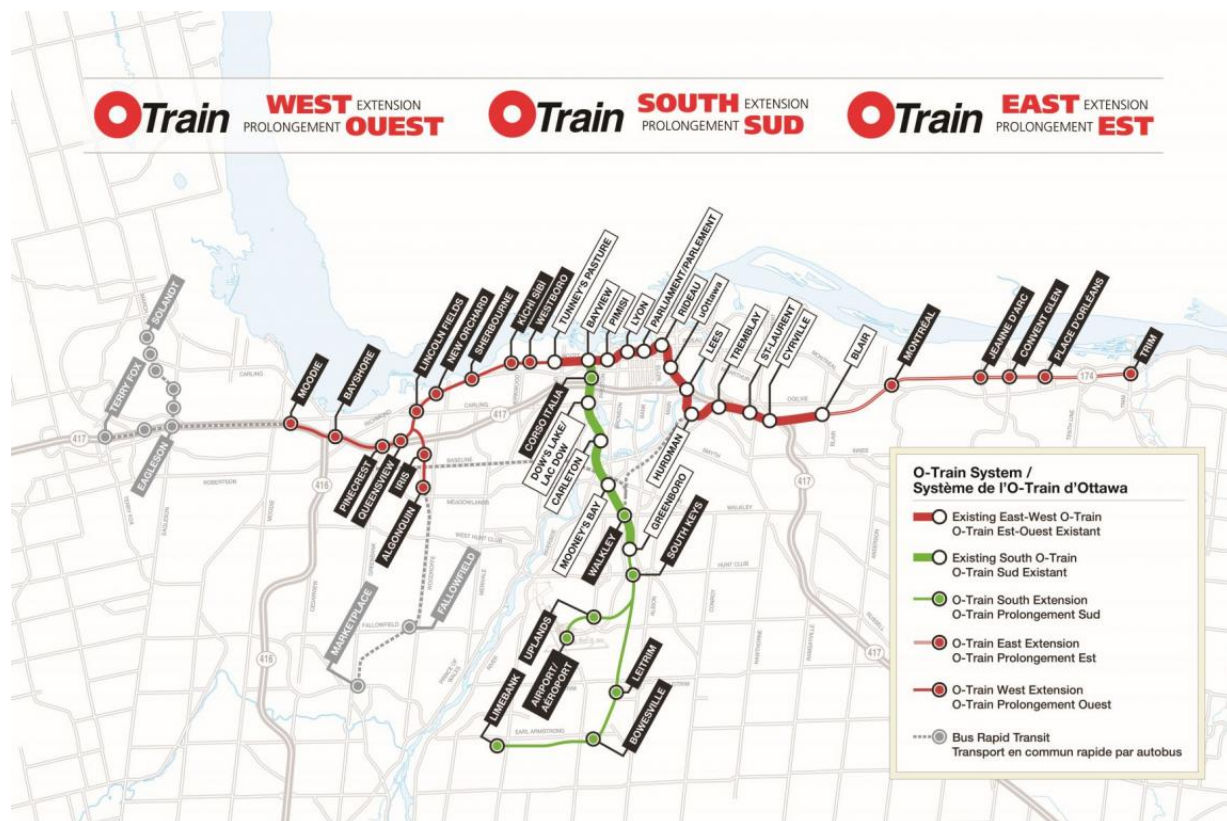
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Stage 1 of the O-Train system included the construction of the first 13 stations of the Confederation Line. The project was awarded to Rideau Transit Group (composed of ACS Infrastructure, Dragados, Ellis Don, and SNC Lavalin), achieved substantial completion on July 27, 2019, and began service in September 2019.

Stage 2 of the O-Train system is an extension to the existing Confederation (West and East) and Trillium (South) lines, including 44 km of rail and 24 new stations. Figure 1 illustrates the existing Confederation and Trillium lines, as well as the extensions included in Stage 2.

The Stage 2 contracts were awarded to “TransitNEXT” (solely owned by SNC-Lavalin) for the Trillium Line extension and to “East West Connectors” (partnership between VINCI Group and Kiewit) for the Confederation Line extension. Contract award was approved by the Ottawa City Council on March 6, 2019, and all Stage 2 work is expected to be completed in 2025.

Figure 1: Stage 1 and 2 O-Train lines



The City of Ottawa (the “City”) is currently preparing the procurement of Stage 3 of the O-Train, including undertaking the Environmental Assessment, preliminary engineering, and costing of the Project, which will allow the subsequent preparation of a project proposal for consideration by the Province of Ontario and the Government of Canada. In order to successfully expand the O-Train to Stage 3 in the context of the existing Stage 1 and Stage 2 contracts, the City is currently reviewing different viable procurement options and best practices for project governance both encouraging transparency, integrity, value for money, openness, fairness, competition, and accountability for outcomes.

2. Project Definition

2.1 Project Understanding

Stage 3 of the O-Train (the “Project”) will be an extension to the existing Line 1 O-Train Confederation line west into Kanata and south into Barrhaven. The extension of the existing Confederation Line 3 west into Kanata would go from the Stage 2 LRT terminus at Moodie Drive to a new terminus at Hazeldean Road. The Line 3 extension proposes a fully segregated LRT facility, 8 new transit stations, new Park and Ride facilities at Hazeldean and Palladium Stations, and an expansion of the approved Moodie Light Maintenance and Storage Facility. The extension of the existing Confederation Line 1 south into Barrhaven, a distance of approximately 10 km, would also be a fully segregated facility which includes seven LRT stations from Baseline Station to Barrhaven Town Centre. Three would be new, elevated stations and four would be converted from the existing BRT stations to LRT stations. A Train Storage and Servicing Facility (“TSSF”) for storing and performing light service on eight trains will be built adjacent to the LRT line near the existing Greenbank Road/VIA Rail crossing. The recommended plan also includes the construction of three new bridges over the VIA Rail line at Woodroffe Avenue, the Southwest Transitway and Fallowfield Road, to address safety concerns, a bus-to-rail transfer terminal and a 250-spot park-and-ride at the Barrhaven Town Centre. The project would also provide new and improved facilities for pedestrians and cycling along the corridor.

2.2 Procurement Objectives

Table 1 describes the City’s procurement objectives as defined by the Project Team. The procurement objectives were developed with the intent to guide the evaluation of procurement options. These objectives fall in line with encouraging transparency, integrity, value for money, openness, fairness, competition, and accountability for the outcomes of the procurement process.

Table 1: Procurement Objectives

#	Procurement Objectives	Description
1	Cost certainty	– Due to the government’s preference for cost certainty
2	Advance the design to an appropriate level	– Due to the desire to reflect lessons learned from past projects, to interface efficiently with Stages 1 and 2, and to ensure stakeholder needs and commitments are met, while encouraging innovation where appropriate
3	Involve contractor and designer early on	– Due to the complexity associated with the soil conditions, the construction of three bridges, the major utilities relocation required, and the systems engineering
4	Retain existing maintainer	– Due to the existing maintenance contract with the Rideau Transit Group on the Confederation line

3. Mandate and Methodology

KPMG has been mandated by the City to review and present best practices for future light rail or similar linear infrastructure procurements in order to achieve transparency, integrity, value for money, openness, fairness, competition, and accountability, as well as suggest procurement options and governance frameworks for Stage 3. This report focuses on reviewing procurement options in the context of the City's existing Design-Build-Finance-Maintain contracts as part of a Stage 3 expansion and recommends preferred procurement options accordingly. It also presents best practices for governance of large-scale procurements, including the interrelationship between technical and engineering teams, legal advisory support, procurement management teams, evaluation committees, steering committees, executive decision-makers, and elected officials. This report also recommends a preferred governance model.

The approach used for the realization of this mandate includes the following steps:

1. Procurement options screening (Section 4) and criteria shortlisting (Section 5.1)

Based on the specificities and key objectives of the Project provided by the City, five feasible procurement options were selected, and nine criteria were developed for the Multi Criteria Analysis ("MCA").

2. Selected procurement options presentation and MCA workshop (Section 5.3)

A workshop was held with KPMG and the City on February 16, 2021 to present and validate the selected procurement options and shortlisted MCA criteria. The workshop participants qualitatively evaluated and scored the selected procurement options against each of the MCA criteria on a five-point scale in the MCA worksheet.

3. Preferred procurement options selection (Section 5.4)

A follow-up call was held with KPMG and the City on March 11, 2021 to present the preferred procurement options obtained as a result of the MCA workshop.

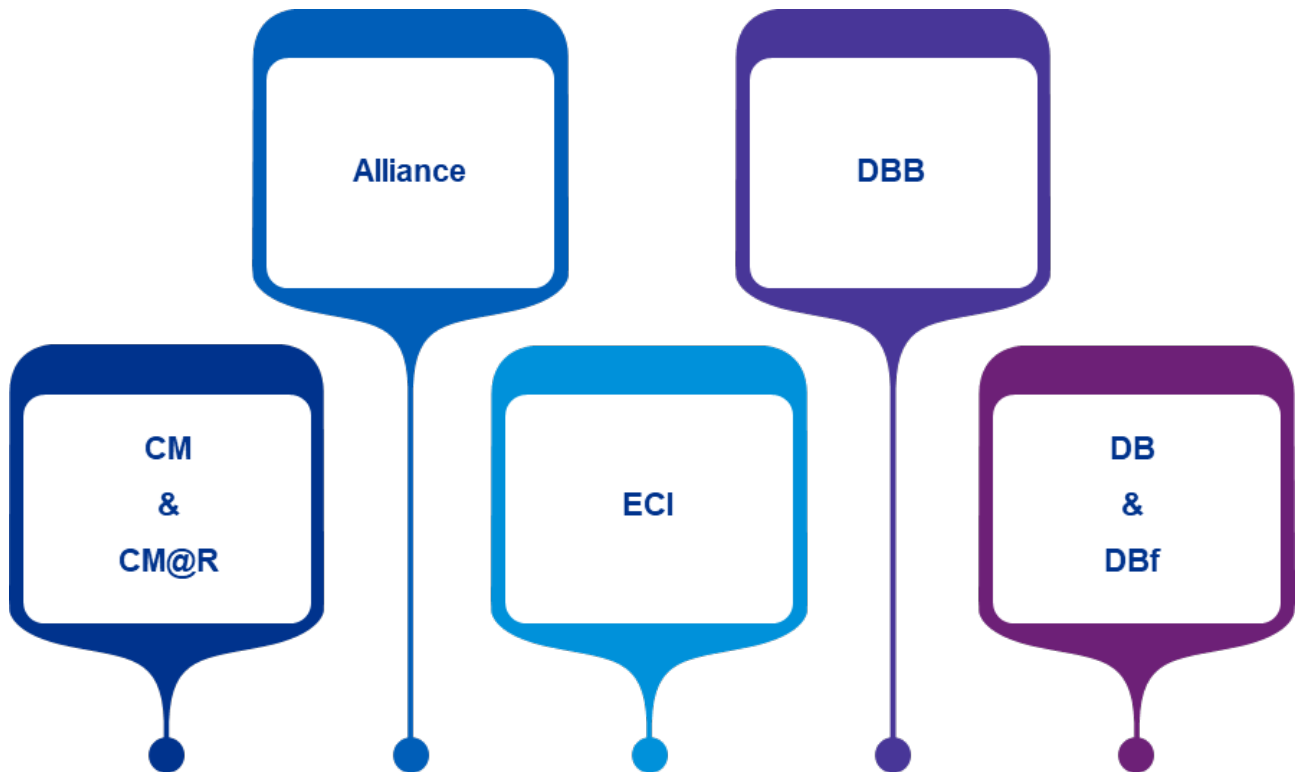
4. Governance structures recommendations (Section 6)

A recommendation on leading practices for governance of large-scale procurements was adapted to the preferred procurement options, as well as The City of Ottawa's experience and objectives.

4. Procurement Options and Screening

The following models represent the range of procurement options that could potentially be utilized to deliver the Project. These procurement options were selected based on the Project scale and scope, market capacity, timing constraints, complexity and implementation requirements.

1. Construction Management (“CM”) & Construction Management at Risk (“CM@R”)
2. Alliance
3. Early Contractor Involvement (“ECI”)
4. Design-Bid-Build (“DBB”)
5. Design-Build (“DB”)
6. Design-Build-Finance (“DBf”)



4.1 Construction Management & Construction Management at Risk

Construction Management (“CM”) is a contracting strategy in which an Owner delegates the day-to-day management and administration of design and construction contracts to a third-party Construction Management team. While the Construction Management contractor carries out project management responsibilities on the Owner’s behalf, overall accountability for project outcomes is retained by the project Owner.

With Construction Management at Risk (“CM@R”), the CM@R contractor is engaged by the Owner to provide consultancy services during the pre-construction stage (constructability and value engineering reviews, tender administration, etc.) and is later contracted to deliver the construction of the project under a cost-plus-fee arrangement to an agreed Guaranteed Maximum Price (“GMP”). The GMP is negotiated before the design is fully complete, and the remaining design is then managed by the CM@R contractor within the GMP. The CM@R contractor is responsible for any construction cost-overruns above the GMP. As a result, once the GMP is negotiated, the role of the CM@R contractor essentially shifts from that of an agent to that of a supplier.

The CM and CM@R contractors generally advise the design team, procure the construction, and manage the project delivery. As the Owner’s agent, the CM and CM@R contractors are authorized to enter into legal relationships with third parties on the Owner’s behalf.

There are many possible variants of CM and CM@R contracts depending on the particular issues involved in the project. Some typical features and considerations relating to schedule, cost, and quality in both CM and CM@R contracts are summarized below.

Schedule CM

- If brought on at the early stages of design, the Construction Management contractor can assist in understanding the complexities in construction and schedule development.
- The CM approach can allow for an early start to construction and, accordingly, a fast-track process.
- The Construction Management contractor’s signing authority allows the turnaround time on changes and contracts to be minimized and for momentum to be maintained at the construction site.
- Schedule delays due to the design (late or inadequate design, for example) are the responsibility of the Owner.
- Construction cost overruns resulting from delays due to construction (such as poor coordination of site activities) are the responsibility of the Construction Management contractor, as they are typically paid a fixed price for construction. However, progress or milestone payments are typically made to the Construction Management contractor during construction; therefore, the Construction Management contractor may not be incentivized to achieve timely completion to the extent that it would under a procurement model that does not compensate the contractor until construction is complete.

Schedule CM@R

- If brought on at the early stages of design, the CM@R contractor can assist the Owner in understanding the complexities in construction and schedule development.
- The CM@R approach can allow for an early start to construction and, accordingly, a fast-track process.
- Schedule delays due to the design (due to late or inadequate design, for example) are the responsibility of the Owner.
- Construction cost overruns resulting from delays due to construction (such as poor coordination of site activities) are shared between the Owner and the CM@R contractor, with the Owner's risk capped at the GMP. However, progress or milestone payments are typically made to the CM@R contractor during construction; therefore, the CM@R contractor may not be incentivized to achieve timely completion to the extent that it would under a procurement model that does not compensate the contractor until construction is complete.

Cost CM

- The project Owner retains responsibility for the design and construction phases of the project and therefore retains understanding/transparency to the costs.
- The project Owner's control is reduced during the construction phase as the contract signing authority is released to the Construction Management contractor.
- There is often little incentive for the Construction Management contractor to pursue creative construction solutions that could increase efficiencies during the operations phase.

The Construction Management contractor can reduce the number of change orders by advising the project Owner throughout the design phase and identifying potential design shortfalls and constructability issues prior to construction. The Construction Management contractor will typically possess expertise to implement efficient change management processes, which can minimize the overhead and markup associated with change orders during construction.

Cost CM@R

- Cost certainty is achieved in the design phase once the GMP is negotiated.
- The negotiation of the amounts that should be allowed in the GMP for contingency and undefined scope is difficult due to the CM@R contractor wanting to justify as large a maximum as possible, in order to limit their exposure. The Owner may obtain a third-party estimate to challenge the GMP, but the construction is essentially sole sourced to the CM@R contractor without the competitive tension of a tender process influencing the proposed GMP.
- The GMP is typically supported by a combination of market proposals and estimated material take-offs from the scope. Typically, the CM@R contractor will be entitled to a share of any amount left in the GMP at the end of construction, which can motivate the contractor to continue to look for cost-reduction opportunities after the GMP has been negotiated.
- The nature of a CM@R agreement is such that the contractor is responsible for completing the project within budget; however, the Owner retains responsibility for monitoring the costs,

schedule and quality of the construction as it progresses to ensure that the costs assigned to the GMP are fair.

Quality CM

- The involvement of a Construction Management contractor generally improves the design quality, as the Construction Management contractor will review the design from a constructability perspective and will generally have better constructability expertise than the Owner.
- The Construction Management contractor’s compensation is generally tied to effort expended on a time-based system, which allows for objectivity and transparency in the trade-off between construction costs and quality (since the Construction Management contractor is not financially motivated to reduce costs at the expense of quality).
- However, the Construction Management contractor is not financially motivated to ensure quality, and it is difficult to financially motivate a Construction Management contractor to provide more than a minimally acceptable performance. The Construction Manager contractor has no responsibility for the asset’s long-term operational performance. The performance specification is therefore critical in ensuring that the Construction Manager contractor produces an asset with the level of quality the Owner requires.

Quality CM@R

- Depending on the terms of the CM@R agreement, the CM@R contractor will be financially responsible for the remediation of any deficiencies, provided that the deficiency noted is within the control of the contractor.
- Once construction is complete, the asset is handed to the project Owner to maintain and operate, which relieves the CM@R contractor of any obligation for the asset’s long-term operational performance.

Benefits and Challenges CM@R

The following table summarizes the benefits and challenges of the CM@R model.

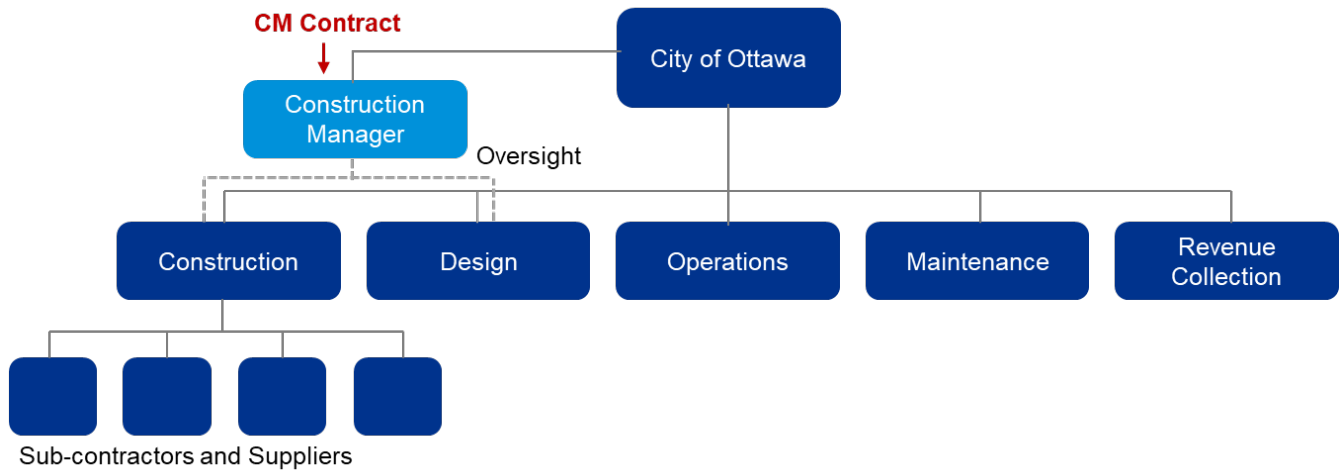
Benefits	Challenges
<ul style="list-style-type: none"> - Timely Completion: The CM@R contractor can assist in understanding the complexities in construction and schedule development, encouraging a more efficient construction period and timely completion. GMP encourages timely construction completion - Reduced Turnaround on 	<ul style="list-style-type: none"> - Minimal Schedule Risk Transfer: Risk of schedule delays are retained by the Owner - Reduced Control: The Owner’s control is reduced during the construction phase as the CM@R contractor has signing authority - Lacks a Holistic Lifecycle Approach: Doesn’t optimize lifecycle costs and long-term

Benefits	Challenges
<p>Change Orders: CM@R contractor's signing authority minimizes the turnaround time on change orders and contracts</p> <ul style="list-style-type: none"> - Greater Transparency: The Owner retains responsibility for the design and construction phases of the project and therefore retains understanding/ transparency to the costs - Enhanced Constructability: Design is reviewed from a constructability perspective - Reduced Change Orders: Can reduce the number of design change orders 	<p>quality/performance</p> <ul style="list-style-type: none"> - No Performance Guarantee: No "guarantee" of asset performance and quality during operations - Less Opportunity for Innovation: Less opportunity for private-sector innovation to create efficiencies during the operations period than the alliance model - Lower Construction Quality: CM@R contractor is not financially motivated to ensure construction quality - Less Price Competition: Construction is essentially sole sourced to the CM@R contractor without the competitive tension of a tender process influencing the proposed GMP - Risk Premium: GMP is likely to include a risk premium

In Summary CM

There can be benefits to contracting out the Construction Management role to a specialized construction management firm that has the necessary expertise and resources to manage the project on the Owner's behalf, particularly for Owners with limited in-house construction management resources. The advantages of a CM approach are most likely to be realized (and hence the additional cost of hiring a Construction Management contractor most likely to be justified) on relatively complex projects involving numerous counterparties; e.g., multiple material and equipment suppliers and construction trades, and for projects in which the Owner lacks the in-house expertise to oversee the design and construction. However, the Owner retains ultimate responsibility for design and construction scope, schedule and quality gaps.

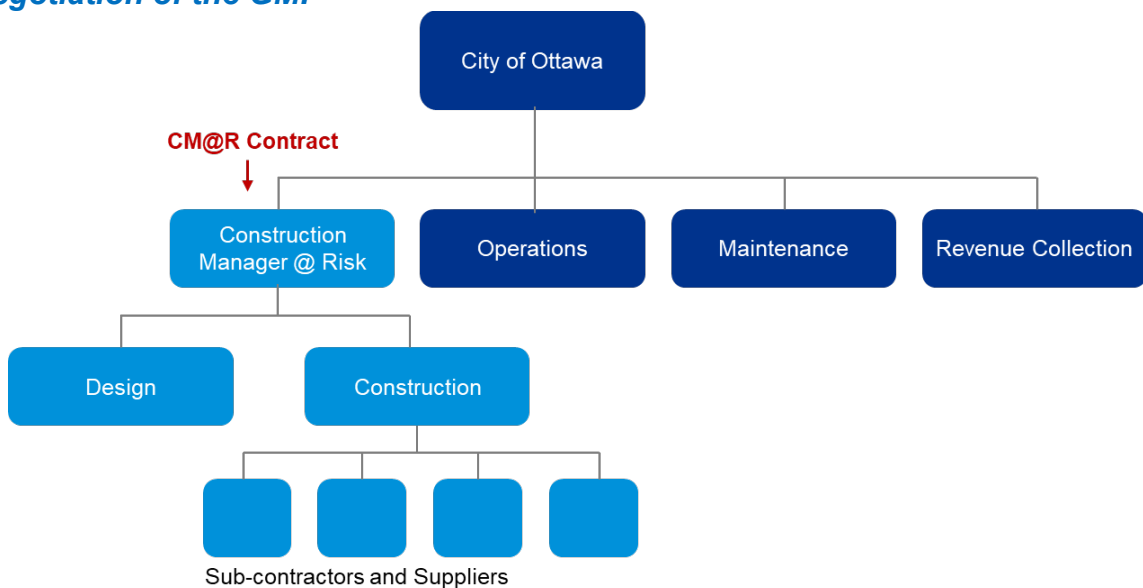
Figure 2: Typical Responsibilities under a Construction Management Model



In Summary CM@R

The advantages of a CM@R approach are similar to those of a CM approach, with the added advantages of cost certainty earlier in the project (at the point at which the GMP is negotiated), and construction cost risk transfer (once the GMP is negotiated). As a result of the risk transfer involved, the GMP is likely to include a risk premium. The advantages of a CM@R approach are most likely to be realized, and any risk premium justified, on a relatively complex project involving numerous counterparties.

Figure 3: Typical Responsibilities under a Construction Management at Risk Model, Post-Negotiation of the GMP



4.2 Alliance

An alliance contract is formed by the project Owner, designer, construction contractor, operator, and suppliers. Together, they deliver a specific project. Under this strategy, all parties share the responsibility for all aspects of the project, including design, construction, and construction management. Compensation under an alliance contract is directly tied to cost, schedule, and profitability milestones of the overall project.

The fundamental difference between alliance contracts and traditional contracts is the underlying principle: a non- adversarial approach between the contracting parties. This is achieved through establishment of alliance principles, good-faith commitments, existence of an alliance board, and adoption of no-dispute provisions. The collaboration requires a time commitment on the Owner's part, but efficiencies and win-win situations are maximized.

The characteristics of an alliance model and the issues associated with it depend upon the unique characteristics of the project. Some typical considerations and issues relating to schedule, cost, and quality of an alliance contract are summarized below.

Schedule

- The increased complexity of the contract(s) between entities increases the time required to plan and deliver the procurement structure and details.
- Given the uncertainty of delivery dates, alliance contracting is not generally suited to projects with an inflexible completion deadline.
- The higher degree of risk-sharing characteristic of alliance contracts may be desirable when schedule risks are difficult to quantify, as they allow the Owner to incentivize the contractor to manage schedule risks without incurring a significant risk premium, which would typically be included were the Owner to attempt to transfer all schedule risk to the contractor.
- Schedule risks are shared under alliance contracts, which exposes the project Owner to 'uncapped risk'.

Cost

- Reduced threat of disputes compared to traditional adversarial contracting approaches.
- Earlier involvement of all parties at preliminary design may provide greater visibility into project costs.
- The higher degree of risk-sharing characteristic of alliance contracts may be desirable when cost risks are difficult to quantify, as they allow the Owner to incentivize the contractor to manage cost risks without incurring a significant risk premium, which would typically be included were the Owner to attempt to transfer all cost risk to the contractor, e.g., by using a fixed-price contract under another procurement model.
- Cost risks are shared under alliance contracts, which exposes the project Owner to 'uncapped risk'. To mitigate this risk, some alliance contracts may have "right of first refusal" provisions that allow the construction contract to be subject to a market tender should the Owner need a market benchmark for the construction costs estimated by the alliance partner.

Quality

- Less constrained design process may be more innovative and co-operative.
- Non-adversarial approach, which focuses on project outcomes and open communication is often productive for projects with very high risk and complexity.
- Depending upon the term of the alliance contract and the payment structure to the alliance partners, the project Owner shares the risk of deficiencies during the construction phase and may retain the risk of deficiencies during operations. The performance specification is therefore critical in ensuring that the alliance partner produces an asset with the level of quality the Owner requires.

Benefits and Challenges

The following table summarizes benefits and challenges of the alliance model.

Benefits	Challenges
<ul style="list-style-type: none"> - Project Outcomes Focus: Focuses on project outcomes and open communication - Performance Enhancement: Participants are encouraged to take calculated and agreed risks and opportunities to pursue cost savings and enhance project performance, without fear of legal liability if they fail - Common Goals: The primary parties are incentivized to achieve the same set of goals that they set or agreed to - Greater Visibility of Project Requirements: Earlier involvement of all parties at preliminary design may provide greater visibility into project requirements compared to other models - Greater Opportunity for Innovation: Collaborative process may encourage a greater degree of innovation - Flexibility: There is flexibility to adapt to scope changes, 	<ul style="list-style-type: none"> - Behaviour Dependency: Project success is directly dependent on the behaviour of individuals within the team - Cost and Schedule Risk: Cost and schedule risks are shared under alliance contracts, which exposes the Owner to ‘uncapped risk’ - ‘Soft’ Target Cost: An approach to the selection of alliance members, which does not evaluate price elements combined with any imbalance between the commercial capabilities of the alliance partner and the Owner, may result in a ‘soft’ target cost which inflates the Owner’s cost of delivering the project - Significant Time Commitment: Requires commitment and collaboration from all parties, including significant time commitment from the Owner - Less Price Competition:

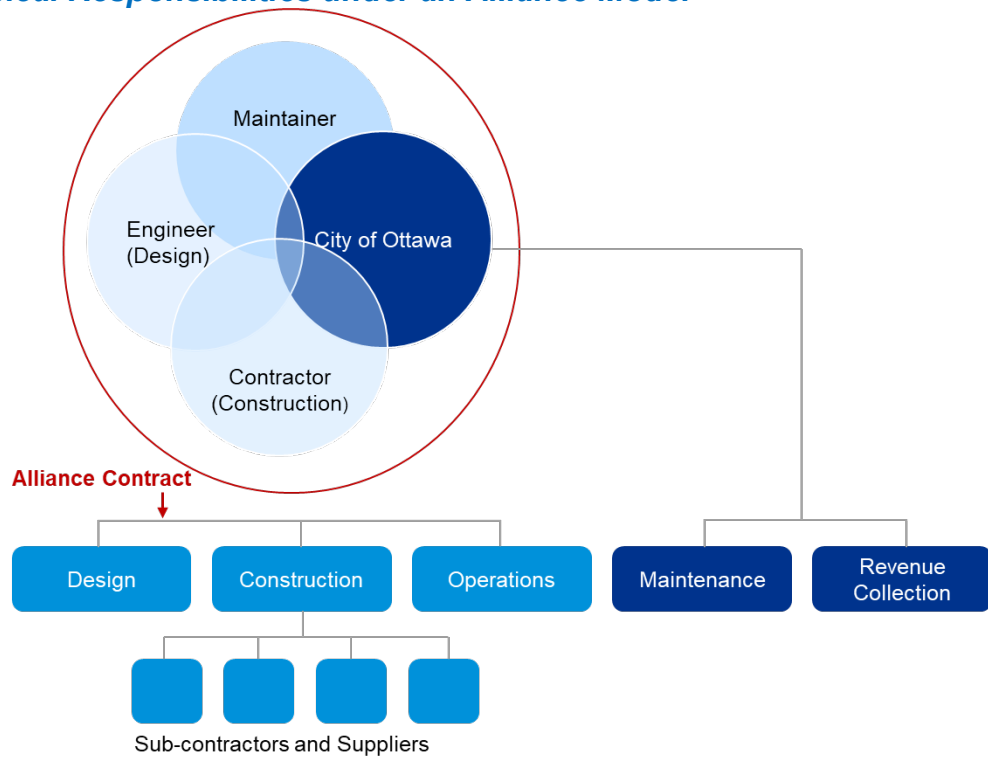
Benefits	Challenges
<p>risks and opportunities as they arise during delivery of the project</p> <ul style="list-style-type: none"> - Risk Allocation: The project's risks can be better managed through a collaborative effort, where each party's knowledge, skills and resources are shared - Higher Degree of Risk Sharing: Higher degree of risk sharing compared to DB – may be desirable when risks are difficult to quantify, as they allow the Owner to incentivize the primary parties to manage risks without incurring a significant risk premium - Fewer Disputes: Integrated governance structure fosters greater collaboration which should reduce the threat of disputes compared to traditional adversarial contracting approaches - Enhanced Constructability: Increased constructability of the design as communication between designers, contractor, and the client is instantaneous - Greater Integration of Resources: Can be beneficial for projects that are significant in size and complexity – integrated approach enables pooling of resources and expertise and ensures no duplication of resources between parties - Dynamic Project Management Approach: Project management teams are able to react better to 	<p>Projects are not competitively bid; perceived as low value for money. Market participants may be hesitant to enter a risk-sharing arrangement before cost of project is defined</p> <ul style="list-style-type: none"> - Greater Upfront Time and Resources: Can be very time consuming for parties to agree to the final alliance contract - Lacks a Holistic Lifecycle Approach: Less opportunity to incorporate long-term operations and maintenance work under the agreement - Low Market Experience: Less project experience and lessons learned to draw from - Capability: The Owner's team may not be sufficiently capable (e.g., skills, experience, behaviours) to deal with the complexity of the project and alliance delivery method

Benefits	Challenges
multiple future project outcomes as projects become more dynamic compared to traditional fixed-scope projects.	

In Summary

In alliance contracts, parties seek to align their commercial interests and – as a result – efficiencies and win-win situations are maximized. Alliance contracts are collaborative ventures that require commitment from all parties, including a significant time commitment from the project Owner. In particular, alliance contracting requires a commitment to establish the necessary governance processes and the ability to allocate the internal resources required to participate in a relationship contract and accept a risk-sharing arrangement. This commitment is most likely to yield a return on longer-term and more complex projects. It is anticipated that an alliance contract would result in less claims than would typically be seen under other delivery models given the work done in advance to define the solution, and risk-sharing arrangement. However, the initial cost can be higher upfront, and the model can expose the Owner to ‘uncapped risk’, resulting in higher project costs.

Figure 4: Typical Responsibilities under an Alliance Model



4.3 Early Contractor Involvement (ECI)

A critical constraint for owners' consideration of alliances is the large amount of resources required from the alliance leadership teams and management teams throughout the life of the alliance.

Two-stage Early Contractor Involvement ("ECI") contract is a reaction to the need for owners to place a considerable number of resources in alliance teams, as well as to better understand and equitably allocate risks during construction.

Schedule, Cost and Quality

- Two-stage ECI contract has similar schedule, cost and quality benefits to the alliance contract procurement option.

Two-stage Approach

This approach to project delivery offers substantial benefits for the following reasons:

- During the first stage, contractors are provided ample time and resources to design and document the project and identify project risks. This process is similar to the preliminary stage of an alliance contract where the project scope is defined and where the target cost and schedule is defined. This results in a more robust identification of risk and a realistic project schedule and price to be defined.
- During the second stage, construction can commence with negotiated risks. This allows for the establishment of a guaranteed maximum price or guaranteed construction sum for the project. This also avoids the likely variations and excessive project 'contingency' fees that are normally associated with other procurement options.

Benefits and Challenges

The following table summarizes the benefits and challenges of the ECI model.

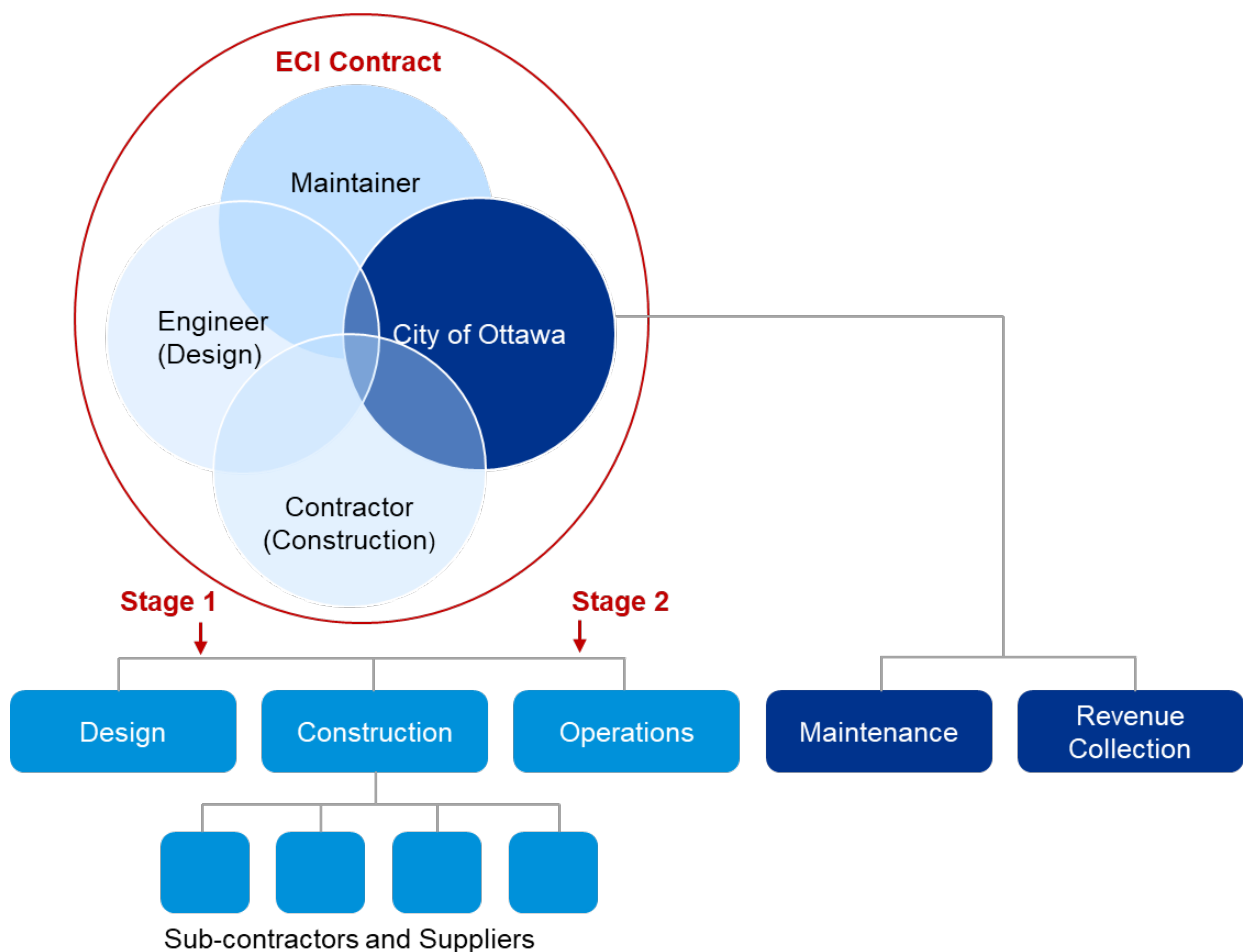
Benefits	Challenges
<ul style="list-style-type: none"> - Project Outcomes Focus: Focuses on project outcomes and open communication - Cost Certainty: Can ultimately lead to a traditional contract being executed (e.g., fixed-price design build). - Common Goals: The primary parties are incentivized to achieve the same set of goals that they set or agreed to (although to a lesser extent that under 	<ul style="list-style-type: none"> - Tendering Costs: May result in higher tendering costs, particularly if a competitive approach is taken - Project Cost Risk: Total project costs might not be known prior to commencement of construction - Design Risk: Owner may lose its independent source of design advice, if the designer is appointed by the contractor - Definition of Functional and

Benefits	Challenges
<p>alliancing)</p> <ul style="list-style-type: none"> - Greater Visibility of Project Requirements: Earlier involvement of all parties at preliminary design may provide greater visibility into project requirements compared to other models - Greater Opportunity for Innovation: Collaborative process may encourage a greater degree of innovation - Risk Allocation: The project's risks can be better managed through a collaborative effort, where each party's knowledge, skills and resources are shared. Schedule risk is mitigated as ECI allows for the schedule to be developed based on clearer information - Greater Collaboration: Upfront collaborative work on the project aims to reduce threat of disputes compared to traditional adversarial contracting approaches - Enhanced Constructability: Increased constructability of the design as communication between designers, contractor, and the client is instantaneous - Varied Expertise of Resources: During the collaborative development phase the project draws on the expertise of all parties and ensures the most appropriate resources are involved at the right time 	<ul style="list-style-type: none"> - Technical Requirements: Functional and technical requirements are not fully defined when the contractors are selected - Behaviour Dependency: Project success is highly dependent on the behaviour of individuals within the team at the collaborative development phase - Significant Time Commitment: Requires commitment and collaboration from all parties, including significant time commitment from the Owner - Lacks a Holistic Lifecycle Approach: Less opportunity to incorporate long-term operations and maintenance work under the agreement - Capability: The Owner's team may not be sufficiently capable (e.g., skills, experience, behaviours) to deal with the complexity of the project and ECI delivery method. In particular, ECI requires extensive open book pricing knowledge

In Summary

Though this two-stage contract adopts greater relational contracting principles and more equitable risk allocation than most other procurement options contracts, it does not embrace the risk-sharing, no-disputes and no-liability framework of the alliance contract. To this end, this two-stage contract provides greater cost certainty than the alliance contract as a guaranteed maximum price is obtained at the end of the first stage. It should be noted that the ECI contract may not be suitable for projects where risk in the construction phase remains high or with many unknowns as it would increase the number of claims and ultimately affect the guaranteed maximum price obtained in the first stage.

Figure 5: Typical Responsibilities under an Early Contractor Involvement Model



4.4 Design-Bid-Build (DBB)

Design-Bid-Build (“DBB”) is a traditional procurement model in which the Owner awards two distinct and sequential contracts for design and construction.

1. The first contract is a consultant appointment of a design team to (i) develop the Owner’s brief into a full detailed design and (ii) to assist the Owner in putting the construction of the project out to tender.
2. The second contract is with a construction contractor to build to that design.

The characteristics of a DBB model and the issues associated with it depend upon the unique characteristics of the project and contract formed. Some typical considerations and issues relating to schedule, cost, and quality of a DBB project are summarized below.

Schedule

- The sequential nature of the DBB model, in that the construction contractor is only hired once the design is complete, has two schedule implications:
 - o The overall process is generally longer than that for other procurement models; and
 - o The construction period may also be longer than under other procurement models, as there is no opportunity for the construction contractor and designer to collaborate and incorporate constructability considerations into the design.
- Schedule delays due to the design (e.g., due to late or inadequate design) are the responsibility of the Owner.
- Construction cost overruns resulting from delays due to construction (such as poor coordination of site activities) are the responsibility of the construction contractor, as they are typically paid a fixed price for construction. However, progress or milestone payments are typically made to the construction contractor during construction; therefore, the construction contractor may not be incentivized to achieve timely completion to the extent that it would under a procurement model that does not compensate the contractor until construction is complete.

Cost

- The project Owner retains the majority of the project risks under a DBB model and has to manage the interface between the designer, who may claim defective construction; and the builder, who may claim faulty design.
- The construction budget is not determined until the design is complete and the construction contract is awarded.
- Since the construction is based on the tendered design, any design shortfall or constructability issue may be costly for the project Owner to resolve.
- There is often little incentive for the designer to pursue creative design and/or construction solutions that could increase efficiencies during the operations phase.

Quality

- The project Owner retains a significant degree of control over the project by managing both the design and construction contracts. As a consequence of retaining this control (and approving the final design), the project Owner remains liable for any performance shortfall in the design.
- Once construction is complete, the asset is handed to the project Owner to maintain and operate, which relieves the design and construction contractors of any obligation for the asset's long-term operational performance. The construction contractor therefore has no motivation to improve the lifecycle performance of the asset.

Benefits and Challenges

The following table summarizes the benefits and challenges of the DBB model.

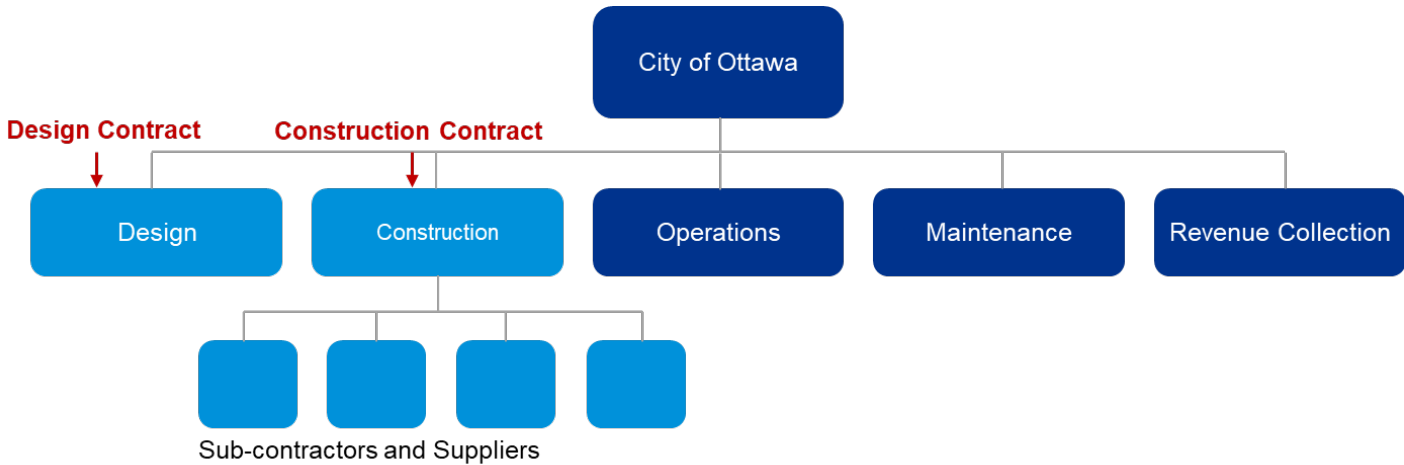
Benefits	Challenges
<ul style="list-style-type: none"> - Significant Market Experience: Well understood and commonly used approach by the public sector - Control: Significant degree of Owner control of project - Flexibility: Flexibility to respond to changing conditions and citizen concerns - Less Upfront Time and Resources: Less upfront time and resources spent on projecting future operational requirements and risks 	<ul style="list-style-type: none"> - Lacks Integration: Requires completed design before awarding construction contract - Constructability Issues: Typically no opportunity for the construction contractor and designer to collaborate and incorporate constructability considerations into the design - Minimal Risk Transfer: Owner retains the majority of the project risks (e.g., cost/schedule overruns) - Less Cost Certainty: Construction budget not determined until the design is complete and the construction contract is awarded - Lacks a Holistic Lifecycle Approach: Doesn't optimize lifecycle costs and long-term quality/performance - No Performance Guarantee: No "guarantee" of asset performance and quality during operations - Less Opportunity for Innovation: Less opportunity for private-sector innovation to

Benefits	Challenges
	create efficiencies during the operations period than the alliance model

In Summary

The DBB model is the most commonly used procurement method. Project owners, contractors and suppliers are familiar with the model and the evaluation process is simple – the lowest bidder is usually the winner. However, for a complex and/or high-risk project, the project Owner’s retention of the majority of the project risks can be a significant disadvantage as the risk and cost of design errors or omissions will typically increase with the complexity of the project. In addition, it can limit private-sector innovation as the design and construction teams are typically not afforded the opportunity to work together and the short-term nature of the contract forces a short-term view of the asset.

Figure 6: Typical Responsibilities under a Design-Bid-Build Model



4.5 Design-Build (DB)

The Design-Build (“DB”) model awards the design and construction under a single contract. Consortia, joint ventures or subcontract agreements may be established between two or more companies to pool the resources and expertise necessary to deliver a DB project.

The tender of the DB is not based upon a detailed design, but rather the project requirements as defined in the form of a performance specification, which states what the project needs to achieve in terms of functional requirements, rather than how to achieve it.

The characteristics of a DB model and the issues associated with it depend upon the unique characteristics of the project and contract formed. The General Contractor is typically the lead in this arrangement as the majority of the cost, schedule and quality risk relate to the construction. Some typical considerations and issues relating to schedule, cost, and quality of a DB project are summarized below.

Schedule

- The DB contract is awarded at an earlier stage of design than the construction contract under a DBB approach (typically during the preliminary design stage rather than during the detailed design stage). This has several schedule implications:
 - o The DB model enables a fast-track process as construction can begin before the design is complete.
 - o As the construction contractor in a DB consortium typically controls the designer, there is a focused effort to limit ‘non-owner caused’ change orders and incorporate constructability considerations in the design, both of which increase the potential for the construction period to be reduced.
- Schedule delays due to the design (late or inadequate design, for example) are the responsibility of the DB consortium. Construction cost overruns resulting from delays due to construction (such as poor coordination of site activities) are the responsibility of the DB consortium, as they are typically paid a fixed price for design and construction. However, progress or milestone payments are typically made to the DB consortium during construction; therefore, the construction contractor may not be incentivized to achieve timely completion to the extent that it would under a procurement model that does not compensate the contractor until construction is complete.

Cost

- Competing contractors are motivated at the bid stage to leverage their technical and commercial expertise to innovate and find the most efficient, value-for-money design solution.
- The construction cost risk is transferred to the DB consortium, as they will typically have provided a fixed price to design and construct the project.
- It is typically more difficult and costly to implement a change order under a DB than a DBB because of the way the contract is structured.

- There is often little incentive for the DB consortium to pursue creative design and/or construction solutions that could increase efficiencies during the operations phase.

Quality

- The DB consortium is responsible for building an asset to the performance specification, and therefore is liable for any design shortfalls.
- The DB consortium is financially motivated to under-design and reduce construction costs as they have no responsibility for the asset’s long-term operational performance. The performance specification is therefore critical in ensuring that the DB consortium produces an asset with the level of quality the Owner requires.

Benefits and Challenges

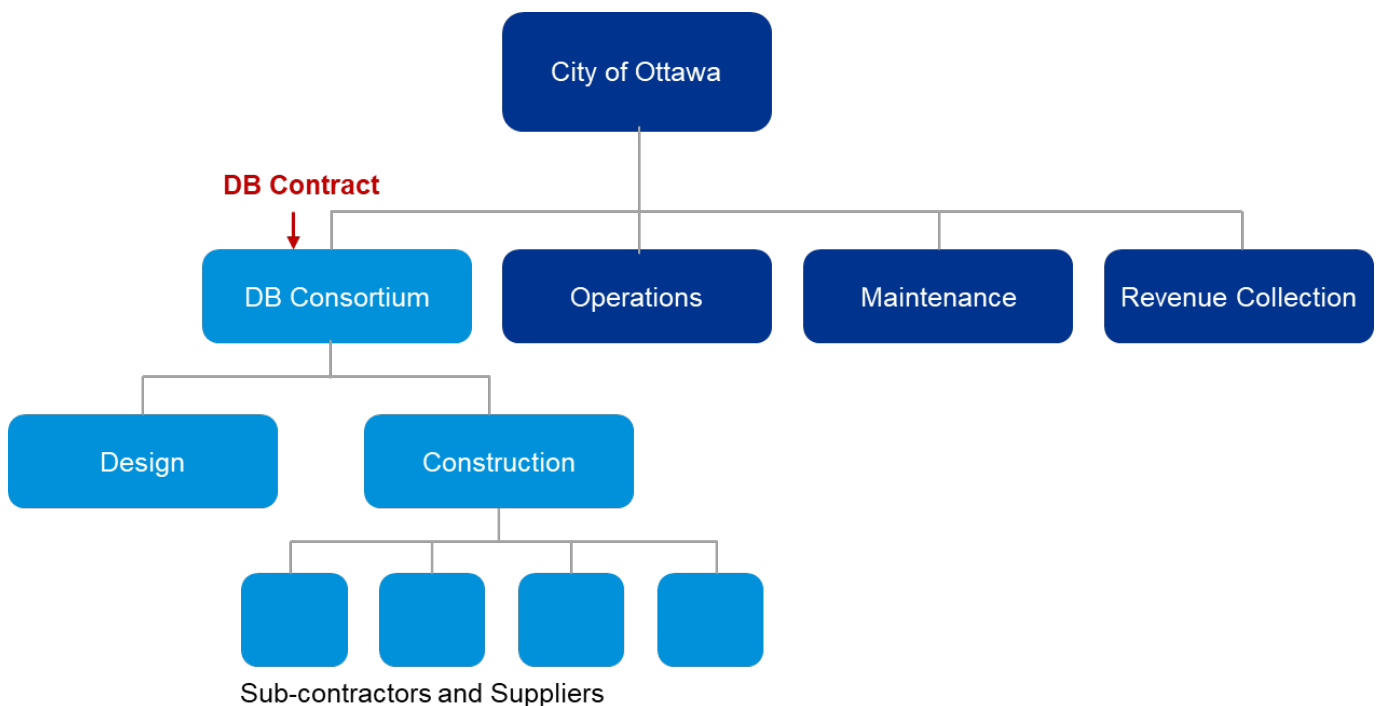
The following table summarizes the benefits and challenges of the DB model.

Benefits	Challenges
<ul style="list-style-type: none"> - Greater Efficiency and Cost Savings Potential than DBB: Integration of design and construction creates efficiencies and cost savings - Cost and Schedule Certainty: More certainty on final construction price and completion than DBB - Enhanced Constructability: Enhanced constructability of design plans compared to DBB - Accelerated Delivery Schedule: Can accelerate project delivery schedule compared to DBB - Reduced Risk: Reduced design and construction risk for the Owner compared to DBB 	<ul style="list-style-type: none"> - Lacks a Holistic Lifecycle Approach: Doesn’t optimize lifecycle costs and long-term quality/performance compared to DBFM - No Performance Guarantee: No long-term “guarantee” of asset performance and quality during operations compared to DBFM - Less Opportunity for Innovation: Less opportunity for private-sector innovation to create efficiencies during the operations period than the alliance model

In Summary

The principal advantage of the DB approach is the elimination of the need for the project Owner to manage the interface between the design and construction of a project, and the transfer of the risk associated with this interface to the DB consortium. The advantages of the DB approach are most likely to be realized on projects, which offer significant scope for innovation, and for which the advantage of transferring design risk is greater. The key to the success of the DB approach lies in the quality of the performance specification and ensuring these capture all of the Owner's requirements without prescribing the means to achieve them.

Figure 7: Typical Responsibilities under a Design-Build Model



4.6 Design-Build-Finance (DBf)

Similar to a DB model, a Design-Build-Finance (“DBf”) approach awards the design and construction under a single contract. Consortia, joint ventures or subcontract agreements may be established between two or more companies to pool the resources and expertise necessary to deliver a DBf project.

The distinguishing feature between the DB and DBf procurement models relates to who retains the financing risk. Under a DB model, the project Owner is responsible for financing the entire project. Conversely, under a DBf model, responsibility for construction financing and the associated financing risks are transferred to the DBf contractor/ consortium. In addition, the DBf consortium will be motivated to complete the project on time as the Owner will withhold all or a significant proportion of payment until project completion. Any incremental interest costs and financial penalties associated with schedule delays will be borne by the DBf consortium.

The characteristics of a DBf model and the issues associated with it depend upon the unique characteristics of the project. Some typical considerations and issues relating to schedule, cost, and quality of a DBf project are summarized below.

Schedule

- Schedule delays due to the design and construction cost overruns resulting from delays due to construction are the responsibility of the consortium.
- Since the DBf consortium is typically not compensated until construction is complete, this type of financing arrangement is advantageous to minimize completion risk and provide greater schedule certainty for the project Owner.
- Similar to the DB approach, the DBf approach creates opportunities for the designer and construction contractor to collaborate, thereby reducing the risk of schedule overruns.

Cost

- The DBf approach allocates financial risks including interest rate fluctuation to the DBf consortium and provides another form of security. The private sector is only compensated after construction is complete, through one lump-sum payment.
- The higher cost of private-sector borrowing compared to public-sector borrowing could result in a higher final cost to the project Owner than if the project Owner were to fund the project directly.
- There is often little incentive for the DBf consortium to pursue creative design and/or construction solution that could increase efficiencies during the operations phase.

Quality

- The responsibility for operations, maintenance, and any expansions after construction is complete are still retained by the project Owner under the DBf arrangement. As a result, it is still difficult to incentivize the private sector to pursue creative design and/or construction solutions that could increase efficiencies during the operations phase.

- The DBf consortium is financially motivated to under-design and reduce construction costs as they have no responsibility for the asset’s long-term operational performance. The performance specification is therefore critical in ensuring that the DBf consortium produces an asset with the level of quality the Owner requires.

Benefits and Challenges

The table below includes a summary of the benefits and challenges of the DBf model.

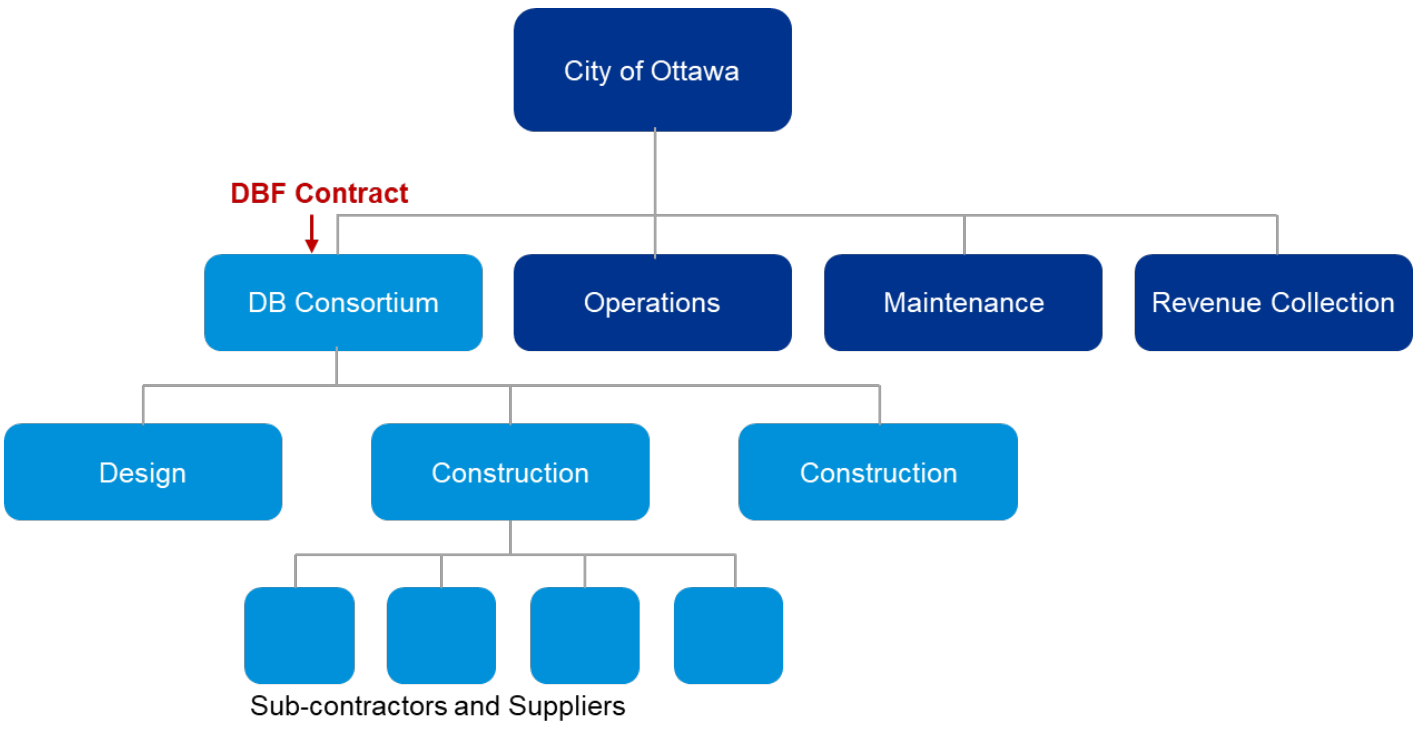
Benefits	Challenges
<ul style="list-style-type: none"> - Greater Efficiencies and Cost Savings Potential: Integration of design and construction creates efficiencies and cost savings - Enhanced Constructability: Enhanced constructability of design plans - Accelerated Project Delivery Schedule: Can accelerate project delivery schedule - Greater Risk Transfer: Reduced design and construction risk for the Owner: Financial risks borne by Project Co (construction period only) - Greater Cost and Schedule Certainty: Greater cost and schedule certainty – no payment to Project Co until substantial completion is achieved (assumes no progress payments) - Performance Quality: Substantial completion payment is performance-based – partner must construct the project in compliance with specifications - Increased Scrutiny and Security from Lenders: 	<ul style="list-style-type: none"> - Lacks a Holistic Lifecycle Approach: Doesn’t optimize lifecycle costs and long-term quality/ performance - No Performance Guarantee: No “guarantee” of asset performance and quality during operations - Less Opportunity for Innovation: Less opportunity for private-sector innovation than the alliance model - Higher Borrowing Cost: Higher cost of private-sector borrowing compared to public-sector borrowing

Benefits	Challenges
Lenders provide additional oversight, scrutiny and due diligence to help enforce performance that is not present in models without a financing component	

In Summary

The advantages of the DBf approach are most likely to be realized on a project with greater risks, for which the higher cost of private-sector borrowing may be justified by the value of transferring the financing risk and/or the greater schedule certainty and extra security associated with the private-sector provision of finance.

Figure 8: Typical Responsibilities under a Design-Build-Finance Model



5. Multi Criteria Analysis

A qualitative analysis was conducted based on a set of criteria derived from the Project’s scope and procurement objectives and applied to the models identified as part of the initial screening. The qualitative analysis focused on the criteria that would differentiate between the procurement options, while considering the procurement objectives and encouraging transparency, integrity, value for money, openness, fairness, competition, and accountability for outcomes. The aim of the Multi Criteria Analysis (“MCA”) was to shortlist the procurement options further to two to three possible options to be examined further. It should be noted that this methodology is designed to qualitatively assess potential procurement options, and detailed quantitative analysis, risk assessments and market sounding exercise should be completed before a final procurement model is selected.

5.1 MCA Criteria Shortlist

The set of criteria shown in Table 2 were developed based on the Project’s scope and procurement objectives as described by the City. At a facilitated workshop, City representatives reviewed a pre-established list of qualitative evaluation criteria that are commonly considered when selecting a delivery model for large infrastructure projects. The City representatives identified those relevant to the Project, and adapted the descriptions as necessary. These criteria formed the basis of the qualitative analysis of the selected procurement options. The MCA criteria focused on the main differentiating factors between the procurement options.

Table 2: MCA Criteria Descriptions

#	Criteria	Description
1	Scale and Scope	<ul style="list-style-type: none"> - The extent that the Project is of a sufficient scale and scope to be delivered under the procurement option. - The extent to which the Project scope aligns with the Project components required for the procurement option. - The extent to which the procurement option has the ability to integrate with existing operations to ensure minimal disruption and continuity in service provided to customers. - The extent to which the procurement option encourages the private sector to innovate during the design and construction phase.
2	Timing Constraints	<ul style="list-style-type: none"> - The extent to which the timeline is sufficient to develop specifications and contract documents to deliver the Project under the procurement option.
3	Implementation Capacity	<ul style="list-style-type: none"> - The extent that the Project Sponsor has adequate resources and experience to effectively deliver the Project under the procurement option. - The extent that the Project Sponsor has the capacity and

#	Criteria	Description
		experience to oversee or manage the delivery of the Project under each procurement option.
4	Market Capacity and Interest	<ul style="list-style-type: none"> - The extent that the procurement option has sufficient private-sector capacity and generates market interest among the appropriate players possessing the relevant skills, expertise and capacity to deliver the Project (design, construction and maintenance).
5	Cost Certainty	<ul style="list-style-type: none"> - The extent that the procurement option provides mechanisms to increase cost certainty that the costs incurred during the design, construction, and operation periods will not exceed the bid price.
6	Complexity	<ul style="list-style-type: none"> - The management of the degree of complexity associated with the Project, as well as the ability to quantify and manage the risks.
7	Risk Allocation	<p><u>Design and Construction Risk Allocation:</u></p> <ul style="list-style-type: none"> - The extent that the procurement option optimizes risk transfer between the private sector and the Project Sponsor during the design and construction period. <p><u>Operational Risk Allocation:</u></p> <ul style="list-style-type: none"> - The extent that the procurement option optimizes operational risk transfer between the private sector and the Project Sponsor during the operations period. <p><u>Maintenance Risk Allocation:</u></p> <ul style="list-style-type: none"> - The extent that the procurement option optimizes maintenance risk transfer between the private sector and the Project Sponsor during the maintenance period.
8	Lifecycle Approach	<ul style="list-style-type: none"> - The extent that the procurement option supports a lifecycle approach during the design, construction, operations and maintenance phases of the Project. A lifecycle approach can potentially better support the Project Sponsor in achieving long-term financial and operational goals of the Project (e.g., quality of maintenance and service). - The extent to which the operations and maintenance are embedded in the contract.
9	Collaboration with Stakeholders	<ul style="list-style-type: none"> - The extent and likelihood that appropriate approvals from stakeholders can be obtained to deliver the Project under the procurement option within the required timeframes. - The extent to which the Ottawa City Council is engaged in the process.

5.2 MCA Criteria Weighting

The relative importance of each MCA criteria was established by assigning weightings to each of the shortlisted MCA criteria, based on their relevance to the strategic objectives of the Project. The MCA criteria were scored on a three-point scale, as defined in Table 3.

Table 3: MCA Scoring Matrix Weighting

#	Criteria	Score	Meaning	Rationale
1	Scale and Scope	2	Medium	<ul style="list-style-type: none"> – Sufficient scale of the Project (over \$3 billion). – 100% design level will not likely incentivize the private sector to innovate. – Seamless service integration required between Stage 3 and Stages 1 & 2.
2	Timing Constraints	1	Low	<ul style="list-style-type: none"> – No specific timing constraints yet.
3	Implementation Capacity	3	High	<ul style="list-style-type: none"> – City has acquired extensive experience during Stages 1 & 2.
4	Market Capacity and Interest	2	Medium	<ul style="list-style-type: none"> – Ability to attract a sufficient number of bidders for the process to remain competitive. – Should be noted that the pool of bidders would be different under a CM/CM@Risk contract than under the others. And the pool for a project of this size and scope is relatively small.
5	Cost Certainty	3	High	<ul style="list-style-type: none"> – City is assuming federal funding for the Project. – Cost certainty is most likely to be preferred by the Government.
6	Complexity	2	Medium	<ul style="list-style-type: none"> – Stage 3 is a highly complex project from a construction standpoint (e.g., soil condition, bridges, major utility relocation, different types of land, open cut sections, systems, CBTC systems, etc.). – However, Stage 3 should be less complex than Stages 1 & 2 as they included tunneling works and vehicles.
7	Risk Allocation	3	High	<ul style="list-style-type: none"> – Geotechnical risk to remain with private sector. – Maintenance risk to remain with City/ addressed through current maintenance provider. – Vehicle risk to be discussed.

#	Criteria	Score	Meaning	Rationale
8	Lifecycle Approach	1	Low	<ul style="list-style-type: none"> – City will negotiate contract extension with its current maintainer. – Important to have a sort of warranty for the long-term quality of the works.
9	Collaboration with Stakeholders	1	Low	<ul style="list-style-type: none"> – Important to engage with the Ottawa City Council and obtain their feedback.

5.3 Scoring

The selected procurement options were scored against each of the MCA criteria on a five-point scale, as defined in Table 4.

Table 4: MCA Scoring Matrix

Score	Meaning	Description
1	Very Low	<ul style="list-style-type: none"> – Procurement option has a very low level of alignment with the stated criterion. – Delivering the Project under this procurement option would directly contradict the intent of this criterion.
2	Low	<ul style="list-style-type: none"> – Procurement option has a low level of alignment with the stated criterion. – Delivering the Project under this procurement option does not support the intent of this criterion.
3	Medium	<ul style="list-style-type: none"> – Procurement option has a medium level of alignment with the stated criterion. – Delivering the Project under this procurement option somewhat supports the intent of this criterion.
4	High	<ul style="list-style-type: none"> – Procurement option has a high level of alignment with the stated criterion. – Delivering the Project under this procurement option supports the intent of this criterion.
5	Very High	<ul style="list-style-type: none"> – Procurement option has a very high level of alignment with the stated criterion. – Delivering the Project under this procurement option directly supports the intent of this criterion.

5.4 Results of MCA Analysis

The rationale for the scoring of the shortlisted procurement options against each of the MCA criteria is detailed below in Table 5.

Table 5: MCA Scoring Matrix Rationale

#	Criteria	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf	Rationale
1	Scale and Scope	3	3	3	3	3	3	<p>Overall, any shortlisted procurement option could be feasible at this time for a project of this scale and scope.</p> <ul style="list-style-type: none"> - CM / Alliance: The City has not previously realized a project of this magnitude using these models. - ECI: The contractor would have enough time to reflect on the Stage 2 experience. - DBB: This model would be viable for the stations and mitigate geotechnical risk (not enough in-house expertise to retain geotechnical risk). - DB / DBf: These models are commonly used to deliver projects of similar scale and complexity to Stage 3.
2	Timing Constraints	2	5	5	2	4	4	<p>No timeline has been defined yet.</p> <ul style="list-style-type: none"> - CM: The Contractor will have to manage multiple contracts on behalf of the Owner (public sector

#	Criteria	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf	Rationale
								<p>procurement). This model provides the opportunity to address the project critical path very early on.</p> <ul style="list-style-type: none"> - Alliance: This model could take longer to get set up given that the Owner does not have previous experience. - ECI: This model allows the City to work through the schedule and plan at an early stage, mitigating schedule risk arising at a later stage. - DBB: This model requires a double procurement. - DB / DBf: These models require a shorter procurement period as the contractor can choose its own sub-contractors and because the level of design required is 30%.
3	Implementation Capacity	2	1	3	3	5	5	<ul style="list-style-type: none"> - CM: The Owner needs to have the capacity and experience with the CM model in case the Owner needs to take the project back from the contractor. The CM model consist of a heavy monitoring/managing component. - Alliance: This model requires to set up a separate office with separate payroll and duplicate governance. This model requires secondments to a special team, and to work in

#	Criteria	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf	Rationale
								<p>partnership with the contractor.</p> <ul style="list-style-type: none"> - ECI: The City has not previously realized a project according to the ECI model, therefore training will be required. The ECI model requires extensive open book pricing knowledge (as contractor might try to game on pricing). - DBB: The City has not previously realized a project of this size according to the DBB model. The City has previous experience in complex DBB (e.g., downtown stormwater tunnel; water pipes; roads). Hiring enough people to administer this project will be required. - DB / DBf: Similar to DBB. The City can build on the experience acquired during Stage 2.
4	Market Capacity and Interest	3	2	4	5	5	3	<ul style="list-style-type: none"> - CM / ECI: Contractors prefer these progressive approaches. They get paid a fee for the design they provide, which makes these models more attractive. - Alliance: Canada has never seen an alliance of that size. - DBB: The market has much experience with this model.

#	Criteria	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf	Rationale
								<ul style="list-style-type: none"> - DB / DBf: Common in Canada. Contractors spend a lot on the design and the honorarium does not cover it all, which has triggered some push back in the market recently.
5	Cost Certainty	1	2	5	3	4	4	<ul style="list-style-type: none"> - CM: Cost certainty will only be achieved once the project is over. - Alliance: This model provides an idea of price but does not provide exact certainty depending on how risks materialize. There should be less claims as the issues were reviewed and mitigated early in the process. - ECI: This model works towards the GMP, hence providing more price certainty than the alliance model. The price certainty comes during the second phase. There should be less claims as the issues were reviewed and mitigated early in the process. - DBB: The phasing also comes into play for this model. There is no ability to have the construction cost influence your design. The price certainty is higher than for the alliance model because the parties pre-agreed on who will take the risk. Duration uncertainty leads to cost uncertainty. There is a higher

#	Criteria	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf	Rationale
								<p>likelihood of claims with the DBB model.</p> <ul style="list-style-type: none"> - DB / DBf: These models provide cost certainty, although there is a higher likelihood of potential claims.
6	Complexity	2	4	5	3	4	4	<p>OLRT Stage 3 is complex from a construction point of view, but not as complex as Stage 1 (Stage 1 had the tunnel and the vehicle).</p> <ul style="list-style-type: none"> - CM: The complexity managed is by the contractor. - Alliance: This model is based on collaboration and transparency. - ECI / DB / DBf: These models provide a greater understanding and visibility on the complexity. - DBB: Constant change orders and higher likelihood of claims, therefore a higher contingency should be included.
7	Risk Allocation	2	3	4	2	4	4	<ul style="list-style-type: none"> - CM / DBB: The Owner is responsible for the design - any issues will be its responsibility. - Alliance: The Owner has less control. Both the City and the contractor will try to minimize the risks as one single team. This model could bring an additional challenge in terms of

#	Criteria	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf	Rationale
								<p>reputational risks to the Owner.</p> <ul style="list-style-type: none"> - ECI: This model has a collaborative period to discuss risks and how to mitigate them through the design and construction. Therefore, the project does not require as much contingency. - DB: This model does not carry design risks. - DBf: Similar to the DB model. The finance component provides lender oversight to support in addressing issues.
8	Lifecycle Approach	4	5	5	4	5	5	<p>No long-term model is considered.</p> <p>All models can capture a lifecycle approach if structured accordingly, although collaborative elements, or those that allow innovation may encourage new or more efficient lifecycle approaches.</p>
9	Collaboration with Stakeholders	3	4	4	3	2	2	<ul style="list-style-type: none"> - CM / DBB: These models provide a lot of opportunities for Council engagement. - ECI / Alliance: These models can provide more transparency. - DB / DBf: These models are typically more restrictive.

The weighted results of the MCA workshop with the City are summarized below in Table 6.

Table 6: MCA Weighted Scoring Matrix

#	Criteria	Assigned Weighting	CM & CM@Risk	Alliance	ECI	DBB	DB	DBf
1	Scale and Scope	Medium	6	6	6	6	6	6
2	Timing Constraints	Low	2	5	5	2	4	4
3	Implementation Capacity	High	6	3	9	9	15	15
4	Market Capacity and Interest	Medium	6	4	8	10	10	6
5	Cost Certainty	High	3	6	15	9	12	12
6	Complexity	Medium	4	8	10	6	8	8
7	Risk Allocation	High	6	9	12	6	12	12
8	Lifecycle Approach	Low	4	5	5	4	5	5
9	Collaboration with Stakeholders	Low	3	4	4	3	2	2
Total Weighted Score >>>			40	50	74	55	74	70

The aim of the MCA workshop was to identify two procurement options to be considered further – ECI and DB were identified as the options best able to meet City objectives, and the needs of the Project at this time. The DBf option also scored highly, and given the similar nature to a DB, this report also considers a DBf procurement option when discussing governance best practice.

The ECI model scored the highest mostly due to its degree of cost certainty, the risk allocation mechanism obtained through collaboration, the visibility on complexity, the amount of resources required for its implementation and the market interest for this model. The DB model also scored highly due to the ease of implementation given the City's prior experience, the relative cost certainty, the risk allocation and the market interest for this model. The DBf model shares many of the same characteristics as the DB model.

The CM & CM@Risk models scored the lowest mostly due to the uncertainty around the Project cost, the level of implementation capacity required by the Owner and the high level of risk absorbed by the Owner. The alliance model also obtained a low score due to the amount of resources required for its implementation, the low-price certainty and its higher degree of risk sharing. Finally, the DBB model was not selected due to the high level of risk absorbed by the Owner, the uncertainty around the duration required for its implementation and the higher likelihood of claims.

6. Project Governance Structure Recommendations

6.1 Project Governance Best Practices

The best approach to capital project governance depends on the unique requirements of an organization; leading practice indicates a number of common principles can help ensure success.

It is necessary to set up the right project governance structure for the organization, which allows an entity, such as the Ottawa City Council to maintain control while ceding day-to-day responsibility to management. Whatever that structure is, it also needs to take a lifecycle approach, rather than just being implemented for procurement and construction. Governance begins at the earliest planning phase of a project and continues through implementation and ultimately into operations. A lifecycle approach is necessary to ensure that project objectives and risks cover the life of the Project, not just the implementation. The governance structure should also reflect the unique nature of the Project, whether that is the procurement option, the level or risk transfer, its operating environment, or the stakeholders. For example, if provincial and federal funders are involved, they may be part of the governance structure.

Any new project should learn from the past, so those at the highest levels of governance should be aware of commonly occurring issues. When setting project objectives, planning the scope, resourcing and dealing with stakeholders, these commonly occurring issues should be front-of-mind, and governance entities should probe management on them.

All decision-makers up to and including the Ottawa City Council and other key stakeholders must receive and act upon, the right information on a consistent basis. Doing so will ensure predictable progress and informed decision-making, thereby increasing the certainty of project success. To get this information, a structured process ensures the right information is received when it is needed. Regular reporting information should be brought forward in a standard format from the project team based upon the oversight requirements of the given project. It is the responsibility of all members of the project governance structure above the Project Manager to exercise their due diligence by challenging the project team.

Stage 3 is a complex, large value Project – and one that has increased potential to impact the reputation of the City. In addition, it has many external interfaces such as the public, other City departments and potentially multiple levels of government due to funding requirements.

A comprehensive internal governance model is essential for managing decision-making with respect to the Project in accordance with the following overarching principles:

- Ensure a single point of accountability at each level for the success of the Project to enable clarity of leadership, and timeliness of decision-making;
- Be clear in setting objectives and define trade-offs between objectives to help support aligned decision-making;

- Ensure a degree of separation between project governance and corporate governance: interface and integration should be considered;
- Ensure there is a line of sight variation reporting to ensure Executive Steering Committee has sufficient, accurate and timely information to make responsive informed decisions;
- Enable efficient and effective project decision-making through clear and unambiguous delegations of authority and ensuring the right targeted people are involved (e.g., effective use of sub-committees);
- Minimize layers (increasing flatness) of the governance structure to influence the ability to escalate issues quickly;
- The entire project team – whether City employees, consultants or contractors – are committed and accountable for the success of the Project; and
- Align internal stakeholders around their role and support required for the Project.

An appropriate governance structure will also support the City in meeting its objectives of transparency, integrity, value for money, openness, fairness, competition, and accountability for outcomes.

6.2 Proposed Project Governance Plan

6.2.1 Governance Roles and Responsibilities

Given the principle of single-point accountability of project leadership mentioned above, and the importance of promoting accountability for outcomes to the City, defining the roles and corresponding responsibilities within a governance structure is critical to the Project's success. It will create and clearly identify the decision-making process and flow of accountability. This section, in descending order of authority, describes the following governance roles:

- Council
- Council Sub-Committees
- Executive Steering Committee
- Project Sponsor
- Project Director
- Major Project Advisory Panel
- Project Team

Regardless of procurement option, these roles and responsibilities should follow leading governance practices, although the individuals involved at different stages may change (e.g., where different expertise is required), and the skillset and experience of the individuals may differ by delivery model (e.g., ECI should ideally have a Project Director that understands construction costing). This approach will ensure integrity and value for money for the Project.

Council: The Ottawa City Council approves major project decisions such as overall Project budget, schedule, scope, and borrowing bylaws. The Ottawa City Council defines the Project objectives including the ability to prioritize elements such as train service performance or customer experience. They then delegate accountability and responsibility for the Project broadly to the Project Sponsor. The Project Sponsor is responsible for providing regular Project status updates to the Ottawa City Council to ensure they have confidence in the Project Team and understand Project progress. Any material deviations to the approved Project decisions are required to come back to the Ottawa City Council for ratification (e.g., overall changes in budget, or major changes in scope as described in Section 6 of this report). Although Council is not involved in the selection process of the bidder, Council is notified by the Executive Steering Committee of the list of shortlisted bidders at the RFQ stage and the preferred bidder at the RFP stage. Council will establish appropriate governance through delegation of authority, and the project management is responsible for implementation within the controls of the governance structure, as well as providing updates, assessments and action alternatives related to risk events to the Ottawa City Council as needed.

Council Sub-Committees: Due to broad responsibilities of the Ottawa City Council, it is common to create a working group or sub-committee of Council to deal with a specific project. Recognizing the limited time available in the Ottawa City Council meetings, a sub-committee allows the necessary time and focus to be committed to decisions related to the Project. A sub-committee could assist in developing the Ottawa City Council expertise in capital projects – the sub-committee should ideally include individuals with knowledge and experience of large capital projects or works, as well as representatives from the wards most affected by the Project. If members do not have much experience related to capital projects, then it is recommended that training is provided to help ensure success, as well as external technical experts as a part of the committee, and/or individuals from outside of the City team can augment the committee as appropriate. It could also support by reporting to the Ottawa City Council on a summary and issue-oriented basis, reflecting the advice of the sub-committee as to the significance of an issue to the organization.

Executive Steering Committee: The Executive Steering Committee provides oversight of the Project and ensures that the Project Sponsor is held accountable to meet the budget, scope, and schedule set by the Ottawa City Council, and other and key performance indicators established by the Executive Steering Committee. In addition, the Executive Steering Committee supports and assists the Project Sponsor in breaking down silos and removing barriers across the corporation. They ensure that the business units under their leadership fully support the Project and remove all obstacles as necessary. They champion what is best for the corporation. Ideally, the Executive Steering Committee would consist primarily of internal stakeholders like operators, constructors, and maintainers.

Project Sponsor: The Project Sponsor is accountable for the delivery of the Project. The Project Sponsor is the Chair of the Executive Steering Committee. Their duties include resolving escalated issues, providing guidance to and supporting the Project Director, overseeing engagement and issue management with the Ottawa City Council, and liaising with key stakeholders. The Project Sponsor provides regular Project status updates to the Ottawa City Council. They hold the Project Director accountable and responsible for Project scope, schedule & budget and team health.

Project Director: The Project Director is accountable for the scope, schedule and budget of the Project, as well as the overall health of the Project Team. The Project Director is accountable and responsible for the Project scope, schedule, budget and Project Team health. The Project Director provides leadership and direction to the Project Team and makes sure that the Executive Steering Committee and ultimately the Ottawa City Council are well informed of the Project metrics. The Project Director provides regular reports to the Executive Steering Committee and to the Ottawa City Council to keep them generally well informed.

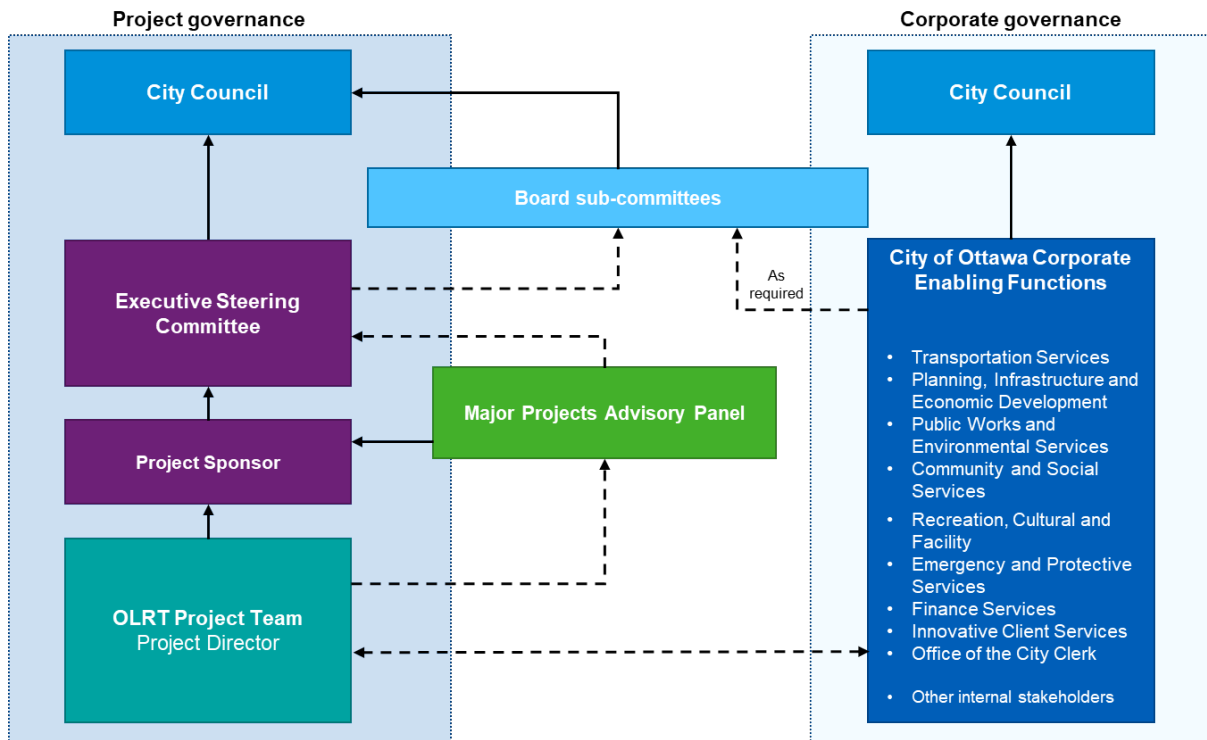
Major Project Advisory Panel: The Major Project Advisory Panel reports to the Project Sponsor and supports the Executive Steering Committee in their oversight of the Project. The Panel comprises external advisors who possess expertise in the areas of procurement, commercial, stakeholders, design, finance, constructability, and LRT systems. The Major Project Advisory provides confidence to Executive Steering Committee that the Project is meeting its metrics and resolving issues as they arise. The Panel identifies early key project risks and potential mitigation strategies. The Major Project Advisory Panel carries out enquiries on behalf of Executive Steering Committee on identified topics where specific input is desired, and to report back to the Executive Steering Committee as agreed.

Project Team: The Project Team is composed of the pool of resources that are required to successfully execute the Project. The resources include technical and process experts overseeing functions such as property acquisition, environmental management, regulatory experts, financial management, communication, human resources, etc. The source of these resources could be internal to the shareholders, seconded from the shareholders, or contracted externally. The resources are the most competent people available, regardless of their employer. Regardless of procurement option, the Project Team will change depending on the stage of the Project. For instance, the team will require more procurement support during the procurement; however, will likely require individuals with more project controls experience during construction. The City has a well-developed approach to the procurement of large capital projects already and will be building on this extensive experience for the Project. It is recommended that during the procurement, the Project Team consists of technical and engineering teams, legal support, procurement management, and financial teams. These team members can be from the City, or through contracted staff and/or advisors. It is vital that the Project Team consists of individuals with appropriate expertise for the Project, as well as the procurement option selected. For instance, if using a DBf model, it is preferable that the team includes individuals with experience of drafting a DBf style of agreement and designing a procurement strategy that will deliver the Project under a P3 approach. For ECI, it is assumed the team will consist of individuals with expertise of the procurement model, as well as an understanding of construction costing and construction methodologies. A familiarity with the Project – its scope, environment, properties on the alignment – is also advantageous.

The Project Team should work under the direction of the Project Director – ideally as one team – all working towards the objectives of the Project and its successful completion. Under an ECI approach, the selected contractor team will also work very closely with the City team to develop the Project requirements, budget, scope and schedule.

The organizational chart below shows how the various roles and responsibilities would work together, and the clear lines of reporting and authority.

Figure 9: Project Governance versus Corporate Governance – Organizational Chart



Another aspect of the governance structure that could be incorporated into the above is an assurance role. The purpose of assurance is to provide comfort to the corporate level governance (i.e., City Council), that the Project is being delivered correctly, and agreed processes are being followed. This role would be filled by a party independent to the Project – an internal risk function, for example – or a separate consultant.

For ECI, DB, and DBf, the roles and responsibilities would not change materially, but skills and experience of the individuals filling the roles may.

For instance, under ECI, it would be beneficial to have a Project Director who has experience of construction pricing and an understanding of costing methodologies used by contractors, particularly at the early stages of a project. For a DB/DBf, it is more important to have a team that understands monitoring of a contract.

The individuals may also change as the Project evolves. Continuity of personnel is more important under ECI due to the collaborative element, and the importance of those relationships that are built over time. However, under all models, it is expected that the composition of the Executive Steering Committee may change as the Project moves into construction, and then operations since those involve a very different skill set than that of procurement.

The aspect that is strictly maintained, regardless of procurement option, is the separation of corporate and project governance. This helps ensure that any project runs smoothly, without political interference, which can put a project at risk. This also ensures the fairness of a procurement, as well as transparency internally at the City, as well as to various stakeholders.

In essence, to reach the common goal of successfully delivering the Project, it is essential to empower the Project Team by establishing clear lines of accountability and a clear reporting structure.

6.3 Terms of Reference

6.3.1 Major Decisions and Approvals

The matrix below details the major milestones that will occur during the set-up phase of the Project and the approvals required at each stage. By agreeing to these approvals and milestones early in the process, all parties are clear on what must be done and when. There are clear lines of accountability which enables efficient and effective decision-making. The matrix further distinguishes the primary (1st) and secondary (2nd) responsible parties for the approvals required at each stage of the Project.

Topic:	Project Director	Project Sponsor	CFO	Executive Steering Committee	Ottawa City Council
Project charter		2 nd		1 st	
Project risk tolerance				2 nd	1 st
Project scope		2 nd			1 st
Project evaluation methodology		2 nd		1 st	
Project budget		2 nd			1 st
Project schedule		2 nd			1 st
Changes within the Ottawa City Council Resolution		2 nd		1 st	
Changes outside of the Ottawa City Council Resolution				2 nd	1 st
Borrowing bylaws			2 nd		1 st
Funding structure			2 nd		1 st
Finance structure	2 nd	1 st			
Property acquisitions	2 nd	1 st			
Procurement strategy				2 nd	1 st

Topic:	Project Director	Project Sponsor	CFO	Executive Steering Committee	Ottawa City Council
Legal procurement docs and contract	2 nd	1 st			
RFQ release	2 nd	1 st			
RFP release	2 nd	1 st			
Preferred proponent selection		2 nd		1 st	
Contract award	2 nd	1 st			

For any procurement option, it is vital that there is clear decision-making and accountability. The decisions and approvals outlined above would not change by procurement option, but the timing of them may.

For instance, due to the collaborative nature of ECI, the Ottawa City Council would be unable to approve the budget and schedule of a project before moving to procurement – there are many decisions and trade-offs to be made before this can be finalized. A budget and schedule would only advance for approval once the City team and the contractor had worked together to develop appropriate construction methodologies, as well as identified risks and how to mitigate and/or manage them. Therefore, the Ottawa City Council and the Executive Steering Committee would expect more interactions using the ECI model, although the ultimate decisions to be approved would not change. As a result, any Federal and Provincial funding the City may seek would likely have to be secured before the GMP is final.

Using DB/DBf, it is expected that interactions with the Ottawa City Council would not be as frequent up front; however, there may be more interactions during construction as claims are expected to be more likely under a DB/DBf model compared to ECI.

This reporting structure ensures appropriate transparency throughout the Project, as well as accountability.

6.3.2 Executive Steering Committee Meetings

Council members interviewed as part of this mandate expressed a desire to be more informed of both the process and project progress. While it is recommended to ensure corporate governance and project governance remain separate, that does not mean the Ottawa City Council, or other Committees as appropriate, cannot be informed. The Project Sponsor, Chair of the Executive Steering Committee, is responsible to provide regular Project status updates to the Ottawa City Council. The following table presents a suggested approach to working with the Executive Steering Committee, and ensuring they are providing the oversight of the project and Project Sponsor.

As the champions of what is best for the City, they are informed in a timely manner of key project risks, emerging issues, and general updates on the Project. The meetings described below will ensure they can carry out their role on the Project.

Topic		Detail
Executive Steering Committee	Frequency & duration	<ul style="list-style-type: none"> Monthly 1.5-hour meetings (or as required by the Chair)
	Quorum	<ul style="list-style-type: none"> Chair, plus two additional Executive Steering Committee members
	Agenda	<ul style="list-style-type: none"> Monthly: written project management report + key risks and emerging issues Special meetings as issues arise, requiring immediate attention Project report + key risks Discussion – special topics at request of Project Director (invited SMEs / Functional Managers, and also Major Projects Advisory Panel members may be present)
	Minutes	<ul style="list-style-type: none"> Scribed by Project Sponsor’s administrative assistant Reviewed by Project Sponsor for completeness Issued to meeting participants two days after meeting

The Executive Steering Committee is the champion of what is best for the City and for the Project. It is key that they are informed in a timely manner. This would be the case for all of the procurement options. The main difference would be caused by the phase in the Project; e.g., the members of the Committee may be different during procurement versus construction. The Executive Steering Committee will support the integrity of the Project, as well as ensure accountability and overall integrity to internal and external stakeholders.

6.3.3 Report Content and Distribution

The table below describes the leading practices around reporting, and distribution of project updates. The reports below ensure all stakeholders are informed as necessary to carry out their role, while maintaining any confidentiality requirements of the Project. The reports will change in their content as the Project moves from set up, to procurement, construction and then operations, but the principles remain the same. A clear reporting structure promotes transparency and openness to an appropriate degree depending on the Project stage.

Code	Description
P	Prepare
R	Receive

Topic	Project Director	Project Sponsor	Executive Steering Committee	Ottawa City Council
Weekly 1-Page Progress Report (general update) <ul style="list-style-type: none"> Key tasks completed since last Weekly Progress Report Critical risks & issues identification/mitigation/actions 	P	R		
Monthly Project Controls Report <ul style="list-style-type: none"> Focuses on tactical aspects of the Project 	P	R		
Monthly Report <ul style="list-style-type: none"> Key Performance Indicators (KPIs) <ul style="list-style-type: none"> Cost, schedule, scope, contingency requirements, safety, etc. Team health and performance Tasks complete by functional area (i.e., real estate, stakeholders, government relations, engineering, enabling works, procurement) Critical risks & issues identification/mitigation/actions Contractor monthly reports (as applicable) 	P	R		
Monthly Executive Steering Committee Update <ul style="list-style-type: none"> Focuses on strategic aspects of the Project KPIs Summary tasks complete Critical risks (severity > \$X or x months) & issues 		P	R	
Quarterly Ottawa City Council Update <ul style="list-style-type: none"> KPIs Summary of the monthly report and tasks complete Critical risks (severity > \$X or x months) & issues Community impact and mitigation Key messages 		P		R

Topic	Project Director	Project Sponsor	Executive Steering Committee	Ottawa City Council
Special meetings as issues arise, requiring immediate attention				
Ad hoc Community Update <ul style="list-style-type: none"> • Summary of the monthly report and tasks complete • Community impact and mitigation • Key messages 		P		

The reporting function of the Project would be consistent between procurement options. The City’s preference around the KPIs used, and frequency of reporting would be the main factor changing the reporting structure. Reports should provide sufficient detail for all parties to be able to carry out their roles, while maintaining the integrity of the procurement/Project.

6.4 Delegation of Authority

6.4.1 Risk Tolerance

Risk tolerance is the degree, amount, or volume of risk that an organization will withstand. For this reason, risk tolerance for the Project is set by the Ottawa City Council for the City. Risk tolerance is generally expressed as a “P-value”, which defines the confidence level regarding the probability of the budgeted cost not being exceeded.

6.4.2 Contingency Reserve

Risks are events/ occurrences that have a less than 100% chance of occurring but could impact a project. Although risks may or may not occur, there should be an attempt to quantify them and hold funds in a reserve to manage these risks as they present themselves. Risk tolerance is the degree, amount, or volume of risk that an organization will withstand. For this reason, risk tolerance for a project is set by the corporation. Risk tolerance is generally expressed as a “P-value” which defines the confidence level regarding the probability of the budgeted cost not being exceeded. Depending on the procurement option, it is recommended that two levels of contingency reserve will be established based on a P90 confidence level with access and control based on P-value. For changes below the limit set for the Project Director, the Project Director has the authority to approve them (for example, P60). The Project Sponsor has an increased P-value (for example, P60 to P90) within which they can provide an approval. If the changes are above P90, then they are escalated to the Executive Steering Committee and City Council.

Allocating the P60-P90 contingency to the Project Sponsor establishes management’s control over a portion of contingency. Drawdown of contingency will be managed through a contingency

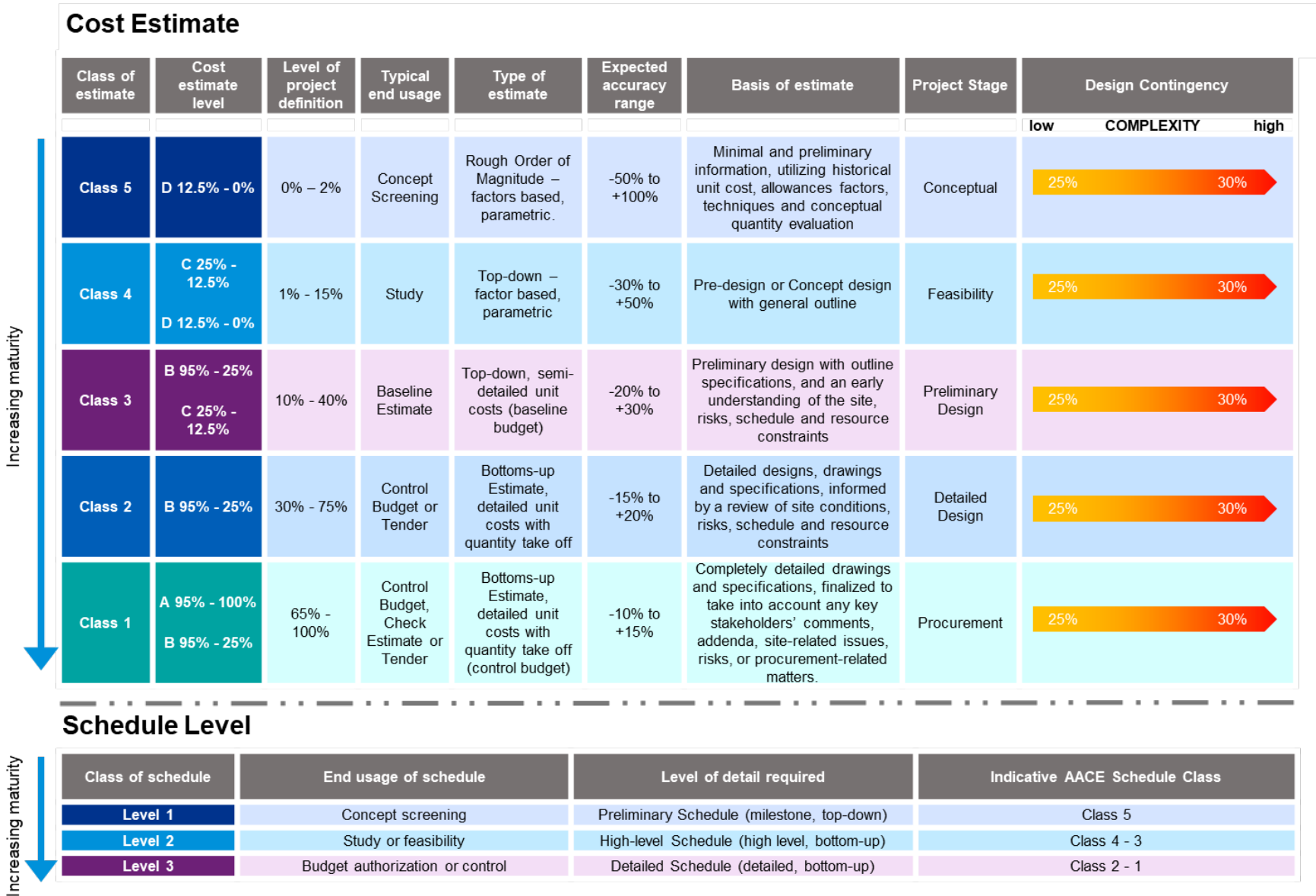
drawdown curve approved by the Executive Steering Committee and limited to single occurrence withdrawals as per the project delegation of authority. Although the Project Director has access to the P60 contingency, if the size of single occurrence exceeds the delegated authorization of the Project Director, the Project Sponsor will also have to approve.

Contingency is calculated in relation to a defined scope and schedule. The cost of changes to either the scope or the schedule imposed on a project, due to external pressures, are not accounted for in either the management reserve or contingency. It should be noted that the contingency is only an estimate and is not intended to cover major scope changes. Contingency will also change as a project develops, and as design and construction methodology are finalized. Figure 10 illustrates how contingency changes over time and – as a project evolves – how approvals may change as a project reaches different stage gates in its development.

Under ECI, the contingency amount is more fluid given the collaborative effort to design the project. However, to maintain accountability and controls, it is still recommended that there are contingency controls in place, and any decisions affecting the contingency over a set amount will trigger an escalation of the decision. This approach also ensures efficient and timely decision-making.

For all procurement options, it is recommended that in advance of the Project starting, it is pre-agreed that any decision that will cause the Project to exceed its pre-set contingency will have to be escalated to the Ottawa City Council, and other limits and controls can also be put in place depending on the City's risk tolerance. This approach to risk and delegation of authority maintains both the integrity of a project, and also promotes accountability throughout the governance structure.

Figure 10: Estimates and Schedule Maturity



6.4.3 Risk Management

Managing risks are key to project success. Risk management should start early in the project planning process. From the beginning, the Project Team should understand the risk environment of the Project; that understanding will become more detailed as the Project evolves. It is recommended that risk management on the Project will be governed by a Risk Management Plan, containing a risk severity matrix and associated protocols. The Plan will help instill a culture of risk within the Project. A Risk Management Plan identifies the risks that must be escalated to the Executive Steering Committee if they occur, as well as any risks that are significant enough to be escalated to Council.

6.5 Procurement

For the procurement stage of the Project, a specific evaluation governance structure is put in place. The objective is to ensure transparency, integrity, value for money, confidentiality, openness, fairness, competition, and accountability for the outcomes of the procurement process. It is important to draw clear lines of reporting and authority, define roles and responsibilities, screen for conflict of interest, facilitate fairness oversight, conduct due diligence, and coordinate the evaluation to be consistent with procurement best practices and industry expectations. While these principles apply to all procurement models, it is important to highlight the nuances of the procurement evaluation processes for DB/DBf and ECI models.

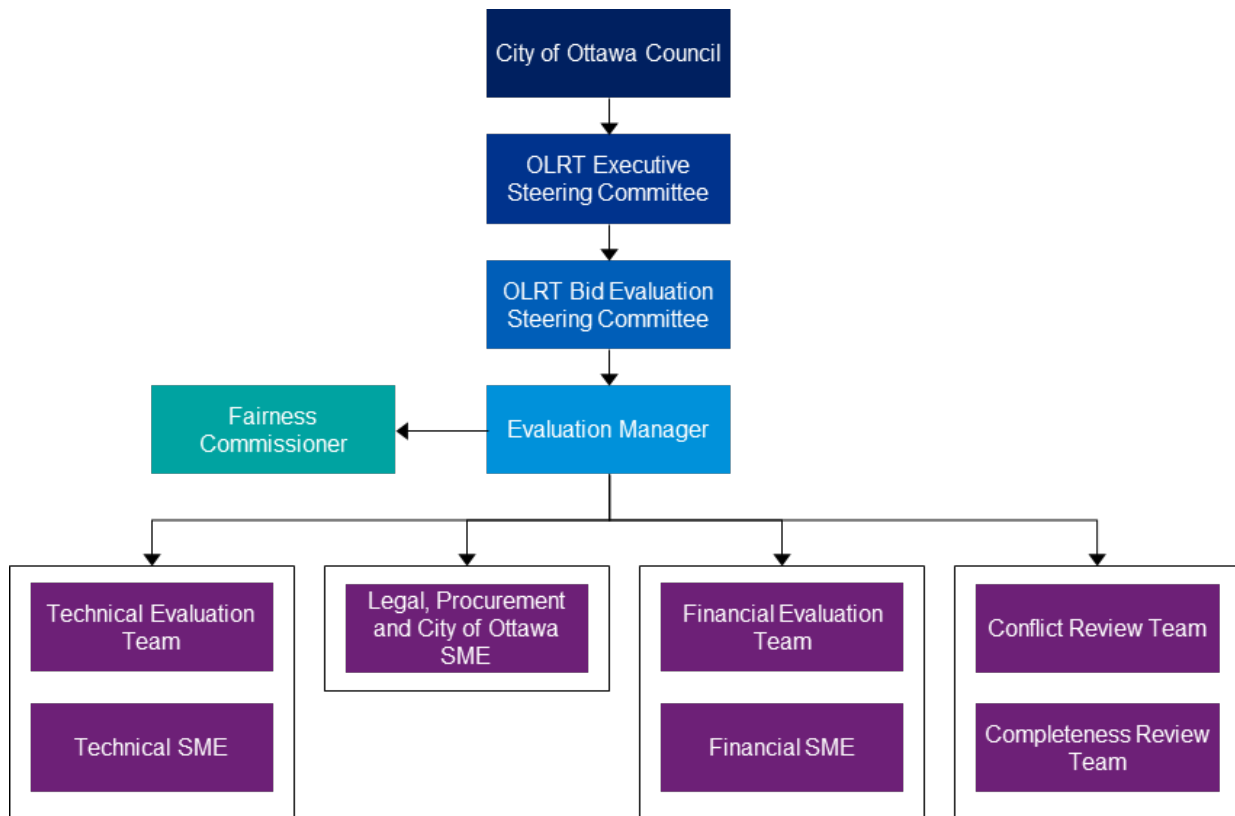
6.5.1 DB/DBf

The tender of a DB/DBf contract is not based upon a detailed design, but rather project requirements as defined in the form of a performance specification, which states what a project needs to achieve in terms of functional requirements, rather than how to achieve it. Competing contractors are motivated at the bid stage to leverage their technical and commercial expertise to innovate and find the most efficient, value-for-money design solution.

In Canada, the procurement of a DB/DBf contract for large capital projects is usually initiated with the Request for Qualification (“RFQ”) stage where typically three bidders are shortlisted to participate in the Request for Proposals (“RFP”) stage. Typically, bidders are bidding to a conformed project agreement. The bidder that best meets the requirements as described in the RFP is selected. The Owner can offer an honorarium to the unsuccessful bidders that were prequalified. The Owner then enters into limited negotiations with the preferred bidder before signing the contract for the scope of a project. This approach aims to encourage innovation, promote fairness and transparency, and – through the competitive process – drive value into the project for the Owner.

Similar to the process followed for Stage 2, and described in the first report “LRT Stage 2 Procurement Lessons Learned”, the evaluation process for the procurement of a DB/DBf contract, during both the RFQ and RFP stages, is typically conducted in four steps: (1) completeness review, (2) technical review and scoring, (3) financial evaluation, and (4) ranking.

Figure 11: RFQ and RFP Stages – Procurement Evaluation Process Reporting Structure



Each level of the procurement/evaluation team is independent of each other, has a clearly defined role with responsibilities, and follows pre-agreed processes. This ensures the integrity of the procurement process. The evaluation governance structure for the procurement of a DB/DBf contract involves the following participants:

1. **Conflict Review Team:** The Conflict Review Team assesses any conflict of interest or potential conflict of interest disclosed by the procurement process participants and bidders and provides mitigation measures.
2. **Completeness Review Team:** The Completeness Review Team opens the bids, compiles the list of key individuals presented in each bid, and ensures that the required information and forms have been substantially completed as per the procurement documents requirements.
3. **Technical and Financial Evaluation Teams:** The Technical and Financial Evaluation Teams are typically made up of project team members, and potentially augmented by other specialists as needed. These evaluation committees are treated as independent from each other, and their behaviour monitored and facilitated by procurement management team members, with a particular expertise in procurement processes. The evaluation teams make recommendations to the OLRT Bid Evaluation Steering Committee. At the RFQ stage, the Technical Evaluation Team evaluates the technical information provided in the prequalification submissions, and the Financial Evaluation Team assesses the financial capacity of the bidders based on the provided financial information and evaluates the financial information provided in the prequalification

submissions. At the RFP stage, the Technical Evaluation Team evaluates the technical proposals, and the Financial Evaluation Team evaluates the financial proposals.

4. **Evaluation Manager:** The Evaluation Manager manages the evaluation process and its logistics, schedules and facilitates the different meetings, organizes the trainings for all participants, and assigns tasks to all participants.
5. **OLRT Bid Evaluation Steering Committee:** The OLRT Bid Evaluation Steering Committee will ensure the evaluation followed the pre-agreed processes and was carried out in a diligent matter. The OLRT Bid Evaluation Steering Committee makes the final recommendation from the evaluation to the OLRT Executive Steering Committee.
6. **OLRT Executive Steering Committee:** The OLRT Executive Steering Committee exercises its due diligence function by asking questions and receiving information from the OLRT Bid Evaluation Steering Committee. The OLRT Executive Steering Committee presents the list of shortlisted bidders to the City of Ottawa Council, for information.
7. **Ottawa City Council:** The Ottawa City Council is notified of the list of shortlisted bidders as a result of the RFQ evaluation process. The Ottawa City Council is informed of the preferred bidder as a result of the RFP evaluation process.
8. **Fairness Commissioner:** The Fairness Commissioner reviews all procurement documents and communication with the market and attends all evaluation meetings.

6.5.2 ECI

An ECI contract is formed by the project Owner, designer, construction contractor, operator, and suppliers to deliver a specific project. The ECI contract unfolds in two stages: during the first stage, the contractors and the Owner work in collaboration to define the project scope, target cost and schedule. Contractors are given ample time and resources to design and document the project and identify project risks. During the second stage, construction commences with negotiated risks. This allows for the establishment of a guaranteed maximum price or guaranteed construction sum for the project.

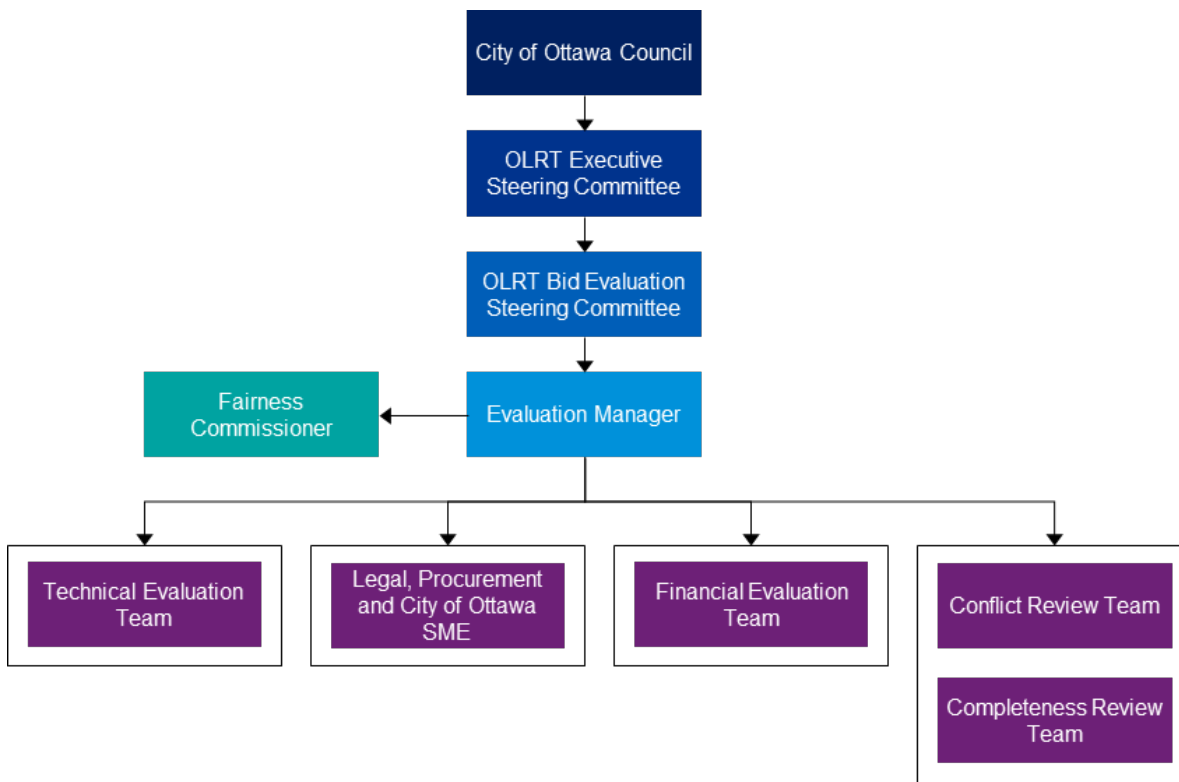
The fundamental difference between ECI contracts and traditional contracts is the underlying principle: a non-adversarial approach between the contracting parties. ECI contracts differ from alliance contracts as they typically require less resources from the Owner, reach a fixed price earlier on and better equitably allocate risks during construction. However, it should be noted that ECI contracts require commitment and collaboration from all parties, including significant time commitment from the Owner. Therefore, the tendering costs for an ECI contract are likely to be higher than those of a DB/DBf contract. While an ECI contract could result in a lengthier project overall than a DB/DBf contract, the ability to work proactively on schedule and plans early in the process allows the Owner to better mitigate schedule risk arising at a later stage, often finding efficiencies during construction related to schedule.

The tender of an ECI contract is based on selecting a team based on their proposed key individuals, their qualifications and experience. The collaboration requires a time commitment on the Owner's part, but efficiencies and win-win situations are maximized. A competitive ECI contract maintains competitive tension by selecting two preferred teams at the qualification stage to participate in the

collaborative stage. Therefore, it should be noted that having two preferred teams requires the Owner to double its resources during the collaborative stage.

The procurement of an ECI contract for large capital projects is usually initiated with the qualification stage, as described in Figure 12, where one or two teams are selected to participate in the collaborative stage. During the qualification stage, the technical and financial evaluation teams assess the different bidding teams based on their key individuals, qualifications and experience.

Figure 12: Qualification Stage – Procurement Evaluation Process Reporting Structure for an ECI contract



During the collaborative stage, contractors are provided ample time and resources to design and document the project and to identify project risks. The project scope, target cost and schedule are defined during this stage. The contractor works with the design team, the operator and the City of Ottawa to develop its tender price for the design and cost estimate on an open-book basis, in a collaborative manner and in real time. This results in a more robust identification of risk and a realistic project schedule and price to be defined. Figure 13 shows the procurement evaluation process reporting structure for the collaborative phase with one preferred team. Figure 14 shows the procurement evaluation process reporting structure for the collaborative phase with two preferred teams, namely a competitive ECI contract. It is likely that the Owner will pay a fee, or retainer to the contractor during the development phase of the project given the significant effort and work the contractor is providing as part of the collaboration. Often at the end of the process this fee will be paid in return for rights to the design work.

The team providing the best value agreement is awarded the construction of the project. This allows for the establishment of a guaranteed maximum price or guaranteed construction sum for the

project. This also avoids the likely variations and excessive project ‘contingency’ fees that are normally associated with other procurement options.

Figure 13: Collaborative Phase – Procurement Evaluation Process Reporting Structure for an ECI contract

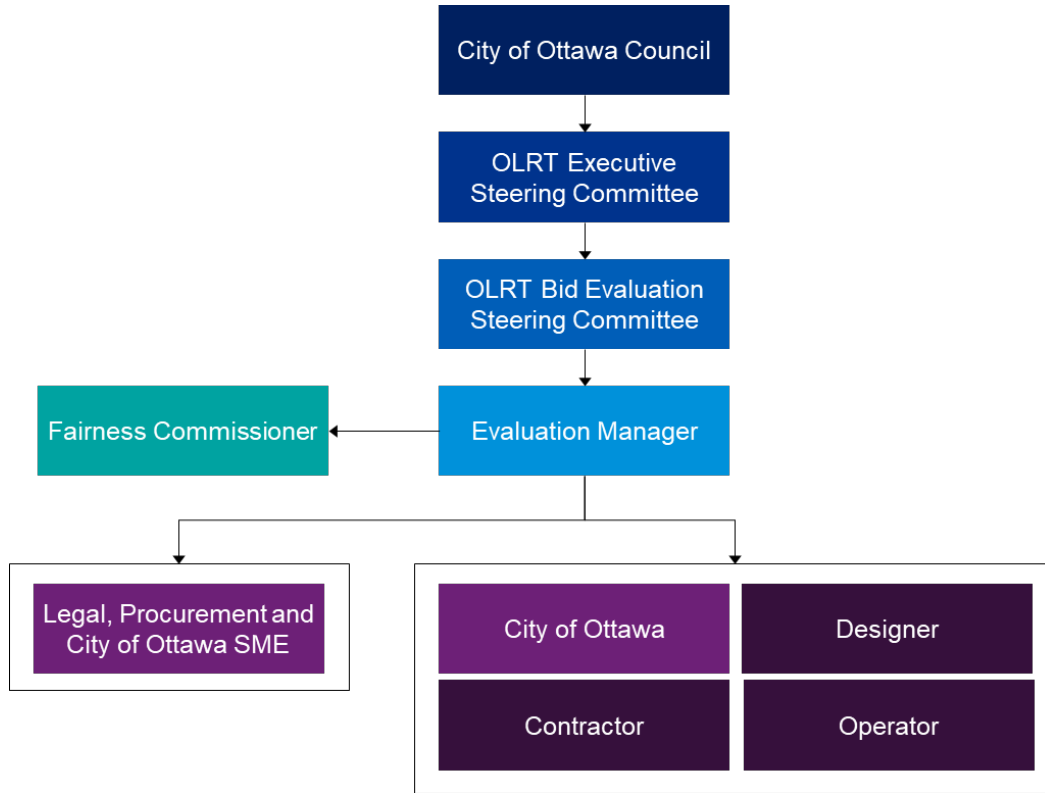
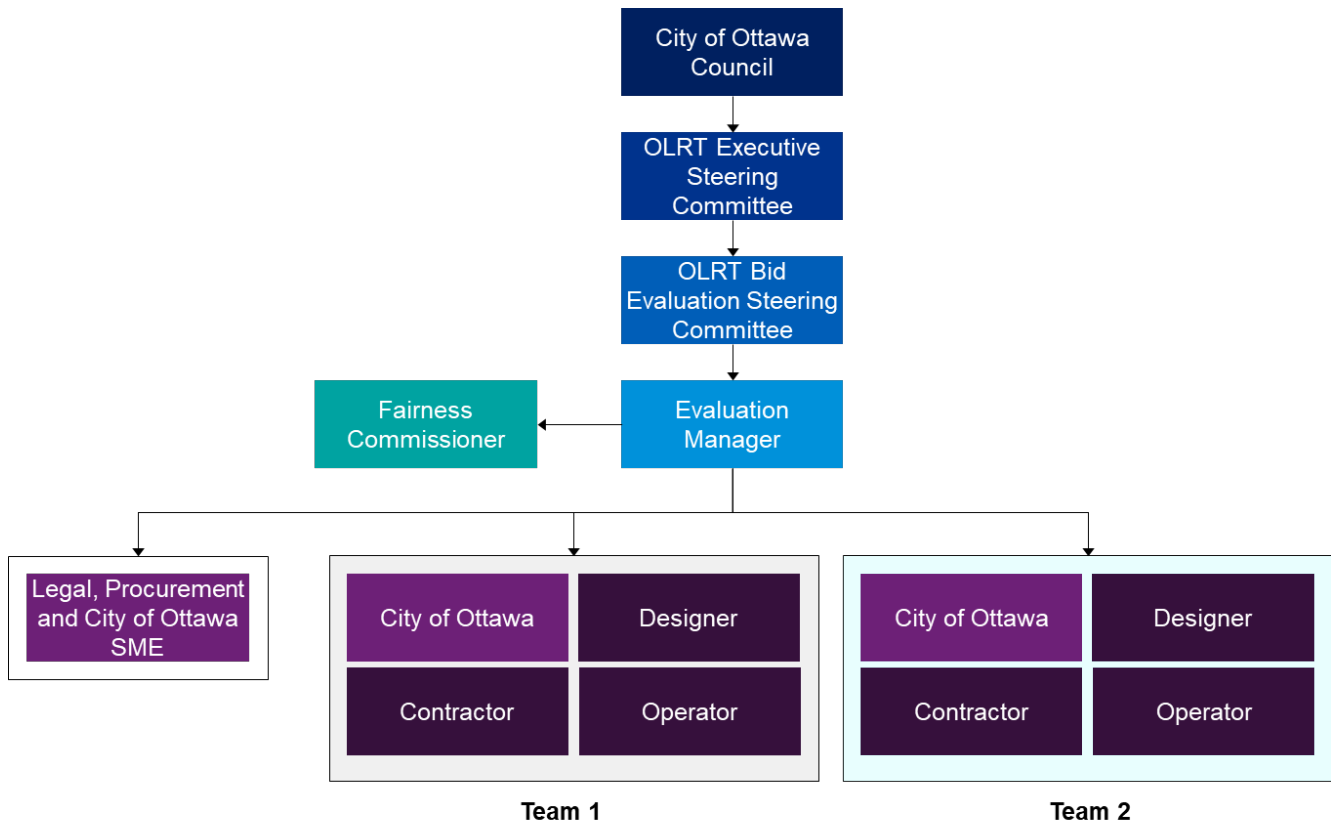


Figure 14: Collaborative Phase – Procurement Evaluation Process Reporting Structure for a competitive ECI contract



7. Summary of Findings

The objective of this report was to recommend preferred procurement options in the context of the City's existing Design-Build-Finance-Maintain contracts as part of a Stage 3 expansion. The multicriteria qualitative analysis performed identified the following delivery models as the preferred procurement options: **Early Contractor Involvement**, **Design-Build** and **Design-Build-Finance**. It should be noted that the methodology used is designed to qualitatively assess potential procurement options, and detailed quantitative analysis, risk assessments, and market sounding exercise(s) should be completed before a final procurement model is selected.

This reports also presents best practices for governance of large-scale projects and associated procurement processes to ensure transparency, integrity, value for money, confidentiality, openness, fairness, competition, and accountability. It is important to draw clear lines of reporting and authority, define roles and responsibilities, screen for conflict of interest, ensure fairness oversight, conduct due diligence and coordinate the evaluation in consistent with procurement best practices and industry expectations. While the general principles presented in this report apply to all procurement models, it is important to grasp the nuances revolving around the DB/DBf and ECI models.

The recommended next steps are the following:

- Conduct a more in-depth analysis on the optimal project-delivery model;
- Update the business case to reflect the impact of COVID-19;
- Establish the strategy for the funding of the Project;
- Consider engaging with the Canada Infrastructure Bank;
- Examine the expansion or scope extension protocols for the current maintainer contracts;
- Determine how to derive the best price / value from the existing maintainer if appropriate; and
- Analyze whether some of the Project scope could be attributed to the existing DBf contractor given the interfaces, according to the scope extension protocol in the contract.

Appendix

Appendix A - References and Bibliography

AACE International Recommended Practices. (2020). *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*.

Discenza, R. & Forman, J. B. (2007). *Seven causes of project failure: how to recognize them and how to initiate project recovery*. Paper presented at PMI® Global Congress 2007—North America, Atlanta, GA. Newtown Square, PA: Project Management Institute.

Kelly, É. V. (2010). Governance rules! The principles of effective project governance. Paper presented at PMI® Global Congress 2010—North America, Washington, DC. Newtown Square, PA: Project Management Institute.

KPMG Thought Leadership. (2019). *Common drivers of project failure: what can internal audit do?*

KPMG Thought Leadership. (2016). *Building on success; learning from failure*.

PMBOK® Guide – Sixth Edition. (2017). *A Guide to the Project Management Body of Knowledge*.

UK Department for Transport and Infrastructure and Projects Authority. (2019). *Lessons from transport for the sponsorship of major projects*.



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