Port Lands Flood Protection & Enabling Infrastructure Project

Executive Level Review of the Due Diligence Final Report dated July 12, 2016

Prepared for

WATERFRONToronto

July 12, 2016 by
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1. EXECUTIVE SUMMARY

The Port Lands Flood Protection and Enabling Infrastructure project is a large, complex project that will involve the use of many different construction techniques to address unique environmental and geotechnical conditions. The elements of the project that pose the greatest risk to meeting the proposed budget and schedule relate to:

1. the confirmation of the regulatory requirements with respect to contaminants present and the associated Risk Management Measures (RMM), and
2. the poor geotechnical conditions that will result in significant total and differential settlement when loading conditions are changed (by cutting and placing fill), and that could damage existing or new services, access roads and structures, unless appropriate measures are taken.

We believe that the effort and reach of the studies carried out to prepare the Due Diligence report are reasonable, and that no further up front consulting studies would be of benefit at this time. However, there are a number of risks and technical challenges that will need to be addressed during the subsequent design and planning phase of the project. We therefore do not believe that the design and construction requirements are sufficiently defined at this point to procure the project under a Design-Build-Finance (DBF) approach. As a next step, we recommend the early engagement of a qualified contractor through a Construction Manager/General Contractor (CM/GC) model. This will enable Waterfront Toronto to reduce risk in stages by progressing the permitting and regulatory approval process, and at the same time:

- Develop a comprehensive Ground Improvement Plan
- Carry out mock-ups and pilot tests
- Carry out constructability reviews
- Advance design
- Define work packages
- Procure early works packages
- Develop realistic detailed contingencies
- Further refine and align the cost estimate and schedule

Cost certainty can be achieved via a CM/GC model once design is finalized, contingencies are developed with the Owner, and the CM enters into a date-certain, Guaranteed Maximum Price (GMP) contract. Independent cost checks can be carried out to validate budgets. The model is nimble in response to changes. Stage control gates (i.e. decision points) can be established at major project milestones which provide the client with the opportunity to exercise a 'go/no-go' decision for successive phases (e.g. when Risk Management Measures are confirmed).

As a CM/GC project progresses, the contingency associated with risks can be reviewed on a regular basis, and re-allocated if those risks do not materialize. As an ultimate control measure on cost and schedule, if unforeseen or un-inferable conditions are encountered, components of the project can be de-scoped or deferred.

2. INTRODUCTION

This document is an executive level review of the Port Lands Flood Protection and Enabling Infrastructure Project Due Diligence Report [DRAFT], dated June 27, 2016.

Kiewit has been requested to:

- Provide opinions on the scope, process, and thoroughness of the due diligence and project planning work completed as a foundation for setting the project budget and developing the procurement/project delivery strategy;
- Recommend any material adjustments to the process, assumptions, and/or conclusions that should be considered by the project team;

- Identify any additional “up front” work that should be undertaken to fill information gaps prior to approving the budget and committing funding; and
- Provide an opinion on the schedule and construction methods that are discussed
- Provide an opinion on the procurement approach, together with a rationale for the recommendation

Kiewit began as a company in 1884, and has constructed many of the most complex projects in North America. For this review, we have assembled a team with specific expertise in the disciplines that relate to the unique aspects of this project, gained internationally and in North America. From a technical viewpoint, the major challenges of the project relate to environmental and geotechnical issues. The review has been structured into the following sections:

- Geotechnical
- Environmental
- Schedule and Estimate
- Risk
- Procurement Model

3. GEOTECHNICAL

The main geotechnical challenge relates to total and differential settlement caused by changing the loading conditions (cutting and placing fill) on sensitive soils that could damage existing and new services, access roads and structures, unless appropriate measures are taken. Many other geotechnical issues are identified in the documents, and potential solutions are offered. However; in order to accurately define scope (along with budget and schedule) from a geotechnical perspective, a comprehensive Ground Improvement Plan should be developed.

The Ground Improvement Plan should:

No.	Description
1	Establish allowable settlement criteria for the individual site features, including the structures and services that are to remain. In particular criteria for differential settlement where there are (or will be) transitions from pile supported to grade supported structures (or infrastructure).
2	After allowable movements are defined, the individual sequencing of the construction phases can be developed, and appropriate techniques with associated schedule and cost can be evaluated.
3	Subsequent work activities and dewatering efforts (for example installation of new utilities and construction of the private developments) that could cause future settlement of completed areas should be considered in the Ground Improvement Plan.
4	Existing Heritage buildings, existing infrastructure, and requirements to maintain access for existing businesses present significant obstacles to a program of surcharging large areas to consolidate the compressible soils. In order to achieve the results indicated in the five areas that have been identified as requiring surcharging in the reports, the surcharge needs to be applied uniformly. The Ground Improvement Plan needs to consider these obstacles, and consider staging services and access into temporary corridors, and potentially moving heritage buildings. The Ground Improvement Plan also needs to align with the environmental mitigation work as well as the site civil works.

The Ground Improvement Plan is an example of work that could be progressed during the pre-construction or CM phase of a CM/GC project. Many components of the Ground Improvement Plan outlined above will involve interactions with the Owner, the existing businesses, and the excavation and remediation components of the project.

Under an alternative DBF model, the geotechnical risks would be extremely difficult to quantify and transfer "all-in" up front. To leave a design build proponent on its own to develop a Ground Improvement Plan with so many moving parts (existing tenants, services, access routes, mobility of heritage structures, etc.) and existing third party commitments may not be practical or desirable. Under a DBF procurement model, we believe that the Ground Improvement Plan would need to be developed by the Owner prior to procurement.

One hydraulic study that may be considered before moving forward with pricing (and that could be advanced during a pre-construction CM phase) is the effect of scour when floodwater is re-directed down the new southward channel/floodplain at the existing bulkhead walls; in particular when the Don Greenway spillway is in use.

4. ENVIRONMENTAL

It is understood that a Community Based Risk Assessment (CBRA), undertaken in accordance with a draft guidance document issued by the Ontario Ministry of Environment and Climate Change (MOECC), will be used to evaluate environmental risk, and provide a basis for soil and groundwater management plans to reduce and manage contaminant levels. Approval or concurrence will also be required by the federal Department of Fisheries and Oceans (DFO), Aquatic Habitat Toronto (AHT), and Toronto and Region Conservation Authority (TRCA), and these approvals are anticipated sometime after summer 2017. The extent to which regulatory instruments will be issued, and the potential impact this will have on the later stages of design and construction costs are unknown. In the interim, the following key assumptions have been made in order to develop many components of the Due Diligence report:

No.	Key Assumption	Other Related Assumptions and Discussion Points

1	Remediation requirements, and target treatment standards for soil and water	• Groundwater treatment is addressed separately through construction management techniques (skimming and sorbent booming) rather than more aggressive means
		• Range of unit price for bioremediation provided is between $16.5-$780/m3 and effectiveness of bioremediation is difficult to ascertain at this stage (assumption was $65/m3).
		• That there is only 20% of fine grained portion separated by soil washing (for both unsaturated and saturated zone soils) and that the majority of this can be treated by bioremediation
		• *In addition to soil remediation targets, assumptions regarding the following factors have been made (that combine to affect treatment cost and time):*
		  ○ *Types of contaminants present (PHC F1-F3 and VOC's vs PHC F4, PAH's and metals or PCB's)*
		  ○ *Remediation method (bioremediation vs. soil washing vs offsite disposal) and quantity of soil suitable for each method.*

2	Beneficial soil reuse	• The assumed quantity of soil that is planned for onsite treatment to meet Table 3 Residential/Parkland or S-GW3 risk based values using bioremediation can be completed within an acceptable duration to allow reuse within the project timelines. • 164,000 m3 (assumed to be banked volume) of non-hazardous contaminated soil will require off-site disposal. *There may be a higher percentage of excavated soil that does not satisfy the required reuse standards or soil treatment durations within project timelines and which may require off-site disposal.*
3	Approval/Concurrence to the risk management	• 1.5m clean fill cap is adequate for Risk Mitigation Measures (RMM) • *There may be a requirement to physically isolate the contaminants*

	measures	*in groundwater from the new Don River Valley System, which would require a change of construction technique.*

It is understood that all three levels of government are represented within Waterfront Toronto, and that the MOECC is supportive of this project. Nevertheless, the regulatory conditions have such a dominant influence on the project scope, that it does not seem practical to procure the project using a traditional DBB or DBF model before those conditions are established. There would be significant financial repercussions if the project were privately financed, and the scope and schedule were to change significantly post award, due to regulatory requirements changing from current assumptions.

However, under a CM/GC contract model the regulatory process could advance during the pre-construction CM phase, concurrent with the development of the Ground Improvement Plan, bioremediation trials and other optimization and sequencing and design; and the Owner will have the flexibility to adapt to regulatory requirements without significant financial repercussions.

5. SCHEDULE AND ESTIMATE

There are a large amount of “known unknowns” associated with the regulatory, geotechnical and environmental issues outlined in the sections above, which restricts the level of scope definition at this time. The challenges outlined in the Due Diligence documents can be addressed with available construction techniques. A discussion on specific construction techniques that are applicable to this project is provided in a table in Appendix B: “Discussion on Proposed Construction Techniques”.

In the version of the schedule included with the Draft Due Diligence report, procurement durations for a CM/GC approach are included. It should be noted that procurement under a DBF approach would require significantly longer durations because of the work described in the Geotechnical and Environmental sections of this report that would need to be carried out before RFP. A comparison of procurement durations is included in Appendix C.

During the pre-construction CM phase of a CM/GC contract, or prior to the procurement of a DBF contract, the following work on schedule and the estimate should be carried out as scope definition improves:

1. Developed Logic will help understand impacts and enable detailed risk analyses
2. Production rates in the estimate will need to relate to the schedule

6. RISK

Estimate accuracy range is an indication of the degree to which the final cost outcome for a given project will vary from the estimated cost. The accuracy range of an estimate is dependent on risk. Risk increases with the potential for conditions to be different from base assumptions (or for new conditions to be discovered). This is sometimes referred to as discovery potential. The major contributors to the particularly high discovery potential on this project are:

- Regulatory changes/unanticipated requirements
- Access constraints from active business
- Performance of bio remediation and other techniques in these conditions
- Interfacing with adjacent projects
- Obstructions or existing infrastructure that must be worked around
- Mitigation of unknown buried foundations and site features
- Poor geotechnical conditions and greater than anticipated ground improvements
- Groundwater management
- Archeological finds

If the project were to be procured under a DBF model at this stage, we do not believe the estimate accuracy presented within the Risk Analysis model of the Due Diligence report and associated cost S-Curve model is appropriate. In our opinion the probabilities of cost and schedule that are presented in the Risk Analysis model in the Due Diligence report place too much confidence in the base estimate and schedule. The base estimate depends on scope definition, which in turn depends on regulatory requirements, remediation measures and the ground improvement plan, which at this point are conceptual.

However, if the project is procured under the CM/GC model there are many tools and features of that model (discussed in detail in Appendix C) that will enable the project to be developed within the budget and target schedule, as the scope for the project becomes more defined. Cost certainty can be achieved during the pre-construction phase once design is finalized, regulatory requirements are confirmed, and contingencies are developed with the Owner. If necessary or desirable, components of the project can be de-scoped or deferred in order to remain within schedule and budget limits before entering into a date-certain, Guaranteed Maximum Price (GMP) contract and proceeding with construction.

7. PROCUREMENT MODEL

This project is substantially different from the type of project that is typically procured through an AFP/ P3 approach, because much of the work is in response to what is found on site, as opposed to a designed structure (e.g. a Hospital). As a result, the portion of the work that impacts costs and schedule, which is contingent on unknown factors, is significantly higher than a traditional project. While inferable risks are transferred under a DBF, un-inferable risks are not, and a procurement model that does not align the client and contractor on minimizing the costs associated with both types of risk will not result in the lowest cost, or shortest schedule. We reviewed the scoring system within the Due Diligence Report and based on experience with similar projects, re-scored the procurement models. We have included a suggested rescoring along with some discussion points in Appendix C.

We consider the CM/GC with a stage gate control point model as described in Appendix C the most suitable approach for the procurement of this unique project.

8. CONCLUSIONS

The list of studies that Waterfront Toronto has carried out to prepare the Due Diligence report is extensive and reasonable, and we do not think the Due Diligence report would benefit significantly from any further studies. Many different construction techniques are available to address the unique challenges that this project presents. However, the scope of work is not sufficiently defined at this point to procure the project under a DBF approach.

As a next step, we recommend the early engagement of a qualified contractor through a CM/GC model with a stage gate approach that is structured to provide cost estimates and schedules with increasing accuracy along with detailed contingencies that can be re-allocated if the risk events they are associated with do not occur.

During the pre-construction CM phase we recommend reducing the regulatory risk by advancing the CBRA, and working with a qualified contractor to develop:

- Ground Improvement Plan,
- Evaluation of construction techniques and advancement of design
- Field scale testing of remediation techniques
- Detailed and aligned cost estimate and schedule.

APPENDIX A: DUE DILIGENCE MATERIALS PROVIDED

No.	Title/Description	Consultant
1	Due Diligence Report	Waterfront Toronto
2	Lower Don River Due Diligence and Validation Report	MVVA et al
3	Due Diligence and Validation Documents 10.15.2015	MVVA
4	Port Lands Environmental, Geotechnical, and Hydrogeological Investigation	GHD
5	Conceptual Site Model	CH2M
6	Screening Level Risk Assessment	CH2M
7	Regulatory Approach (Definition of RSC Areas)	CH2M
8	Geotechnical Conditions	CH2M
9	Remediation and Treatment Options	CH2M
10	Integrated Soil Management Plan	CH2M
11	Preliminary Groundwater Management Plan	CH2M
12	Earthworks Methodology	CH2M
13	Environmental Cost Estimate	CH2M
14	Figures to Accompany CH2M Reports	CH2M
15	Preliminary Design Update Report for Land Creation Works Surrounding Essroc Quay	Riggs Engineering
16	Recommendations and Rationale for Construction Cost Escalation Factors	Hanscomb
17	Conceptual Cost Estimates	Hanscomb
18	Base Line Schedule	HDR
19	Cost Risk Assessment Summary	HDR
20	Procurement Options Analysis	E & Y

APPENDIX B: DISCUSSION ON PROPOSED CONSTRUCTION TECHNIQUES

The following table (organized by Hanscomb's main estimate items) identifies some of the main elements of the project, provides some comments on construction techniques, and discusses challenges with scope definition at this stage.

No.	Scope/Technique	Component	Kiewit Construction Related Comments
1	Flood Protection, Earthworks and Lakefill	Sheet piles to minimize excavation quantities in the river excavation	The Port Lands Fill is described as debris, ash, coal, concrete, wood, brick and other waste materials. The Geotechnical Office in Hong Kong (that has overseen many similar reclamations) carried out a study that found that on 75% of sites where sheet piles were used, design penetration was not reached. These obstacles can be addressed with pre-trenching and drilling equipment for sheet pile installation. Sometimes a line of sheet piles is replaced by a group of soldier piles installed in pre-drilled holes through the obstruction.
			If DFO or Aquatic Habitat Toronto find that physical containment of contaminants is required to prevent them from migrating into the new river valley system, sheet piles will not penetrate the permeable fractured bedrock. Other techniques such as Cutter Soil Mixing (CSM), Diaphragm Wall technique, Permeable Reactive Barriers, or permeation grouting in combination with sheet piles will be required.
		Excavating in the wet	Even with the plugs in place, the water within the excavation of the new riverway may require more aggressive means of treatment for contaminants than skimming and sorbent booming.
			Fingers of rock for equipment placement as shown in the Earthworks Methodology is appropriate
		Placing material in the wet	A large amount of construction is shown to occur below the water level with provisions to place relatively thin layers of materials, including topsoil, below the water without compaction. In our opinion, the likelihood of acceptable quality for these completed features is low. The design of the base of the channel and the wetlands planting areas needs to be evaluated relative to resistance to scour and constructability below the water table. Any requirements for dewatering will be accompanied by requirements for water treatment.
		Geotechnical Suitability of Soil Re-use	The geotechnical conditions report indicates that the addition of cement (between 2-5%) for all soil types described may be required to improve the properties of soils to make them re-usable. This requires evaluation and quantification.
		Surcharging	Surcharging requires large zones, free of sensitive structures and utilities. Staging for access routes,

			structures and services needs to be developed as part of the Ground Improvement Plan.
		Wick Drains, Stone Columns, water collection	The current plan proposes wick drains to accelerate primary consolidation. The potential unintended environmental consequences of transmitting contaminants vertically in the soil profile through the wick drains needs to be evaluated. Stone columns would accelerate the consolidation times further and reduce the overall settlements, but like wick drains, would also provide a potential conduit for contaminants (up and down).
		Soil Washing	Could result in a larger than anticipated fines component requiring bio remediation.
		Bio remediation	Need Regulatory guidance for targets. After that, need to carry out field scale testing to plan full scale implementation.
		Essroc Quay	Removal of weak sediment deposits by dredging likely required. Surcharging of subsoil and fills required.
2	Flood Protection Structures	Rubber Dams	Rubber dam control weirs can provide an effective means of passing increased flows during flood events. However, in our experience, the mechanical and electrical components can be subject to occasional malfunction resulting in unanticipated releases. Flood risk behind a cofferdam during construction to be considered and prepared for.
3	Roads and Municipal Services	Pile to grade support transitions	As roads and services transition from pile supports to grade support (for example adjacent to bridge, or for the developments that will need to tie into existing utilities), consideration for the transition areas need to be addressed in the Ground Improvement Plan. Solutions may be accommodated by surcharging, or with rigid inclusions, stone columns, or approach slabs at those transitions.
		Sewers and other services	The requirement to treat contaminated groundwater whenever dewatering is required would mean that techniques and approaches that minimize dewatering requirements may be very advantageous.
4	Bridges, Marine Structures	Timing	Because the bridges will be constructed on piles founded on rock, they can be constructed in advance, and as noted, there should be a cost and schedule advantage to construct the bridges prior to excavation of the new riverway. Furthermore, the amount of discovery related to these structures is low. Consideration to maintaining access routes to be considered.
		Negative Skin	Down-drag by the soils consolidating around the piled

		Friction	foundations will cause increased loading on the piles, and needs to be accounted for in the design.
		Pile caps	Where possible, pile caps should be designed above the groundwater table. Some indicative drawings suggest driven piles with fairly deep pile caps. We suggest drilled shafts with higher pile caps to minimize dewatering requirements.
5	Other Items		
a	Adjacent projects	Gardiner Expressway	The Gardiner is likely to be a P3 DBFM project due to the low potential for discovery and suitability of the project to that contract model. It is likely the Port Lands project will need to accommodate the interface challenges that the Gardiner project may impose, for which a flexible contract model will be best suited to address.
		Ashbridges Bay Outfall Tunnel	This tunnel (and others a little further away) can provide an excellent source of fill material. A portable screen and crusher can make many of the materials required out of the tunnel muck.
b	Regulatory Agency	MOECC	We anticipate that ECA portable water treatment plants will be required to treat all dewatering. Different treatments are appropriate for different contaminants, and can have significant cost implications.

APPENDIX C: PROCUREMENT MODEL EVALUATION DISCUSSION & RESCORING

Kiewit has reviewed the Procurement Option Analysis that formed part of the Due Diligence documentation that evaluates various contract models, including Alternative Financing and Procurement (AFP) models such as Design Build Finance (DBF) and Build Finance (BF), traditional models such as Design Bid Build (DBB) and Design Build (DB), and the Construction Manager/General Contractor (CM/GC) model for suitability to the very unique Port Lands Project. Discussion is provided with respect to:

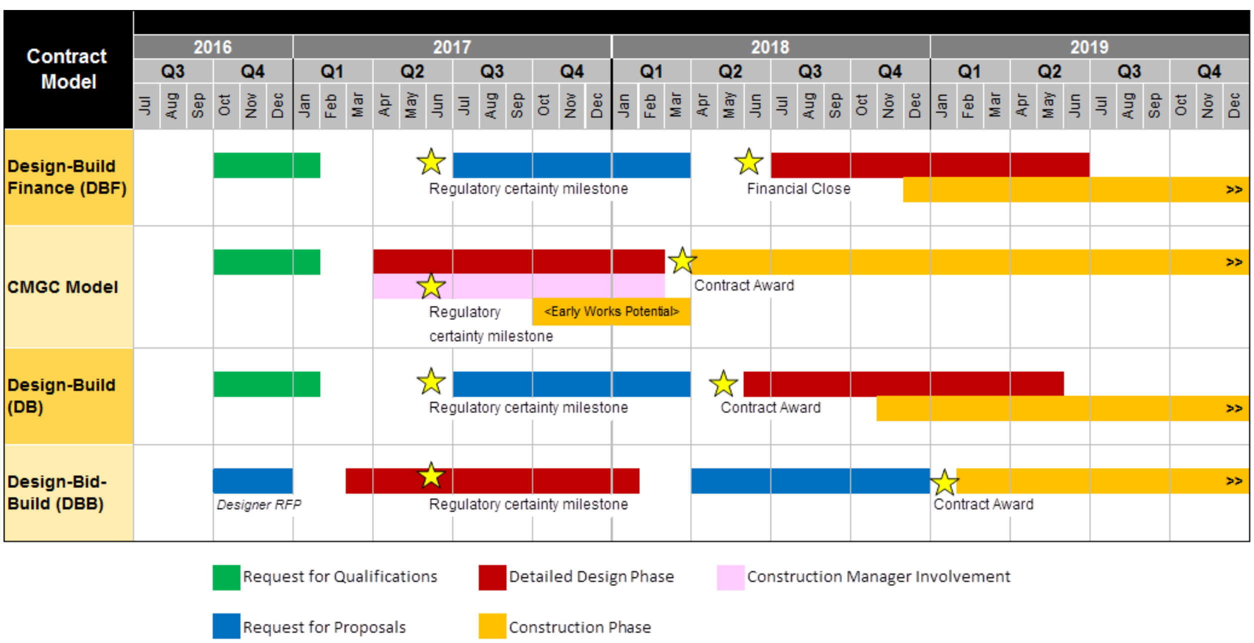
1. Project Schedule Considerations
2. Project Budget Considerations
3. Management of Project Risks
4. Flexibility & Collaboration

PROJECT SCHEDULE CONSIDERATIONS

Unlike a typical AFP/P3 project, the major risk elements for this project are very difficult to quantify prior to detailed design and constructability reviews, and as a consequence under a DBF the baseline construction schedule would likely become mis-aligned with the actual work and become difficult to track to.

A CM/GC model will allow the contractor and Owner to begin work on long-lead-time items (surcharging, permitting, etc.) earlier than an extended DBF or DB procurement. Regulatory approvals and permits can be acquired during design development so that regulatory risk is removed prior to final price development.

The figure below provides indicative durations for the different procurement model presented in the Due Diligence Report and their impacts to the design and construction of the Project.



PROJECT BUDGET CONSIDERATIONS

While cost certainty may be high with a typical DBF project (e.g., a hospital), this project has a very high discovery potential, and it is likely that not all the risk transfer that is suggested to occur under the AFP models will be possible and/or affordable. The DBF approach is not always conducive to efficient risk mitigation because there is inherently less collaboration between the contractor and Owner. Also, under the DBF model risks are transferred at a cost that will be incurred regardless of whether the associated risk events happen.

Under the CM/GC approach, the contractor and Owner work together to mitigate risks upon discovery. Cost certainty can be achieved via a CM/GC model once design is finalized, contingencies are developed with the Owner and the CM enters into a date-certain, GMP contract. This is well suited to this particular project, because the unique environmental and geotechnical risks would be extremely difficult to quantify and transfer "all-in" up front.

While privately financing the project could defer funding expenditure, this financing would ultimately increase overall costs because the government can borrow money at a lower rate than the private sector.

MANAGEMENT OF PROJECT RISKS

Successful Risk Transfer on P3 projects is based on the premise that when enough information is available, the private sector is more efficient at managing and therefore pricing risk. However this relies on the precedent of "known and inferable risk". This project has a higher level of potential discovery compared to a more typical social or civil infrastructure project, and as a result the risk transfer is not as efficient. Market sounding participants indicated that the environmental and geotechnical risks should remain with the Owner.

The dominant risk on this project relates to permitting and regulatory requirements. A CM/GC approach enables the team to have permits and regulatory certainty prior to agreeing to final pricing. Under the CM/GC model, risks are identified and quantified together with the Owner, designer, & CM, and cost is only incurred if those risks materialize. If risk and contingency is reviewed on a regular basis, the contingency associated with risks that did not occur can be re-allocated. As a CM/GC project progresses, if required, components of the project can be de-scoped or deferred in order to remain within schedule and budget limits.

FLEXIBILITY & COLLABORATION

CM/GC projects are very collaborative, with Owner-CM integration ongoing throughout the planning and design phases. Independent cost checks can be carried out to validate budgets, and the model is nimble in response to changes. Stage control gates (decision points) can be established as major project milestones which provide the client with the opportunity to exercise a 'go/no-go' decision for successive phases. For example, a Control Gate when regulatory requirements are finalized would make sense prior to authorizing later stages of design that depend on those requirements.

The nature of the project leads to challenges in defining performance specifications for major components of the work. Using a CM/GC model, performance specifications are able to be jointly developed during the detailed design phase which allows the Owner to receive up-front information on how certain project specifications will ultimately affect the budget and schedule. It is very rare that a dispute ever develops in a CM/GC contract because the CM contractor and the Owner have jointly developed the methodologies, risk matrix and contingencies.

The following table is our rescoring of the five procurement options presented in the documents:

			AVERAGE SCORES				
Evaluation Criteria	**Weighting**		**DBB**	**DB**	**CM/GC**	**BF**	**DBF**
Innovation	H	3	1	3	4	2	3
Sustainability and Environmental Management	H	3	5	4	5	5	4
Design Excellence	H	3	5	4	5	5	4
Competition	M	2	3	4	4	4	5
Cost Certainty	H	3	2	4	4	2	4
Schedule Certainty	M	2	3	3	3	4	4
Funding Expenditure Timing	M	2	2	2	3	4	4
Time to Deliver Project	L	1	1	2	4	1	3
Risk Transfer/Management	H	3	1	3	3	2	3
Interface Coordination and Flexibility	H	3	3	2	4	2	2
Legal Considerations/Precedent Projects	M	2	5	2	5	4	4
Logistics	M	2	1	2	3	1	2
Collaboration	H	3	1	2	4	1	3
Total Weighted Score			**83**	**94**	**127**	**92**	**110**

APPENDIX D: CONTRIBUTORS

Kiewit's team for the Port Lands Flood Protection and Enabling Infrastructure Due Diligence Review.

	**KEN HANNA** Principle in Charge, VP, Ontario Area Manager	With more than two decades of experience in transportation, infrastructure, and heavy civil projects, Mr. Hanna brings a wealth of North American knowledge with more than 10 years of senior project and executive management experience. While serving as an off-site Principle-in-Charge, he has extensive involvement with more than $3 billion in alternative delivery projects such as Design-Build, Construction Manager / General Contractor (CMGC) at Risk, and P3 procurement and delivery.
	**TIM SHEPHERD** Project Director	Mr. Shepherd brings 18 years of project management experience on large, complex infrastructure projects primarily within Ontario. Tim is currently a Project Sponsor for the Eastern Canada District, which includes executive oversight of transit and transportation projects in the Greater Toronto Area as well as new project pursuits.
	**BRIAN NORCLIFFE M.Sc., P.Eng.** Project Manager	Mr. Norcliffe has more than twenty years of international experience in geotechnical engineering, design and project management of civil works in the energy, transportation, infrastructure, and utilities sectors. He provides leadership and management of day-to-day operations and has managed projects through design, procurement, construction and commissioning.
	**TOM SABOURIN P.Eng.** Sr. Geotechnical Engineer	Mr. Sabourin is a senior geotechnical expert with more than 30 years of practical experience in engineering design, methodology selection, and construction throughout North America. His fields of expertise include earth works, marine construction, deep foundations, support of earth, rock slope engineering, slope stability, dewatering, geotechnical instrumentation and testing.
	**STEVEN SAYE, P.Eng.** Sr. Geotechnical Technical Lead	Mr. Saye is a Senior Geotechnical Engineer and Design-Build Geotechnical Technical Lead supporting Kiewit projects across North America. With 38 years of experience, he is a recognized expert in the design of soft soil ground improvements and the implementation of geotechnical engineering for design-build projects. Mr. Saye works with design-build teams in the US and Canada developing project concepts, designs, and estimates.
	**SHANE DIXON** Senior Scheduling Manager	Mr. Dixon brings 12 years of experience working in various markets including infrastructure, power, buildings, science & technology, healthcare, corrections, and government & military. Throughout his North American career, Mr. Dixon has developed, implemented, and trained employees on scheduling procedures and best practices. Currently, Mr. Dixon is the Eastern Canada District Scheduling Manager leading a central hub of schedulers assisting projects across the country and developing processes to efficiently respond to project needs.
	**LAWREN GREEN, MBA** VP, Finance & Development	Mr. Green has 10 years of experience working on complex, diverse P3 transactions in Canada and the United States. He brings combined experience with the private and public sectors that spans across a variety of contract and procurement models.
	**MICHAEL BILLOWITS, M.Sc. (Eng.), P.Eng, PMP** Environmental Remediation Engineer	A national authority on soil remediation, Mr. Billowits has more than 20 years of work experience in the role of consultant, Owner, and contractor dealing with remediation of contaminated sites and permitting. He previously held the position of National Manager of Contaminated Sites with the federal government. Currently, Mr. Billowits is the President of Outcome Consultants Inc, providing project management, construction management, and environmental consulting services for a portfolio of projects with a construction value in excess of $2B.

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