

Appendix C



CONSTRUCTION LEADERS



March 17, 2014

VIA EMAIL: KJarvela@victoria.ca

Mr. Ken Jarvela
CITY OF VICTORIA
1 Centennial Square
Victoria, BC, V8W 1P6

Dear Mr. Jarvela:

**RE: JOHNSON STREET BRIDGE REPLACEMENT
Design Delay and Scope Increases Request for Change Order
Our File No.: 2261300 - 2A.2**

We write further to our earlier notices regarding design delays and increases to the scope of the project. As outlined in the attached submission, these design delays and increases in the scope of the project have increased the cost of the project by approximately \$9.5 million. We request a change order with respect to these additional costs and a 5 ½ month extension to the Project Schedule.

If the OSD deck plate can be reduced in thickness to 16mil and the number of ribs reduced to 16, the adjusted counterweight steel and lead quantities may reduce these impacts approximately \$1.6 million, subject to receipt of final balance design.

These calculations reflect our estimate of the impacts based upon the following assumptions: (i) that there will be no further delays to the completion of the design; and (ii) that there will be no further scope growth. PCL may be required to provide further submissions for additional costs if the project encounters further design delays and increases to the scope of the project. For that reason, we urge the City to promptly resolve the issues raised in our submission.

To be clear, we wish to assist the City as it works through these issues in order to minimize the impact of the design delays and scope increases. For this reason, we are encouraged by the continued dialogue on these issues. We are available at your convenience to discuss resolution of both the design related issues and our ultimate change order entitlement. Ultimately, our priority is to resolve these issues and to focus entirely on completing the construction program.

Should you have any questions regarding the above, please contact the undersigned.

Yours truly,

PCL CONSTRUCTORS WESTCOAST INC.

Dan Leachman
Construction Manager
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DL/rj

PCL CONSTRUCTORS WESTCOAST INC.

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Attachments: Request for Change Order //17/2014
Work Schedule Comparison

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Change Order Request Design Delay and Scope Increases

Introduction

1. This document sets out PCL's preliminary submission for additional compensation and additional schedule time arising out of increased scope of work and delays incurred on the Johnson Street bridge project.
2. The increase in scope has been sizable, and the delays and cost escalation have been significant. To a large extent, both arise out of the difficulties that the City's consultants have experienced in finalizing a bridge design that is consistent with the scope of work set out in the Contract.
3. PCL is not privy to the contract between the City and MMM. Similarly, PCL has never seen the contract between MMM and H&H. PCL believes that there may be gaps between those two contracts, with the result that MMM is responsible to the City for providing a completed design, in the form of issued for construction ("IFC") drawings, but that responsibility may not have been passed on to H&H.
4. It has been very difficult for MMM to issue IFC drawings for this project. The result has been significant delays and scope creep. The IFC issue is discussed in greater depth below in this submission.

Finalization of Design

5. The cost overruns, material scope increase, and delays on this project are largely attributable to the City, through its consultants, modifying the design process in a manner that is inconsistent with the Agreement.
6. This deviation from the process set out in the Agreement has:
 - a. Resulted in the issuance of design drawings that are incomplete;
 - b. forced PCL to expend much more time analyzing in considering the design;
 - c. prevented PCL from procuring materials or commencing construction based upon the incomplete status of the design;
 - d. resulted in material quantity increases;
 - e. exposed PCL to potential liability for design, which responsibility properly belongs with the City; and
 - f. delayed the project.
7. To be clear, with the exception of some very limited aspects of the project, the risks and responsibilities for the design rest with the City, in accordance with the terms of the Contract. Article 1.2 of the Agreement states:

The City will provide all design required for the performance of the Work, except for:

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- (a) design that is expressly stated in the Contract Documents to be the responsibility of the Contractor (such as, for illustration, the design of temporary structures under GC. 4.9); and
- (b) the design of portions of the Project, if any, as specifically described in Appendix B – Scope of Work that the Contractor will undertake on a design-build basis.

The City has engaged MMM Group Limited as its lead designer to perform the City's design obligations under this Contract.

8. Neither of the two exceptions described in Article 1.2 (e.g. temporary structures and design-build work) are at issue in this claim. The design-build work is very limited in scope, specifically outlined in Appendix B. Design-build work is limited to the Harbour Road Retaining Wall.
9. In fact, all of the issues relevant to this claim are with respect to design that is fully the City's responsibility.
10. The fact that design responsibility rests with the City is reinforced in Article 1(c) of Appendix H of the contract:

Nothing in this Appendix H will be interpreted to:

- (1) assign responsibility for any design to the Contractor, except as may be expressly assigned to the Contractor in writing in the Contract Documents; or
- (2) amend or relieve the City from its obligations to provide design and construction drawings for the performance of the Work, unless otherwise set out in the Contract Documents.

11. The Contract was awarded based upon several "design optimizations". The design optimization concepts were not fully designed at the time the Contract was signed, but had been sufficiently developed to allow them to be priced. The relevant contract provisions are Article 3.1 and Article 3.2. They provide that to the extent the design for any portion of the Project requires design development or is in any way incomplete, the City will instruct and cause the Consultant to complete such design.
12. Further, GC 4.10 provides that if there are errors in the drawings, PCL is entitled to claim extra compensation arising from those errors, as long as PCL does not proceed with the work without first seeking clarification.
13. The design development process is set out in the Contract. It culminates in a finalized design, which is supposed to be reflected in drawings marked "Issued for Construction" ("IFC").
14. The Contract emphatically prohibits PCL from proceeding with work before being issued IFC drawings for that work. Article 3.3:

3.3 Issued for Construction Drawings

The Contractor will perform construction in accordance with drawings which have been stamped "Issued for Construction" by the Consultant or the Consultant's approved delegate,

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and, for construction which the Contractor will undertake on a design-build basis, the Contractor will perform construction in accordance with drawings which have been stamped "Issued for Construction" by the Contractor's consultant and stamped "Reviewed" by the Consultant or the Consultant's approved delegate. The Contractor will not proceed with any construction for which it has not received "Issued for Construction" drawings.

15. Article 3(d) of Appendix H clearly places responsibility for design related delays on the City. That article states:

The City will cause the Consultant to deliver any final construction documentation (including, as appropriate, plans and specifications) where reasonable 30 days, but in no event less than 15 days, prior to the Contractor's planned date for the commencement of construction or procurement activity for such Work as indicated on the updated Work Schedule, and any failure to comply with this provision will be deemed to be a City delay to which the provisions of GC 8.1 will apply.

GC 8.1 sets out PCL's entitlement for additional compensation and schedule relief for delays caused by the City.

16. GC 4.20 of the Contract deals with shop drawings:

unless expressly required otherwise by the Contract Documents, the drawings provided to the Contractor by the City for construction will be sufficiently complete to permit the Contractor to proceed with the Work, and to prepare Shop Drawings to show details such as fabrication methods, connections or other details that are not customarily included in construction drawings provided by an owner for work similar to the Work

17. According to Article 3.3, PCL is not "permitted" to proceed with the Work without IFC drawings. Therefore, pursuant to GC 4.20, the drawings by the City to PCL must be IFC drawings.
18. It is not within the City's or Consultant's power to direct PCL to proceed in the absence of IFC drawings. The clause in question (Article 3.3) is as much for PCL's protection as for the City's benefit. There are serious risks that flow from carrying out work based on design that is not fully completed, including the risk that the design may change, or that PCL will be found to have performed the remaining design work by default. PCL is entitled to enforce that clause.

LATE DESIGN DELIVERY

Unfortunately, the City has not completed the Design within the timeframes required by the Contract. There are two notable delays. The first relates to the late delivery of "Issued for Detailing" drawings ("IFD"). The second relates to late delivery of "Issued for Construction" drawings ("IFC"). These delays have been compounded by improper issuance of IFD's in place of IFC's. Specifically, the consultants have purported to issue IFD drawings with the direction that PCL, through its steel detailer, prepare shop drawings for review by the consultants, and after the consultants have written their comments on the shop drawings, the marked-up shop drawings together with the IFD drawings would constitute a set

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of IFC drawings. As explained below, that proposed process is expressly contradicted by the terms of the Contract.

The deadlines for delivery of IFD drawings are clearly set out in Appendix D of the Contract. The following compares those contractual deadlines to the actual delivery dates of the IFD's:

- **Completed design and issued for detailing drawings of a complicated joint** – The City and the Consultant were required to release this detail by March 15, 2013. PCL received a version of this detail on March 20, 2013. However, that version was not representative of the optimized design or the indicative design. Consequently, PCL has not yet received this detail.
- **Completed design and issued for detailing drawings of a portion of the bascule span (ring or substantial portion of the truss):** The City and the Consultant were required to release this design by April 20, 2013. The first ring drawings were released July 2, 2013. However, they were modified by Field Instruction 005 as late as January 28, 2014. We are currently determining the impact of those changes.
- **Completed design and issued for detailing drawings for the bascule span:** The City and the Consultant were required to release this detail by May 20, 2013. This design was generally completed with the issuance of Field Instruction 007 on February 23, 2014, although there remains significant design issues that are unresolved and are impacting completion of our suppliers steel shop drawings.

We note that these three elements of the design are the only aspects that contemplate the use of IFD drawings. As noted above, the City's consultants have attempted to issue IFD drawings for other aspects of the design. We see no support for that process in the Contract. On the contrary, the process undertaken by the City's consultants related to these other IFD drawings contradicts Article 1(c) of Appendix H, quoted above. For all of these other aspects of the design, the City is obligated to provide IFC drawings in accordance with Article 3(d) of Appendix H. Unfortunately, the IFC's have not been delivered as required by the Contract.

The design deliverable dates in the Contract were not met. Pursuant to Article 3.3 of the Agreement, completed design deliverables with which the Contractor can proceed with construction are those which have been stamped "Issued for Construction" by the Consultant. To date, the only Bascule Span element that has been issued IFC is the bascule pier piles.

The following schedule shows what IFC drawings have been issued to date. Note: The dates shown for the October 2 table reflect dates provided at that time by MMM and do not represent Contract dates or

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design deliverable dates originally provided by MMM.

DESIGN SCHEDULE						
DISCIPLINE	COMPONENT	STATUS	OCTOBER 2 MMM DATE	ISSUED IFD DATE	ISSUED IFC DATE	REMARKS
FIXED STRUCTURE (MMM)	Substructure - East	IFC	2013-09-30		2013-12-20	
	Substructure - West (excluding Rest Pier)	IFC	2013-10-27		2014-02-14	
	Substructure - Rest Pier	IFC			2014-02-25	Not issued with West substructure dwgs as MMM added maintenance platform.
	Substructure/Superstructure (revised IFC set)	IFC			2014-03-06	2nd set of IFC sub/superstructure drawings issued without changes bubbled, and new drawings added. PCL to notify MMM.
	Precast - East	IFC	2013-10-15		2013-12-20	
	Precast - West	IFC	2013-10-31		2013-12-20	
	Superstructure - East	IFC	2013-11-21		2014-01-28	
	Superstructure - West	IFC	2013-11-21		2014-01-28	
	Approach Walls - East	IFC	2013-10-11		2014-02-14	
	Approach Walls - West	IFC	2013-11-15		2014-02-07	
FIXED STRUCTURE (H&H)	Substructure - Bascule	IFC	2013-10-23		2014-03-11	
	Precast - Bascule	IFD	2013-10-16	2013-11-22		
	Superstructure - Bascule	IFD	2013-10-16	2013-11-22		
BASCULE STRUCTURE	Ring	IFD	-	2013-07-02		Revisions made 2013-12-12 & FI 05
	Trusses	IFD	-	2013-07-23		Revisions made 2013-12-12
	Splice	IFD	2013-10-11	2013-12-12		
	Orthotropic Deck	IFD	-	2013-07-08		
	Walkways	IFD	2013-10-31	2014-02-21		Deck details missing; IFD incomplete. IFD completed in FI 07
	Outriggers	IFD	2013-10-31	2014-01-28		Camber missing; IFD incomplete. Completed in FI 06
	Counterweights	IFD	NO DATE	2014-01-28		Partially issued in FI 05, connection details outstanding. FI 08 completed counterweight and provide connection detail.
	Balance	IFD	NO DATE	2014-02-20		Missing specs.
MECHANICAL	Equalizers	IFD	-	2013-08-20		Non-stamped version issued 2013-08-02
	Rack/Span Drive	IFD	-	2013-08-20		
	Other	IFD	-	2013-08-20		
ELECTRICAL	Controls & Primary Distribution	IFD	-	2013-09-06		Non-stamped version issued 2013-06-31.
	Lighting - Functional	60%	2013-12-01			100% date used, IFC expected 04/05/14.
	Lighting - Architectural	60%	2013-12-21			100% date used, IFC expected 04/05/14.
	Distribution - Local	60%	2013-12-15			100% date used, IFC expected 03/31/14.
	Traffic	90%	2014-01-30			IFC expected 03/31/14.
CIVIL	Grading	IFC	2013-11-15		2014-02-14	
	Roadworks & Drainage	IFC	2013-11-15		2014-02-14	
	Services	IFC	2013-12-13		2014-02-14	
ARCHITECTURAL, OTHER	Railings	90%	2013-11-21			90% issued in DDR 03/06/14.
	Guardrails	90%	2013-11-21			Typical details only; no IFC info
	Landscaping	30%	2014-01-31			No progress since indicative
	Demolition	30%	2013-11-15			No progress since indicative
	Control Building - Steel	90%	2014-01-10			
	Control Building - Arch	30%	2014-01-10			
	Fendering	ON HOLD	2013-12-06			MMM advised 2014-01-30 partial IFC to be issued. Date TBD.
			MMM DATE	Shaded dates are design schedule dates that have been missed		
				Missing IFC Drawings		

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The drawings provided to the Contractor by the City for construction must be, according to the contract, sufficiently complete to permit the Contractor to proceed with the Work, and to prepare shop drawings.

In addition to these late design deliveries and well after the initial IFD's were issued, numerous design changes were made to those drawings causing delay, rework, and additional cost to PCL and our suppliers. Two key examples are described below.

1. Field Instruction 001 was issued August 19, 2013, modifying the IFD drawings initially received last July for the truss. This field instruction made significant changes to the upper chord of the trusses, causing re-detailing, additional steel procurement, and delayed submission of truss shop drawings. Our letters of August 30 and September 6, 2013 highlighted the delays incurred due to this instruction.
2. Field Instruction 005 was issued January 28, 2014 that modified IFD drawings initially received last July. This Field Instruction made significant changes to the ring structure that cause re-detailing effort and reordering of replacement plates for steel ordered under the Consultants direction after receiving the original IFD Ring drawings.

PCL letter Notice of Delay-Ring Design Revisions was sent to the City and MMM on February 13, 2014 as a result of Field Instruction 005. This notice addressed two issues.

- a. There are ongoing technical design issues that remain unresolved that have delayed preparation and submission of shop drawings. Complicating this effort is the fact that the Consultant has provided IFD drawings containing design that cannot be built in accordance with the design and the governing codes. Many of these issues are not resolved and continue to delay shop drawing completion and submission.
- b. Secondly, PCL has been instructed to generate shop drawing and procure plate steel based on IFD drawings. The truss and ring IFD drawings were issued in July 2013, but significant changes continue to be made to these drawings by field instruction that are causing re-detailing efforts and costs to be incurred by PCL and our fabricator in order to accommodate the directed changes. This has resulted in a design that is never finished and our fabricator is forced to go back to the drawing board to accommodate the changes. It has made it extremely difficult to ever "finish" the shop drawings and submit them.

In addition to the Consultant's inability to finish the design and for ZTSS to subsequently finish the shop drawings, one of the primary drivers of this ongoing delay is the necessity to make a 3rd mill order of replacement plates for aspects of the design that have been changed or have arrived late. This 3rd and last mill order will take 4 months to receive from the mill in China. The specified grade of steel is a special order and subject to a minimum order. There are numerous areas of the bascule structure that await plate material or revised plate material including upper and lower counterweights, MUD/PED structures and outriggers, primary truss field splice, new curb details, ring revisions, and potentially OSD deck changes. These changes are caused by multiple field instructions and elements of the IFD design delivered late.

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Field Instructions were issued that modified previously issued IFD drawings or added missing parts of the design:

- FI 001 – Issued 8/20/13 – Modified Truss IFD
- FI 002 – Issued 10/15/13 – Provided Structural Steel Specifications
- Truss Splice IFD – Issued 12/12/13 – amended by FI 005 1/28/14
- MUD/ PED IFD – Issued 11/22/14, Outriggers issued 1/7/14, additional information provided in FI 06 2/3/14.
- FI 005 – Issued 1/28/14 – Modified Ring, Truss, Truss Splice, and Counterweight IFD.
- FI 006 – Issued 2/3/14 – Provided MUD/PED Outrigger camber and decking information.
- FI 007 – Issued 2/21/2014 – Provided miscellaneous connection details required in the walkways.
- Missing information to date– Lower Counterweight connection details, 16mil OSD balance information, and RFI responses impacting steel detailing efforts.

The yet-to-be-confirmed timing and content of the final design of the project (the complete package of stamped IFC drawings and specifications from the Consultant) has the potential to cause further scope increase and delay. If there are any further changes to the design after the 3rd mill order, PCL cannot warrant that the added material can be milled in China due to the minimum order constraints. Therefore, the full extent of scope increases and delays on this project are not yet certain. However, they have been estimated based upon several assumptions:

- a) The completion of the design will be consistent with the scope of work as currently contained in the latest issue of drawings from MMM; and
- b) there will be no further delays caused by late design; and
- c) there will be no further increases in quantity caused by the design yet to be provided.

SCHEDULE ANALYSIS

PCL's Initial Work Schedule JSB-01F is part of the Contract as referenced in Appendix D. This schedule is the basis for our Work Schedule JSB-1304A submitted on May 1, 2013 to MMM. Please refer to the JSB Work Schedule Comparison attachment. This Work Schedule Comparison compares:

- the baseline Work Schedule (JSB-1304A) dated April 1, 2013
- to our most recent schedule (JSB-1402C) dated February 3, 2014.

The project completion date in JSB-1402C has slipped approximately 10 months from PCL's planned completion date as shown in the Baseline Work Schedule. The critical path for both schedules run through design, steel shop drawings and fabrication, then erection of the steel bascule span. The design

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and shop drawing development timelines have been stretched out significantly due to the Consultant's inability to complete the design enough for the shop drawings to be submitted in a timely manner.

The April 1, 2013 Work Schedule (JSB-1304A) contained 4 months of Contractor's float as PCL planned to complete the project 4 months before the Contract Completion date of March 31, 2106. PCL's proposed price and overhead for the Project reflected this early completion plan. The completion date forecasted in JSB-1402C is September 16, 2016, 5-1/2 months after the Contract Completion date.

We expect the City will appreciate the fact that PCL will admit that part (4-1/2 months) of the 10 month total delay is due to PCL's own concurrent delays to our work to construct the East Trestle and Bascule Pier shafts and we will not seek compensation for those 4-1/2 months.

SUMMARY OF DELAY COSTS

1. Due to the extended time PCL's staff will be required to be on site, we ask for reimbursement for costs expended to keep our staff, equipment, and facilities for 5-1/2 months Jobsite Overhead.

PCL Jobsite Overhead	\$ / Month	Description
Project Staff	\$ 152,100.00	Salaried staff, QC Manager, Survey
Equipment	\$ 83,800.00	Cranes, service equipment, maintenance.
Site Overhead	\$ 10,400.00	Office costs, trailers, tool cribs, toilets, water, power
Temporary Services	\$ 11,600.00	Temp power, office equipment and supplies, copiers, computers, phones.
Safety	\$ 4,800.00	Site security, flagging, safety supplies and training
Site Management	\$ 1,400.00	Maintain railings, access, erosion control
Waste Management	\$ 500.00	Waste haul
Relocation Expense	\$ 36,100.00	Travel, Out-of-town living expense
Staff Expenses	\$ 2,200.00	Misc meals for training and team building
Total Cost per Month	\$ 302,900.00	

Total Request for PCL Extended Jobsite Overhead:

5-1/2 Months @ \$302,900 per month

\$1,665,950

2. Due to the extra work required on PCL's part in analyzing, providing responses, managing additional efforts as a result of the current late status of design, and the inherent quantity scope growth and impacts on suppliers and subcontractors, PCL has been required to employ additional staff to the project and reassigned existing staff to manage the City's late design.

Additional PCL staff to manage Design, Delays	Months	\$/Month	Total
Construction Manager	12	\$ 24,000	\$ 288,000
Project Manager	8	\$ 15,000	\$ 120,000
Planning Superintendent	4	\$ 22,000	\$ 88,000
Coordinator	4	\$ 10,000	\$ 40,000
Estimator	4	\$ 12,000	\$ 48,000
Total claimed			\$ 584,000

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3. ZTSS has requested direct cost reimbursement for re-detailing cost, utilizing purchased structural-grade steel as counterweight plate, and scrap costs due to design changes made to previously issued IFD drawings.

ZTSS Requests for Compensation	Detailing	Steel Waste/ Premium	Scrap Costs
Subtotal	\$ 84,880	\$ 41,397	\$ 89,536
Total claimed			\$ 215,813

4. Atema QA costs in China have increased because of the added support they have provided during the shop drawing process. Their staff in China and US has increased to help solve the technical issues that would have been resolved if IFC drawings were issued as the Contract contemplates.

Atema Added QA Costs	Months	\$/Month	Total
Added Prefabrication Staff	7	\$ 35,128	\$ 245,896
Added Duration for Inspection & Technical Manager	7	\$ 106,111	\$ 742,777
Total claimed			\$ 988,673

TOTAL DELAY COST SUMMARY

1	PCL Jobsite Overhead	5-1/2 MO	\$302,900/MO	\$1,665,950
2	PCL Additional Staff	32 MAN-MO		\$584,000
3	ZTSS Change Requests	1 LS	\$215,813	\$215,813
4	QA China Extended Duration	7 MO	\$197,000/MO	\$988,673
	DELAY COST TOTAL			\$3,454,436

For this delay, PCL requests a Change Order granting a time extension of 5-1/2 months and \$3,454,436 reimbursement from the City for delay related out of pocket additional costs.

Change Order Request Design Delay and Scope Increases**MATERIAL QUANTITY GROWTH**

The basis of the Agreement between the City and PCL in regards to material quantity growth or shrinkage resulting from completion of design is as follows:

- The basis of As-Bid material quantities upon which PCL's original bid estimate and the Contract Price is based on are the Optimizations as described in Appendix G for those elements of the bridge considered in Appendix G. For those Project elements not considered for Optimization in Appendix G, the original estimate and Contract Price is based upon the respective quantities inherent in the original Indicative Design provided by the City in the original bid package.
- Material quantity growth or shrinkage is determined by comparison between the As-Bid design quantities and the Issued for Construction (or Issued for Detailing, as the case may be) design quantities.
- As described in the Contract Documents (e.g. article 3.0 of the Agreement), the project will be designed as described in Appendix G for those design elements included in Appendix G. For those design elements not amended from the Indicative Design through the Optimization review process, they will be designed in keeping with the Indicative Design.
- GC 7 of the Contract allows the City to make changes to the Contract Design and Work required under the Contract through the Change process.
- At the time of entering into the Contract, both the City and PCL understood the original Indicative Design, as well as the elements of that design which have been agreed to be included as superseding Optimized design elements in Appendix G, to be technically achievable and correct. This understanding was based upon reliance by the City, as well as PCL, on the pre-bid design work carried out by both the Consultant, MMM, and Hardesty & Hanover. To date PCL has not received any notice from the Consultants stating that the pre-bid design work described is not representative of an achievable bridge design as required by the Contract.

PCL's contractual entitlement to additional compensation exists because the contract price was based upon a defined scope of work. The Contract specifically contemplates and provides for additional compensation for extra work. GC 7.1 states:

The City may, without invalidating the Contract, make changes to the Work by altering, adding to, or deducting from the Work (a "**Change**"), with adjustments, if any, to the Contract Price or the time for the performance of the Work or both as set out in this GC. 7.

The following appears not to be in dispute:

- a. None of the consultants have suggested or stated that the design optimizations are impossible to achieve;

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- b. therefore, it must be assumed that the final design of the bridge can be accomplished within the parameters set out in the original indicative design;
- c. The design as it currently exists is beyond the parameters set out in the original indicative design. There have been increases in quantities, such that the current weight of the bridge is approximately 30% greater than contemplated at the time of the original indicative design;
- d. the only possible conclusion is that the design in its current state is more robust than contemplated by the original indicative design and design optimizations.

PCL expects that the City will attempt to rely upon article 4.4, which states that with the exception of structural steel,

"...the City will not owe the Contractor any additional payment if the actual quantities or materials required for the performance of the Work vary from the quantities of materials as may be shown or indicated on the Contract Documents."

However, that clause is based upon two key assumptions:

- 1. It cannot apply to errors in the original indicative design. It must be assumed that the original indicative design did not contain errors and was capable of being constructed; and
- 2. that it would not apply to changes made to the design either to accommodate the wishes of the City or its designers, or to make the design more robust, or to compensate for flaws in the original indicative design.

The assumptions of constructability and reliability of the original indicative design is confirmed by other clauses in the Contract. For example, GC 4.10 which deals with errors in the Contract Documents, states:

"... the Contractor will not be responsible or liable to the City to discover all or any errors, inconsistencies or omissions.

As well, GC 7.1 specifically entitles PCL to additional compensation for extra work.

If GC 4.4 had been meant to preclude all claims for material scope increase, including those caused by problems associated with the original indicative design and changes initiated by the Owner or Consultant, GC 4.10 and GC 7.1 would be rendered meaningless. It is a cardinal rule of contract interpretation that the contract will not be interpreted in a manner that results in clauses being rendered meaningless.

The most likely intent of GC 4.4 was to preclude claims for variation in quantities where those quantity increases arise because the design optimizations themselves are ill-conceived. PCL provided a series of design optimizations, based on advice given by H&H, which have been incorporated into the Contract. It is PCL's risk that the design optimizations, based upon the original indicative design, are achievable.

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However, as stated, those optimizations are based upon the underlying original indicative design, which was provided by the City through MMM.

Clearly, when a contractor provides a fixed price for a fixed scope of work, and the Contract allocates responsibility for design to the Owner, the only reasonable interpretation is that the price is based upon a defined scope of work. If the design is incomplete at the time the price is given, the only reasonable interpretation is that the Owner will complete the design in a manner that does not increase the scope of work, and therefore contractor will not be responsible for increases resulting from change in scope. As long as the finalization of the design falls within the parameters of the original scope, the Owner would not be responsible. However, in this case, for the reasons given above, the increases in material quantities were caused by design changes made by the Consultants that fall outside the parameters of both the original indicative design and the design optimizations.

In spite of reasonable efforts by all Parties to follow the Design Development and Review Procedure described in Appendix H of the Contract Documents, effective adherence to this procedure by all Parties has proven to be difficult. As such, a progressive review of the evolving design and comparisons to the As-Bid Design by all Parties has also been difficult and at times impossible.

To the extent that design has been delivered to date by the City to PCL through the Consultant, PCL has the following observations and comments:

1. As discussed in Section 1 of this document, to date delivery of Design in the form of IFC drawings and specifications is significantly behind the Work Schedule.
2. Design has frequently been delivered in incomplete and partial packages of information.
3. On numerous occasions, as design has been further developed, materially significant revisions to prior instructions have been issued by the Consultant through Field Instructions. At times the content of these Field Instructions have led to increased costs and delays to both PCL and affected suppliers or sub-contractors, as a result of required rework or material waste and reorder requirements.
4. As the evolving design information is becoming complete enough in a preliminary format such that PCL is able to take off meaningful preliminary As Designed (not yet IFC) quantities for comparison to As Bid quantities, it is becoming evident that the current design contains significant material quantity growth as well as a consequential increase in labour and equipment requirements associated with this increased material quantity where applicable.
5. As the evolving design information is becoming complete enough in a preliminary format, such that PCL is able to compare the evolving As-Designed (not yet IFC) design to the As-Bid design, it appears to PCL that the current bridge design now is producing a more robust and seemingly higher standard bridge than either the Indicative or the Optimized design, where applicable, would have produced when completed. This design enhancement is not necessary to meet the design requirements of the Contract, as the original Indicative Design as well as the respective

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Optimized Design elements could presumably have been designed As-Bid. This design enhancement, however, is certainly beneficial to the City in that life cycle costs are likely to be significantly lowered from those which would be experienced over time by the As-Bid bridge design. PCL can only assume that this enhancement of bridge design evolved properly in the context of consideration by the designers of project whole life cycle costs as the designers have worked on design completion. This is certainly in keeping with the intent of clauses 4.5 (a) and 4.7 of the Agreement to minimize risk through collaboration and that higher quality than the referendum is desired. However, the collaboration contemplated in these sections does not shift design risk to PCL or entitle the City to increase the scope of the project without additional compensation to PCL.

6. Evolving design on a highly technical bridge such as this one, in all likelihood, may have presented designers with opportunities to enhance the overall quality of the bridge. The resultant iterative design process may account for much of the delay in IFC design delivery as well as the now apparent Material Quantity Growth. To be clear, PCL is not suggesting that all Parties have not been working diligently and professionally to deliver to the City the highest standard of bridge within reason.

In keeping with the Contract Documents, including GC7 and GC 7.4 (a) (i), in respect of the Changes made to the As-Bid designs as described, PCL requests that an adjustment to the Contract Price and Time for Performance of the Work be made by the City.

Summary details of the comparisons between As-Bid Quantities and the current design information available to PCL follows, along with cost comparison between the As-bid cost allowances in PCL's estimate / Contract Price and PCL's most current information as to the expected costs of the current design. For clarity, PCL has not yet received final IFC documents for the design as required by the Contract, and as a result has been unable in many cases to finalize the actual final costs which will be necessary to be expended to build the Work of the final design. The values presented herein for Material or other quantity differences as compared to the As Bid design are only valid to the extent that the IFC version of the final design is equivalent to the current design information PCL is aware of. As new design information becomes available, PCL reserves the right to further refine or otherwise change or add to or delete from the comparisons and calculations herein in keeping with the character and content of the new information.

PCL has participated in the Design Development and Review Procedure (DDR) outlined in Appendix H. However, this process was not followed by the Designer:

- The Design Development Submittal Schedule was not provided by the Consultant in the manner described for both timeliness and content.
- The information that eventually was provided did not support our planned work dates.
- The information provided was and remains incomplete in terms of design deliverables and dates provided have not been met.

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- Due to the piecemeal way the plans and specifications came to PCL for review, it was impossible to determine if the design was in conformance with the Optimization or to ascertain what parts of the design were necessary.
- Lastly, our DDR comments were largely not incorporated by the Designer and no explanation given as to why the comments would not be considered.

Due to the increased weight of the Basculer Span, the mechanical support and drive systems along with their structure supports were made stronger to support the increased design loads. PCL is experiencing cost pressure from the mechanical system vendors and fabricators as well as increases in concrete strength and rebar throughout the foundation supports. The drilled shaft foundations were not optimized in our Proposal. Further, the prestressed box girders design contains details that include heavier rebar and prestressing strand than those used on similar MMM designs in Canada. We believe the ship impact loading criteria to be a factor in the design that was not anticipated in the Indicative design.

MATERIAL QUANTITY GROWTH ITEMS

The Basculer Span Superstructure as currently designed is 24% to 30% heavier than represented by the Indicative Design or the weights used for the Optimized Design. We sense that this bridge is being designed to high standards. The weight is an indicator of the robust design and we assume the bridge is being designed to last. The cost of the components described herein are reflective of the added value the design will bring to the benefit of the City for years to come in terms of increased reliability and reduced maintenance cost.

The Indicative Design weight of the Basculer Span Superstructure provided by MMM in Technical Memo #3 August 9, 2012 is: **2,335,135kg.**

PCL's (H&H) estimate of weight for the Basculer Span Superstructure used in our proposal is: **2,443,000kg.**

Basculer Span – Ring Counterweight Details issued February 21, 2014 indicate the weight of the Basculer Span Superstructure to be: **3,040,781kg.**

This represents a Bridge weight of **30% higher** than the Indicative Design weight and **24% higher** than the weights used in PCL's Proposal. This is significant quantity growth and does not conform to the Optimizations and quantities provided in PCL's Proposal or those shown in Appendix G. PCL can only surmise the design is an improvement over what was indicated in our Proposal and Optimization quantities.

STEEL AND LEAD IN THE BASCULE STRUCTURE

The design weight of the fabricated steel structure has increased from both MMM's pre-bid calculated weights (30% higher) and the weights used by H&H (24% higher) to provide balancing information and

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quantities for PCL's Proposal. As the balance information was developed and recently shared with PCL through the design process, we discovered the steel counterweight decreased and the lead counterweight increased dramatically as a result of the heavier bascule span and as compared to the Optimized design and our Proposal.

STRUCTURAL STEEL – FABRICATED AND COUNTERWEIGHT

Calculation for Steel Credit (Add) based on 20mil OSD deck and 18 ribs:

	PCL	MMM	Diff	Unit \$	Difference
	TNES	TNES	TNES	\$/TNE	\$
Fabricated steel	814	990	176	\$ 4,745	\$ 835,120
Misc	45	128	83	\$ 4,745	\$ 393,835
OSD	129	173	44	\$ 4,165	\$ 183,260
CWT Steel	627	215	-412	\$ 1,705	\$ (702,460)
	1615	1506	-109		\$ 709,755

\$709,755 represents the net add for the credit calculation for the total steel weight below the 1615 tonnes lower credit limit. The language in Article 4.4(b) of the Agreement discusses “the Contractor’s actual savings in the purchase and delivery to the Site of such steel for the quantity less than 1615 tonnes”. As each type of steel has different unit prices, the ratio of structural steel to steel and lead counterweight is key to developing this calculation. This number is positive because the more expensive fabricated steel was increased while the less expensive counterweight steel was reduced. So, although the overall steel quantity is reduced, the net savings is an increase. We submit that this calculation and claim for additional compensation is consistent with the reasonable interpretation of Article 4.4(b), outlined above.

The unit prices shown include are the sum of material prices from ZTSS’ purchase order plus, shipping to the jobsite plus, applicable QA oversight costs for Atema in China.

LEAD COUNTERWEIGHT

As the amount of lead required to balance the bridge is related to steel counterweight and the weight of the structure and since the structure weight is increased and the steel counterweight is greatly reduced there is large increase in the weight of lead required to balance the structure. As can be seen from the chart below, the design calls for almost double the amount of lead called for in the optimized design. Again, we believe this is driven by the heavy structure and the limited space available in the counterweight cavities to accommodate the extra weight for balancing the span.

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Calculation for Increased cost for Lead based on 20mil OSD deck and 18 ribs:

	PCL	MMM	Diff	Unit \$	Difference
	TNES	TNES	TNES	\$/TNE	\$
Lead Counterweight	677	1311	634	\$ 3,600	\$ 2,282,400

\$2,992,155 represents the increased cost of all the Bascule Span steel and lead materials above PCL's bid time estimated cost. The estimated unit cost includes shipping to the jobsite.

MECHANICAL SYSTEM COMPONENTS

The design weight of the Bascule Span has increased 24%. As a result, the mechanical system designed to support the Bascule Span has also increased in size. The system has grown accordingly in terms of heavier trucks and equalizers, increased strength in the wheels and bearings, and additional anchorages.

There has been an 87% increase in weight of the span support system from the Optimized Design. This weight increase has resulted in higher fabrication and machining costs and duration along with an increase in installation labour, tools, and equipment. In addition to the pure weight increase, the material properties of the wheels and roller bearings were modified in accordance with an MMM letter dated January 27, 2014, resulting in additional costs and time.

The span support segment has also grown in weight and complexity; the amount of grout needed to transfer the load from the support segment to the ring has also increased. The supply costs of the span support segment structural steel are covered in another section; however, the increase in weight (of nearly 500%) has caused a proportional increase in the amount of labour, tools, and equipment necessary to install the piece. The currently designed segment also has the addition of machined bushings versus standard structural fasteners to connect to the ring; bushings are more expensive to fabricate and more complex to install versus standard structural fasteners. The volume of grout needed to fill the void between, and transfer the load from, the span support segment and the ring has increased 414%.

Anchorage details for the machinery have recently been provided and greatly exceed our anticipated number of anchorages per location. For example, the design information provided to PCL during the bid suggested that 16 anchor bolts would be required per equalizer frame. However, the latest preliminary bascule pier footing details indicate that 64 anchor bolts per equalizer are required. We can only assume this is a result of the much larger than anticipated weight of the bascule span. Increased fabrication and installation costs result from this increase in quantity.

Finally, the rack design details currently shown in the H&H drawings are not consistent with that of the Optimized Design or the design as modified in Change Order #1. Specifically, the rack is currently shown as being fully supported, and as a result fully machined on the back side. This fundamental change - likely due to increased loading - has additional costs associated with the machining but is not included here as we are optimistic that the issue will be resolved through RFI-116 and 116.1.

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	Unit	Quant As-Bid	Quant As-Designed	Difference	Total Increase	Notes
Equalizers, Frames, Wheels						
Supply	Lb	419,000	786,000	367,000	\$ 459,000	87% increase in weight
Bearings change per MMM letter January 27, 2014	LS				\$ 110,000	Added 11 weeks to delivery
Wheel change per MMM letter January 27, 2014					\$ -	Still under evaluation
Installation labor, tools, equipment	Lb	419,000	786,000	367,000	\$ 150,000	87% increase in weight
Subtotal					\$ 719,000	
Span Support Segment						
Supply					\$ -	No change
Bushings	EA	-	220	220	\$ 121,000	No bushings in Optimization
Grout	CF	170	874	704	\$ 143,000	414% increase in grout
Installation labor, tools, equipment	Lb	25,648	127,669	102,021	\$ 415,000	Grout and bushing increase
Subtotal					\$ 679,000	
Rack						
Supply					\$ -	Pending resolution of RFI
Installation labor, tools, equipment					\$ -	Pending resolution of RFI
Subtotal					\$ -	
Anchor Bolts						
Supply	EA	64	256	192	\$ 192,000	400% increase
Installation labor, tools, equipment	EA	64	256	192	\$ 21,000	400% increase
Subtotal					\$ 213,000	
Total Machinery Increase					\$ 1,611,000	

REBAR

The shafts were not optimized in PCL's Proposal. Therefore, the issued for construction design should be consistent with the Indicative Design. Reinforcing steel was initially substantially heavier than the indicative design at the bascule pier. This was partially mitigated through the design development review process. As the drawings have reached IFC status, PCL's reinforcing subcontractor has commenced detailing of the steel and provided updated steel quantity projections. These are then being compared to the concrete quantities to determine the average density of steel. Based on the west abutment and bascule pier footings, we have an average density of 129 kg/m3, ranging from 102 kg/m3 in the mass footing to 203 kg/m3 in the abutment footing. Pier cap steel has not been detailed yet, but indications suggest they are heavier than the 110 kg/m3 anticipated during the bid and described in Appendix G.

The remaining structure is currently being detailed and quantities will be available shortly to confirm the IFC steel quantity for the structure.

Reinforcing Steel Quantity Growth	Add'l Qty [kg]	Unit Cost	Extended
Drilled shaft reinforcing	118,934	\$ 1.99	\$ 236,700
West abutment	19,034	\$ 1.99	\$ 37,900
Substructure projection (less west abutment)	18,579	\$ 1.99	\$ 37,000
Superstructure (not yet quantified)	-	\$ 1.99	\$ -
Total projected overrun			\$ 311,600
* based on average density of 129 kg/m3			
** avg based on bascule footing and west abutment			

Change Order Request Design Delay and Scope Increases**SHAFT CONCRETE STRENGTH**

The Indicative design strength for shaft concrete was 35mpa. The IFC design indicates 45mpa. The cost premium is \$28.63 per M3.

1,046 M3 @ \$28.63 per M3

\$29,950

COST PER M3 SUMMARY TABLE

SUPPLIER	BUTLER	BUTLER2
STRENGTH	35 MPA	45 MPA
BASE RATE (m3)	\$193.00	\$210.00
BASF DELVO	\$6.00	\$6.00
BASF 3030	\$7.13	\$16.15
ENVIRONMENTAL FEE	\$6.50	\$6.50
TOTAL (PER m3)	\$212.63	\$238.65
DIFFERENCE PLUS 10%		\$28.63
REST - BASCULE EST. QUANTITY	1,045.98	M3
MAGNITUDE OF CHANGE		\$ 29,949.62

PS BOX GIRDERS INCREASED REBAR

The rebar density and pre-stressing required by the design is unusual for similar girders on other projects, including projects designed by MMM.

Precast was bid at 117 kg/m3 based on the span length and loading, and similar spans designed recently by MMM Group. Early versions of the precast drawings indicated quantities similar to those indicated by the design information provided to PCL at the time of bid. However IFC design increased to 136 kg/m3 in 1100 mm box girders, 141 kg/m3 in the flanged box girders, and 170 kg/m3 in the 685 mm (IFD) box girders over the bascule pier.

Transverse post-tensioning (PT) has also appeared in two locations in the project. The first location is across the east span between the control building and pedestrian canopy. The post-tensioning was used to cantilever the control building and carry loads through the span to the far side of the span. The City allocated contingency to address this issue as the thought was to solve this problem by deepening the boxes, but the designers chose this PT option instead.

The second location for transverse post-tensioning is the 685 mm box beam spanning the bascule pier. The design has not addressed review comments requesting a traditional box beam and shear key design. H&H designed boxes using a US size that is different from the common Ministry of Transportation size used in MMM's design. Costs have been identified to change the pre-stressing bed form to accommodate this with. This was identified in the design development review process many months ago, but never addressed.

Change Order Request Design Delay and Scope Increases

On the east mid-span, MMM introduced an additional box beam at the south side to address cantilevered concrete curbs and potentially loading conditions on this span. The result is an additional box girder, deck area, and supporting pier caps.

	Add'l Qty [kg]	Unit Cost	Extended
Precast rebar growth			
1100 box girders	10,213	\$ 3.40	\$ 34,700
1100 flanged box girders	9,380	\$ 3.40	\$ 31,900
685 box girders	5,687	\$ 3.40	\$ 19,300
Subtotal			\$ 85,900
Precast transverse post-tensioning	Add'l Qty [ea]	Unit Cost	Extended
East mid-span	8	\$ 7,500	\$ 60,000
Bascule pier span	5	\$ 7,500	\$ 37,500
Subtotal			\$ 97,500
Additional box girder	Add'l Qty [ea]	Unit Cost	Extended
East mid-span	1	\$ 34,668	\$ 34,700
Subtotal			\$ 34,700
Bed change for non-standard boxes	Add'l Qty [ea]	Unit Cost	Extended
Bascule pier span	1	\$ 60,000	\$ 60,000
Subtotal			\$ 60,000
TOTAL			\$ 278,100

Change Order Request Design Delay and Scope Increases

Therefore, the quantification of costs contained in this submission is based upon those assumptions stated above, as well as those described in more detail below:

- a) the final rebar quantity for the remaining structure not quantified above does not exceed an average density of 110 kg/m³
- b) the final lead weight for the counterweight will not exceed 1311 tonnes.
- c) as-detailed steel weights do not exceed the design weights provided in the IFD balance design and summarized above.
- d) quantities of the east approach structure (nearing completion) do not exceed those quantities listed in Change Order #2
- e) MMM will issue stamped IFC drawing for the completed bascule section by March 15, 2014
- f) MMM will issue stamped IFC drawings for lighting (architectural and functional) by March 15, 2014, including all structural and civil design associated with lighting.
- g) MMM will issued stamped IFC drawings for handrails and guardrails by March 15, 2014, including all electrical and structural design associated with the rails.
- h) MMM will have completed its final design for the entire project, and will have issued the completed IFC design package, not later than March 30, 2014 for the following packages:
 - a. Electrical, including lighting and controls
 - b. Mechanical, including plumbing
 - c. Structural, including fendering, fixed concrete, and structural steel
 - d. Miscellaneous metals, including access platforms, embeds, etc.
 - e. Control building, including structural and architecturaland not later than April 30, 2014 for the following packages:
 - f. Landscaping, including furnishings and landscape lighting
 - g. Habitat compensation (subject to Change Order)

Any agreement that PCL enters into to settle its claims will be subject to PCL's right to assert further claims if the above assumptions prove to be incorrect. In other words, when MMM finalizes its design, if that design reflects further increase in quantities, or if the design is not delivered to PCL in accordance with the schedule of deliverables that is described herein, PCL will almost certainly suffer further losses, and retains the right to recover those losses accordingly.

Change Order Request Design Delay and Scope Increases

PCL respectfully submits this proposal for Change Order under GC. 7 Changes.

SUMMARY OF REQUEST

ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
DESIGN DELAY COSTS	MO	5-1/2	See Breakdown	\$ 3,454,436
STRUCTURAL STEEL	TNE	-109	VARIES	\$ 709,755
LEAD COUNTERWEIGHT	TNE	634	\$3600	\$ 2,282,400
HEAVIER MECHANICAL SYSTEM	LS	1	See Breakdown	\$ 1,611,000
REBAR	KG	156,547	\$ 1.99	\$ 311,600
SHAFT CONCRETE STRENGTH	M3	1,046	\$28.63	\$ 29,950
PS BOX GIRDERS INCREASE REBAR	LS	1	See Breakdown	\$ 278,100
SUBTOTAL				\$ 8,677,241
PCL MARKUP	\$			\$ 867,724
TOTAL REQUEST				\$ 9,544,965

Note: If the OSD deck plate can be reduced in thickness to 16mil and the number of ribs reduced to 16, the adjusted counterweight steel and lead quantities may reduce these impacts approximately \$1.6 million, subject to receipt of final balance design.

PCL hereby submits this Request for Change Order in the amount of \$ 9,544,965 and the addition of 5 ½ months to the Contract Completion date.

SCHEDULE COMPARISON

