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May 2, 2014
City of Victoria
623 Pandora Avenue
Victoria, BC, V6V 3B9
Attention: Mr. Ken Jarvela, P.Eng.

BY E-MAIL

Re: MMM Response to the PCL March 17, 2014 Letter

1. Introduction

MMM has prepared this letter at the request of the City of Victoria (City) so that it may assess the change order request received from PCL in their March 17, 2014 letter for increased funding and a time extension. This letter accounts for project events up to the end of March 2014.

PCL has struggled to deliver the construction of this project and is consequently now behind schedule and requesting additional funds. We believe that PCL's difficulties are for reasons other than those noted in their letter and that the following are key to PCL's difficulties:

- PCL's Optimized design is fundamentally different from the Indicative design. The Optimized design was not more than 10% complete at the time of PCL's proposal submission and it appears that PCL calculated quantities either from their Optimized design without considering any contingencies or from the Indicative design. In either case, this would lead to a significant error in their bid.
- PCL has staffed the project on site with project managers inexperienced with a project of this type who throughout the project have had difficulties making decisions, understanding the contract and the design and how to integrate design and construction.
- PCL has not understood the difference between the defined term "Work" and the undefined term "construction".
- PCL has engaged structural steel detailers that have no experience with moveable bridges nor with North American standards.
- By end of March 2014, PCL had submitted less than 30% of the anticipated shop drawings and had not maintained their planned schedule for shop drawing development. The

commencement of fabrication was delayed due to delay in shop drawing production as well as lack of fabrication plans and documents. Welder qualification issues remain open and are resulting in risk to fabrication acceptance.

- PCL has insisted on extensive collaboration with the design team and multiple design submissions. This collaboration was outside the provisions of Section 4.5 and for the convenience and benefit of the Contractor. These actions of PCL have hampered design progress.
- PCL has repeatedly requested changes to elements that were already Issued for Detailing (IFD) requiring the design team to re-work drawings. This adversely impacted the design development and the project schedule.
- PCL has gained benefits through cost savings and reduced construction risk from the design developed through the heightened collaboration process. This process resulted in additional design effort and the resulting benefits to PCL have come at the cost of schedule.

The following provides our response to PCL’s March 17, 2014 letter.

2. Summary of PCL’s Claims and MMM Responses

PCL CLAIM	MMM RESPONSE
The design is not compliant with the Optimized Design and this has led to scope growth and increase in quantities.	• The design is compliant with the Optimized Design. • The Optimized Design as presented in PCL’s proposal was incomplete and at best was a schematic level design. • Design was developed with extensive collaboration with PCL. PCL received numerous design submissions for their review and numerous design workshops were held with PCL to develop the design in a collaborative manner. PCL did not note non-compliances during this process. • To address concerns regarding PCL’s Optimized mechanical design, an Alternate mechanical design was developed. After 2 months of deliberation, PCL agreed to the Alternate mechanical design.

PCL CLAIM	MMM RESPONSE
Design was late	• PCL and MMM exchanged multiple versions of the design schedule without coming to an agreement, with the exception of the dates given in Appendix D of the contract, on submittal dates. • PCL had an expectation of submissions from MMM that was not a contractual requirement or practical. For example, PCL requested design submissions for 30%, 60%, 90% and IFC. Given that there were in the order of 44 design packages (excluding specifications), this equated to about 180 design submissions to PCL. This had a serious impact on the schedule. This request from PCL was unreasonable given the 7 days allowed in Appendix H for design reviews. • The need for an integrated design/construction schedule was identified as being needed by MMM at the August partnering session. A focus on a realistic plan for shop drawing production was also identified. This did not happen. Neither of these needs was met by the Contractor. • In hindsight, the schedule was clearly impacted by a number of design revisions requested by PCL after IFD drawings were issued. These included conversion of the welded truss/ring splice to a bolted splice and conversion of the floor beam welded splices to bolted splices. These changes were made at PCL's request and had important schedule impacts. Savings from these design changes were not shared with the City. • Throughout the design development PCL insisted on in extensive collaboration with the MMM team to refine the design and reduce their cost. Examples of this include the bascule pier, the east abutment, the west abutment, and the piling specifications. This was a significant schedule driver. • Outrigger design was delayed due to concerns regarding vibration. This had to be addressed by the design team through rigorous dynamic analyses to develop a properly engineered solution. • See Section 6 of this letter for further details regarding schedule.

PCL CLAIM	MMM RESPONSE
Design development process spelled out in Appendix H of the Agreement was not followed	Numerous design submissions were made to PCL and PCL had extensive opportunities to review the design. Submissions were returned “Reviewed” and never returned marked “Non-Compliant” or “Not Reviewed” as required by Appendix H.
Drawings were incomplete and contained errors	- There are no errors in the drawings. - PCL’s Optimized design was at best schematic on award and in order to allow PCL’s detailers to get started quickly an IFD/IFC process was included in the contract. This process revolved around completing the design and issuing IFD drawings rather than IFC drawings. PCL’s detailers did not meet North American industry standards leading to a breakdown of this approach and requiring PCL to undertake re-work of shop drawings. PCL, in fact, suggested the IFD process and was in favor of and in agreement with this approach. PCL also agreed in discussions to utilize experienced detailers for this project. - Drawings were issued for structural steel detailing in accordance with the contract. - Bearings features had to be changed after IFD and after final balancing of the bridge. Multiple iterations of the span balance computations are common for movable bridges and is a reflection of the iterative nature of design and the low level of development of PCL’s Optimized design. - IFD’s have been updated to be consistent with the SD’s.
No Issued for Construction (IFC) drawings	- IFC have been issued for numerous elements of the project. - The process of getting to IFC requires issuing IFD’s, development of shop drawings (SD), review of shop drawings and issuing the IFD/SD package as IFC. This puts shop drawing production on PCL’s critical path. - The IFC/IFD process was suggested and agreed upon by PCL before Award, is consistent with the contract and was clarified with MMM’s letter of September 2013.

3. Key Elements of PCL's Agreement

The City engaged FMC to develop and manage the procurement of the construction services required for the Project. MMM provided technical support to the City's procurement process and specifically provided an Indicative Design that was used in the procurement document. The Indicative Design represented an incomplete design that reflected the bridge design concept endorsed by the City of Victoria Council. The following outlines the City's procurement process and some of the key elements of the procurement documents and the PCL agreement.

a) Procurement

The basis of the City's procurement model was that qualified and knowledgeable contractors, working together with a designer, are able to bid fixed prices on infrastructure projects based on incomplete design. The following provides an outline of the City's procurement process:

Request for Qualifications Stage. The Request for Qualifications (RFQ) invited qualified contractors, who not only were qualified to construct this unique project, but who also were interested, and have the expertise and experience (either in-house, or by engaging its own qualified designer) to review the Indicative Design and offer suggested cost or schedule benefits;

The RFQ required interested parties to identify its full team, which:

- i. Would require a contractor with financial resources and strength to provide a guaranteed maximum price for the construction under the process outlined in this document
- ii. Could include both contractors and design professionals
- iii. Could include steel fabricator and machine shops.

Request for Proposals Stage. The Request for Proposals (RFP) was issued to three shortlisted proponents and included a draft Construction Contract that stated that the:

- iv. Contractor is to build New Bridge for fixed price;
- v. Contractor is to take all schedule risk;
- vi. Contractor is to build according to construction documents (Drawings and Specifications) that will be issued by MMM Group based on a mutually agreeable schedule; and
- vii. Contractor is to provide construction services while MMM Group would provide design services to the City.

In addition the RFP:

- i. Listed the available funds the City has for the Construction Contract
- ii. Included opportunities for Proponents to have confidential discussions with the City, as to potential adjustments and innovations to save costs and keep fixed Contract Price within budget
- iii. Specified that deviations or changes to Indicative Design would only be permitted with the prior approval of City

Proponents were motivated to identify potential innovations because the evaluation of Proposals would include consideration of such benefits – the evaluation would not be based solely on price (although through innovation costs might be saved) but on quality-adding suggestions. In addition the RFP invited Proponents to advise on the level of detail they might require for any element of the New Bridge in order to give a fixed price so that the City can be sure it is providing the right level of detail required to obtain competitive, keen pricing.

b) Indicative Design

An indicative design that reflected the design concept endorsed by the City's Referendum was included with the RFP. Proponents were told that this design was incomplete and it was required that Proponents optimize the Indicative Design to allow City's affordability ceiling to be achieved.

c) PCL's Optimized Design

Although the PCL's Optimized design is superficially similar to the Indicative design, it is a fundamentally different engineering solution. PCL's proposed optimizations are summarized below and discussed in detail in Section 4.

- Bascule Pier - reduced size to avoid the use of cofferdams
- Rest Pier - simplified geometry.
- Approach Spans - revised structural system to precast concrete box girders and fixed pedestrian walkway
- Bascule Truss - simplified welded truss details by changing the truss chord members from 7 sided to 4 sided sections.

- Mechanical System - hydraulic motors and balancing the structure to account for a shortened counterweight.
- In addition, although not expressly included in their proposal, PCL proposed to install a precast concrete pedestrian bridge rather than the pedestrian bridge shown in the Indicative Design drawings. This pedestrian bridge is located west of the main bridge and spans the west approach road.

d) H&H Transferring from the Proponent to the Designer's Team

PCL retained Hardesty & Hanover (H&H) during the RFP to assist in identifying Optimizations. Some Optimizations and the schedule proposed by PCL made it impossible for MMM to carry on with the design of the bascule span and associated substructures in accordance with the technical assumptions included in the H&H sub-consultant scope of services. The City and PCL encouraged MMM to retain H&H to complete the design based on the premise that the optimizations were H&H's ideas and that H&H had developed the Optimizations sufficiently to complete the design within the timeframes requested by PCL. As such, MMM's contract was amended to include H&H as a sub consultant.

Notwithstanding H&H's involvement with PCL during the proposal development, MMM and H&H have no responsibility to the City for the feasibility of PCL's Optimized design. This responsibility remains with PCL.

e) Key elements of the PCL Contract

The following are some of the key elements of the PCL contract:

Quantity Variation (Other than Steel). The City will not owe PCL 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.

Quantity Variation (Steel). PCL's Contract Price includes 1700 tonnes of structural steel required for the New Bridge superstructure. If the actual quantity of steel is:

- i. between 1615 and 1785 tonnes then there will be no adjustment to the Contract Price.
- ii. greater than 1785 tonnes, then the City will pay as an increase to the Contract Price
- iii. less than 1615 tonnes then PCL's actual savings will reduce the Contract Price.

Responsibility for Design. The contract states that the City will provide all design and that the City engaged MMM to provide to provide this service.

Completion of Design. The contract recognizes that the design used to establish PCL's lump sum bid was incomplete and based on design assumptions. In Appendix G it states that *"References in this Appendix G to design assumptions, such as for illustration the number of motors for the New Bridge, are indicative, and changes as may be required to such design assumptions to achieve the final design will not result in changes to the Contract Price except as may be expressly permitted by the Contract Documents (such as Appendix C)."*

Because the design was incomplete, a design development and completion process was established. This process included the following:

- i. The City will cause the Consultant to plan for the submittal of design development and construction drawings
- ii. PCL will respond to design development submittals quickly
- iii. The City will cause the Consultant to prepare and submit to PCL and the City a design development submittal schedule
- iv. The City will cause the Consultant to include with each design development submittal a clear description of the nature of the submittal and any aspects or components of the submittal that the Consultant wishes PCL to review and comment upon.
- v. Within 7 days of receipt of a design development submittal, PCL will review the submittal and PCL will give notice that the submittal:
 - Appears to be in conformance with the requirements of the Contract Documents ("REVIEWED")
 - Appears not to be in conformance with the requirements of Contract Documents ("NOT IN COMPLIANCE").
 - Cannot be reviewed ("NOT REVIEWED").
- vi. The City will cause Consultant to deliver final construction documents in no event less than 15 days prior to PCL's planned date for the commencement of construction or procurement activity for such Work as indicated on the updated Work Schedule.

IFD/Shop Drawings/IFC Drawings. The process required to achieve Issued for Construction (IFC) drawings for the Bascule span is important to understand in the context of PCL's contract. This process was developed jointly by PCL, the City, the City's procurement advisor (FMC), MMM and Hardesty & Hannover (H&H) prior to Award and was clarified by MMM in September 2013. This process is as follows:

- i. MMM/H&H submit Issued for Detailing (IFD) drawings to the City that allow PCL to commence the Work including production of shop drawings and procurement of materials.
- ii. PCL submit shop drawings to the City for review. If the shop drawings reflect the design intent, the shop drawings are stamped "Reviewed" and issued together with the IFD drawings as an Issued for Construction (IFC) package. This allows PCL to start construction/fabrication.

This IFC/IFD process was developed and implemented as follows:

- i. The IFD/IFC approach was suggested by PCL during the December 2012 contract negotiations in order to obtain a schedule advantage from the fact that "Tender" drawings were not required because PCL's detailer and the City's designer could collaborate in a design-build type environment
- ii. The City, FMC and PCL were intimately involved with the MMM/H&H contract negotiation (Reference e-mail from J. Meyboom to PCL, the City, FMC and H&H dated December 18, 2012, December 19, 2012 and December 20, 2012) in which it was agreed that H&H would issue signed and sealed IFD drawings. We note that Appendix "D" of PCL's contract was developed at PCL's request to reflect the IFD approach.
- iii. PCL commenced shop drawing production based on IFD drawings produced by H&H in May and June 2013 for the truss and ring, respectively.
- iv. PCL submitted shop drawings for the truss structural steel in September. The quality of these drawings was found to be very poor and did not meet North American industry standards. MMM had suggested to the City and PCL that a third party detailer be engaged to help PCL's detailer meet the expected quality of shop drawings.
- v. MMM issued a letter on September 11, 2013 to clarify the IFD/IFC process.
- vi. PCL submitted revised shop drawings for the truss in February 2014. These were found to be generally acceptable. Shop drawings for the "ring" portion of the bridge were not received as of end of March 2014..

The IFD concept is consistent with PCL's Contract:

- i. Clause 4.20 (a) of the General Conditions states: PCL will arrange for the preparation of all required Shop Drawings (including assembly and installation drawings or diagrams) and submission of them to the Consultant, and the following will apply to Shop Drawings:
- ii. Unless expressly required otherwise by the Contract Documents, the drawings provided to PCL by the City for construction will be sufficiently complete to permit PCL 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.
- iii. The term "Work" is defined in the General Conditions as follows: "Work" means and includes anything and everything required to be done for the fulfilment and completion of the Contract.
- iv. As such, the preparation of shop drawings clearly forms part of the "Work" of PCL. Clause GC 4.20 (a) (above), indicates that all PCL requires to prepare shop drawings are drawings sufficiently complete to proceed with the "Work". The IFD drawings issued to PCL meet that standard and PCL commenced work on preparation of the shop drawings on the basis of the IFD drawings.
- v. Article 3.3 of the Agreement / Contract between PCL and the City addresses "Issued for Construction" drawings. It requires that PCL not proceed with construction until issued for construction drawings have been issued. The term "construction" is not defined in the Contract. Our interpretation of the Contract is that "construction" is only a portion of the "Work" of the Contract and there is nothing in the Contract that requires that "Issued for Construction" drawings be issued prior to PCL commencing the "Work" of the Contract.

Initial Work Schedule. An initial schedule was identified in Appendix D of the contract. With reference to this initial work schedule, Appendix G states that *"the attached Technical Services Delivery Schedule is indicative and is not intended, and will not be interpreted as creating duties or imposing obligations on the City or the Consultant."*

The following dates were provided in PCL's contract:

- i. In-water Work may take place between July 1 to October 1 inclusive and December 1 to February 15 inclusive, or as approved by the regulating agency;
- ii. Complete the New Bridge such that it may be used by the public for the purposes for which the New Bridge is intended no later than September 30, 2015; and

- iii. Achieve Total Completion no later than March, 2016.

For PCL to meet of the above dates, the following were required:

- i. Completed design and issued for detailing drawings of a complicated joint mutually selected by PCL, the City and the Consultant in the bascule span will be released by March 15, 2013;
- ii. Completed design and issued for detailing drawings of a portion of the bascule span (a ring or substantial portion of truss) will be released by April 20, 2013;
- iii. Completed design and issued for detailing drawings for the bascule span will be issued by May 20, 2013; and
- iv. Collaborative approach to identifying the design work required to permit the award of a piling contract and the availability of such design no later than January 31, 2013. A later availability of design and award date is subject to negotiations between PCL and its subcontractors.

4. Design of Optimizations

PCL's Optimized design is fundamentally different than the Indicative design. The following summarizes how PCL's Optimized design was taken through to Final design.

EXCERPTS FROM CONTRACT	MMM REMARKS
<u>Bascule Pier</u> PCL's optimized design is largely integrated around by the reduction in size of the bascule pier. Scaling down the pier has helped eliminate the cofferdam previously needed to construct the foundation. PCL's optimized design repositions the counterweight closer to the centre of rotation and moves the drive machinery to the truss wheels, substantially reducing the length and depth of the bascule pier and correspondingly the material and labour costs. The span from the bascule pier to the east abutment is increased to 38 m with this configuration. Further collaboration with MMM Group could result in a reduced span length by potentially relocating the east abutment closer to the bascule pier.	As designed by MMM with extensive collaboration with PCL. As designed by MMM. East approach span and abutment configuration were adjusted in subsequent VE efforts between MMM and PCL to minimize underground work for PCL. This VE effort Included elimination of a very substantial, piled retaining wall.

EXCERPTS FROM CONTRACT	MMM REMARKS
<u>Rest Pier</u>	
PCL proposes to use a simplified rest pier that features vertical columns. Incorporating a precast, stay-in-place formwork system	Substantial simplification of PCL's "Optimized" design as agreed in Appendix "C" under VE items. No cost savings passed on to the City.
<u>Approach Spans</u>	
Another key optimization proposed is changing the approach span superstructure from steel to precast concrete.	As designed by MMM
<u>Truss Member Section Optimization</u>	
To facilitate improved fabrication quality, long term durability, and mitigate potential schedule impacts due to complications during fabrication a key optimization is the simplification of the details of the welded bascule trusses. This optimization changes the truss members to four- sided shapes, from the seven-sided prismatic scheme shown in the Indicative Design.	As designed by MMM. Additional simplifications to the structural steel were also made through collaboration with PCL including eliminating the taper of the top truss chord and replacing the welded splice with a bolted splice.
<u>Mechanical System - Hydraulic Motors and Balanced Structure</u>	
To facilitate a reduction in size of the bascule pier, PCL proposes to relocate and resize the counterweights. Baselineing the counterweight design on the span balance provided in the Indicative Design, the team selected and designed the new drive machinery to suit the shorter distance between the drive and centre of rotation. With the optimized drive and counterweight configuration, Hardesty & Hanover was able to provide a structure that is completely balanced.	As designed by MMM. PCL's Optimized concept was regarded as having high risk with regard to alignment and the duration for installation. A new concept was developed by the design team with input from PCL to mitigate these risks to the Contractor. A Change Order was executed to document PCL's agreement of approach. In the Change Order. PCL agreed to not use this change as grounds for any claims.

EXCERPTS FROM CONTRACT	MMM REMARKS
<u>Basis of PCL Costs</u>	
PCL has performed quantity take-offs based on their optimized design. These quantities serve as the baseline for cost and schedule and the highlights of which are provided below: - Johnson Street and Pandora Avenue: 100mm asphalt, 200mm WGBC, 400mm SGSB - Harbour Road: 80mm asphalt, 150mm WGBC, 250mm SGSB - Galloping Goose: 60 mm AP, 150 mm WGBC; 0 mm SGSB 110 kg/m3 reinforcing density for reinforcing steel 19mm thick pile walls (uncoated)	No mention of other quantities such as lead being part of the “baseline for cost”.
<u>Steel Quantity</u>	
The structural steel weight comprises all structural steel, steel counterweight, orthotropic deck, and other structural steel applications in the New Bridge. Lead weight is related to the steel weight, but not included in the 1785 TNE weight limit in the Contract.	Acknowledged lead not included in 1785 weight limit in contract
Fixed walkway through the ring is supported by columns, not suspended from the precast.	As designed.
X-TEND tensioned mesh has not been included; stainless steel expanded mesh was priced in lieu. PCL has provided product information and will collaborate with the City and their Consultant to provide a product acceptable to all Parties.	References collaboration to finalize an acceptable solution
<u>Pedestrian Bridge</u>	
PCL proposed the use of precast concrete box girders for the pedestrian/cyclist bridge over the west bridge approach.	The PCL Optimized Design did not work from a vertical clearance perspective. As of end March, PCL has not brought forward a workable solution.

5. Detailed Response to Each Point in PCL's Letter of March 17, 2014

PCL's letter of March 17, 2014 has 18 points that form the basis of their claim. These are examined and refuted in the following:

TEXT FROM PCL'S MARCH 17, 2014 LETTER	MMM RESPONSE
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.	Scope changes, with exception of steel in the superstructure, are PCL's risk. Delay has been caused by PCL's conflicting requirements of collaboration, multiple design submissions, a compressed schedule and poor quality shop drawings.
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.	Design finalization is consistent with the Optimized and the Indicative Designs and IFD were as detailed in Section 4 of this letter.
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.	PCL was provided with a copy of the MMM/H&H contract before award and through the City's website has access to the MMM/City contract.
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.	The IFD/IFC process was suggested by PCL in November/December of 2012. This approach is consistent with the Contract and PCL's approach throughout 2013.
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.	The design process was in accordance with Schedule "H" and included multiple design submissions to PCL. The IFD/IFC process was suggested by PCL before award and consistent with PCL's approach throughout 2013.

TEXT FROM PCL'S MARCH 17, 2014 LETTER	MMM RESPONSE
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.	Drawings that were suitable for a competent detailer to undertake shop drawings were issued. Prior to issuing these drawings, PCL undertook multiple reviews of the drawings and returned them stamped "Reviewed". Delay in construction is attributable to PCL's inability to produce acceptable shop drawings and PCL's ongoing requests to modify the design in an attempt to reduce their costs.
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: • The design of portions of the Project, if any, as specifically described in Appendix B – Scope of Work that PCL 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.	All design work has been provided as reflected on the IFD and IFC drawings. Detailing and fabrication requirements are PCL's responsibility.
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	PCL's Optimized Design was at best a schematic design (maybe 10% complete). An experienced Contractor would account for this in establishing the required contingency when using quantities taken from Schematic drawings. PCL has repeatedly pointed to the schematic drawings as being accurate with

TEXT FROM PCL'S MARCH 17, 2014 LETTER	MMM RESPONSE
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.	regard to quantities. MMM/H&H have had to expend extensive effort and fees to make PCL's Optimized design work and has collaborated extensively with PCL in this regard.
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.	There are no errors.
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").	The IFC package will be a combination of IFD and Shop Drawings and a cover letter from the MMM Group. As such PCL's shop drawing production is on the critical path. PCL's failure to submit acceptable shop drawings and given that, up to the end of March, PCL has failed to issue more than 70% of the anticipated shop drawings , poor performance in shop drawing production is the single largest contributor to delay in the project.
14. The Contract emphatically prohibits PCL from proceeding with work before being issued IFC drawings for that work. Article 3.3:	This is incorrect. The contract prohibits PCL from undertaking construction without IFC. "Work" includes shop drawings and, to be clear, shop drawing production is not considered construction.
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 PCL's planned date for the commencement of construction or procurement activity for such Work as indicated on	PCL's construction schedule has never been finalized and as such it is impossible for the City to meet this obligation. As of end March construction/fabrication commencement dates are still not well defined given that more than 70% of the anticipated shops drawings have not yet been submitted by PCL. Construction/fabrication cannot commence with shop drawings being

TEXT FROM PCL'S MARCH 17, 2014 LETTER	MMM RESPONSE
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.	stamped "Reviewed" by the Consultant. Delay has been caused by a combination of PCL's request to have multiple design submissions, PCL's failure to submit acceptable shop drawings, late design changes as requested by PCL and unending collaboration at PCL's insistence.
16. GC 4.20 of the Contract deals with shop drawings: <i>"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 PCL 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"</i>	Drawings provided by City have been sufficiently complete for PCL to commence with the Work. PCL delayed the start of construction/fabrication because they have struggled with the production of shop drawings. This problem was recognized by MMM and MMM recommended that the project engage a third party detailer to help PCL. This recommendation was not followed.
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.	This is incorrect. PCL is permitted to proceed with the Work but not with construction/fabrication without IFC's. As such IFD's are issued to commence shop drawings which are part of the Work but not construction.
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.	The City has not instructing PCL to proceed with construction without IFC's but is instructing PCL to proceed with shop drawings. The IFD/IFC process was developed at PCL's suggestion before award in order to expedite shop drawing production which was recognized as being a critical path activity. PCL's failure to engage a detailer with experience in moveable bridges and North American standards has caused potentially unrecoverable delay to the project.

6. Design Delivery

Design has been delivered in accordance with the IFD/IFC described above in Section 3(e). This process was aimed at expediting shop drawings which were recognized as being on the project's critical path. Appendix D of the Agreement defines the early start/finish dates in the Initial Work Schedule that relate to design. These activities and dates are identified and discussed in the following:

a) Completed design and issued for detailing drawings of a complicated joint-15 March 2013

As discussed during the contract negotiations, the intent of this submittal was to provide PCL with a limited set of design drawings that identify the design of a prototypical joint of the structure. The intent of the submission was to demonstrate to PCL the content to be expected of the IFD drawings to be developed for the structure. The objective was to obtain input from PCL on the level of information provided and identify if any additional design information would be required for the preparation of the shop drawings from the IFD drawings as agreed.

A node design package was submitted on 15 March 2013. This node design package represented a concept for the key transitional node near the ring intersection. Based on feedback from PCL on this concept the node geometry was revised. The node detailing was included in the progress submission of 5 April 2013 and included the single box joint type utilized for final IFD.

In their letter, PCL notes that this submittal remains open. This is not an accurate representation of the submittals. IFD drawings of all nodes of the truss have been submitted to PCL.

b) Completed design and IFD of a portion of the bascule span-April 20, 2013.

H&H presented progress drawings in Vancouver on 23 and 23 April. In this working session, H&H presented the design intent for the structure and a plan as to how this design intent relates to the fabrication plan. In this meeting, H&H expressed the importance of understanding PCL's proposed fabrication and erection plans in order to have the design and construction be consistent. PCL did not voice objection to the documents presented nor did they offer thoughts on the impact of the design development on their fabrication and erection plans. H&H also expressed the importance of the development of shop drawings and noted that the discussions through contract negotiations included the initiation of the shop drawing development as portions of the structure IFD drawings were completed. PCL noted that they would commence the development of shop drawings upon receipt of the structure camber data.

Subsequent to this meeting, a number of progress submissions occurred:

- 10 May 2013 - Progress submission including, but not limited to, substantial portion of truss was provided
- 24 May 2013 - Additional progress submission provided
- 31 May 2013 - IFD drawings of a portion of the bascule span (forward portion of truss provided-including requested camber information)

Coincident to this meeting, the design development for the span support system was halted. This stop of design resulted from the inability of PCL to accept a prior agreed upon change to the roller support system. As a result, H&H noted that the ring design development could not be finalized until the roller support system direction was received. This resulted in a delay in the ring portion design development and IFD submittal.

In order to mitigate the impact of this design delay due lack of direction from PCL on the roller support system, H&H recommended that the design submission schedule be modified to include submission of the forward truss in lieu of the ring as the first major element of the truss. All parties agreed with this approach and a new submittal date of 31 May 2013 was established for the forward truss progress including the span camber data. This revised date was required due to the need to reallocate design resources from the ring design development to the truss in order to accommodate the work stoppage for the ring design development.

c) Completion of design as IFD for bascule span-20 May 2013

As noted above, the IFD date for the substantial portion of the truss was modified due to the delay from the roller support system decision. This decision was finalized in Change Order #1 on 17 May 2013 and H&H restarted the design development for the ring portion of the span.

The following represent the submittal dates for the truss portion of the structure:

- 14 June 2013 - Structural Progress Submission (Including Ring)
- 25 June 2013 - Ring IFD
- 5 July 2013 – Orthotropic Steel Deck IFD

The 14 June 2013 submittal date was controlled by the completion of the span roller support system design. The span roller support system design needed to be completed prior to the finalization of the ring structure to IFD. The machinery systems IFD was submitted on 14 June 2013 and the structural design development advanced to IFD after this date.

As such, the delay in the decision on the span roller support system had a direct impact on the design development schedule and submittal dates. The final acceptance by the Contractor of a change order for this agreed upon change extended over multiple months. As such, PCL was a key party to the delay which resulted in the change to the design development schedule.

d) Other PCL caused sources of delay

Non-Compliance of Contractor's Proposed Fabrication Plan: PCL's proposed fabrication plan for the truss was initially presented in September 2013, 3-1/2 months after issue for detail drawings were released. The plan was rejected due to incomplete information and non-compliance with the Contract Documents, particularly the BC MoT steel specifications which had formed the basis for the project steel specifications since the indicative phase. A formal request for variance from PCL was not made until December, 2013. An agreement on an acceptable fabrication plan concept was reached through a collaborative effort over the course of two months, culminating with meetings in NYC in January 2014

Absence of Contractor's Field Erection Plan: Throughout the project development, PCL failed to provide a field erection plan with a chosen method of span installation. As a result, delays resulted associated with design evaluation, development, and implementation of an acceptable splice to suit the fabricator's installation needs

Bascule Pier Requested Changes: During the design development of the bascule pier, PCL elected to design its own precast support and seal slabs for the construction of the pier foundation. This led to required changes of many of the developed bascule pier wall and column details. In addition, PCL requested changes to the framing and enclosure of the mechanical and electrical rooms, the details of the roof slabs, and the details for the bumper block supports. All of these requests resulted in delay to the final issue of the bascule pier drawings.

Field Instructions: PCL claims that field instructions issued as part of the project process have also resulted in additional delay. In general the field instructions issued are modifications to the IFD drawings based on coordination with PCL and account for the current fabrication and erection plan of PCL.

With respect to Field Instruction 005, PCL claims that re-detailing effort and reordering of steel is required. With respect to the re-detailing effort, H&H has only recently received shop drawings for the ring structure. It is unclear what detailing was complete prior to issuance of Field Instruction 005 since no shop drawings were submitted prior to issuance of Field Instruction 005. It should also be noted that a number of working sessions with PCL were held to clarify details that would be acceptable to the designer. It should also be noted that a number of the issues arose due to the fact that PCL proposed detailing of welds and procedures that were not compliant with the project

requirements in the fabrication process. The non-compliant weld procedures governed their fabrication plan and the plan needed amendment in order to address these concerns.

PCL had input throughout the design development process and this input resulted in additional effort on the part of the design team. PCL notes they are having difficulty in finishing the shop drawings due to the design development and field instructions. The same is true of the IFD drawing packages. The design team found the project delivery process to be very challenging since PCL commented on each submittal and consistently requested changes to the design that resulted in additional scope for the design team and a transfer of scope, such as detailing effort, from PCL to the design team. With respect to the design, PCL indicated this is part of the collaboration requirements of the Agreement. If this is agreed, then it is reasonable to consider the modification of non-substantive elements of the design are also part of the collaboration and work to be included in the scope of PCL to accommodate these changes in the shop drawings.

Multi Use Trail and Sidewalk Design: We note that the sidewalk and Multi Use Trail structural steel IFD's were a source of concern regarding potential vibration caused by pedestrians or wind. Time consuming, complex dynamic analyses and retaining a specialist subconsultant were required to resolve this concern. This issue had to be resolved prior to issuing IFD drawings. Subsequent to the resolution of this issue, the sidewalk and MUD design was delayed by PCL's request to replace welded floor beam/bottom chord connections to bolted connections. This required re-work by the design team and a delay in the delivery of these IFD drawings.

In general, the global schedule delay claimed by PCL does not have merit. The claimed delay is resultant from actions of PCL or is coincident with other delays that have occurred due to PCL's actions. Furthermore, the activities and costs PCL has associated with the claimed delay are of little or no merit. PCL is attempting to shift costs that are part of his scope and responsibility to the City and is offering little documentation to support the claimed costs.

7. Material Quantity Growth and Clause GC 4.10.

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 City prequalified contractors, who not only were qualified to construct this unique project, but who also were interested, and have the expertise and experience (either in-house, or by engaging its own qualified designer) to review the Indicative Design and offer suggested cost or schedule benefits.
- PCL offered a number of Optimizations that modified the Indicative Design in order to achieve the City's affordability limit.

- The contract was awarded with the clear understanding that both the Indicative and the Optimized were incomplete. We believe that the Optimized Design was at best 10% complete.
- It was PCL's responsibility to make allowance for the incompleteness of the design and provide the City with a lump price for the Project.
- Quantities provided by the City to PCL during the proposal period were clearly marked as being incomplete and not to be relied on.

Although PCL's Optimized Design met the architectural requirements of the City, it represents a fundamentally different technical solution to that presented in the Indicative Design. This is illustrated in the following table:

INDICATIVE DESIGN	OPTIMIZED DESIGN
7 sided truss members	4 sided truss members
Electrical motors	Hydraulic motors
Long, light counterweight	Short, heavy counterweight
Long Bascule pit set on the sea bed to accommodate the counterweight constructed with a cofferdam	Short bascule pit at water level constructed without a cofferdam
12, 1.8 m diameter piles	16, 1.8 m diameter piles
Inclined rest pier and inclined abutment walls	Extended piles for piers. Abutments replaced with MSE walls and piers.
Steel approach spans	Concrete approach spans

In February 2013 it was recognized that PCL's Optimized Mechanical Design would lead to considerable risks during erection of the steel and significant difficulties in achieving the required tolerances. An Alternate mechanical design was developed to mitigate this significant concern and this was presented to PCL. After 2 months of discussions, PCL endorsed the change and agreed that the change would have no schedule or cost impact. We believe that this was the only incident of an Owner generated Change Order. With the exception of the Mechanical Alternate Change Order, the Optimized design was achieved as demonstrated in Section 4 of this response.

In their letter of March 17, 2014, PCL states that they have a contractual entitlement to additional compensation because the contract price was based upon a defined scope of work. This is a fundamental misunderstanding of the contract. The basis of the contract was an incomplete design as outlined in the RFQ, RFP, stated in the contract and as noted above. We cannot imagine how PCL could think that the scope was defined when the City very clearly stated that the Indicative Design was incomplete and based on our review of PCL's proposal, PCL's Optimized Design was at best 10% complete. We note that it is not unreasonable for scope to vary by 30% from a 10% design and that this is normally accounted for with appropriate contingency.

PCL's comments about GC 4.10 and GC 7.1 being rendered meaningless are difficult to understand given that PCL would be entitled to extra compensation in the event of an Owner initiated change and that in this case GC 4.10 and GC7.1 would apply.

The Indicative Design formed the basis for the development of the Optimization Concepts and it was the presumption that the Indicative Design to its defined level of development was reasonable and adequate. The Indicative Design also defined the fundamental features of the structure and these features are present in the current design development as depicted in the Issued for Detailing drawings. In their letter, PCL tries to develop a very convoluted argument that the optimized design was based on the Indicative Design and that because the Indicative Design was flawed, so was the Optimized Design. It seems that based on this strange logic that PCL is alleging that there is an error in the design and that they are therefore entitled to compensation. This shows PCL's considerable lack of understanding of the contract and of their own proposal. As noted above, their Optimized Design proposal is a fundamentally different technical design than the Indicative Design and as such the Indicative Design has no bearing on the feasibility of PCL's Optimized Design.

We also note that notwithstanding the absence of a construction schedule and of a mutually agreed design schedule, MMM, in good faith provided PCL with design submissions that went well beyond the scope of the contract, as requested by PCL. As such PCL had numerous opportunities to review the design and participate in collaborative workshops during development of the design. We also note that IFD drawings for the truss, ring and mechanical system were submitted to PCL in June 2013. As of end of March, we had received not more than 30% of the corresponding shop drawings.

Design delivery has been hampered by PCL and the project schedule has been delayed as follows:

- Requests for changes after issuance of IFD drawings. Examples of such changes include modifying the truss/ring connection from a welded splice to a bolted splice, changing welded connections between the floor beams and the bottom truss chord to bolted connections, and changing welded connections between the outriggers and the bottom truss chord to bolted connections.

- Extensive design reviews that included months of discussions with PCL to finalize the bascule pier design.
- PCL's more than 2 month delay in reviewing and eventually accepting a workable mechanical design to replace the optimized design included in the contract.
- 3 month delay caused by PCL's insistence to value engineer the east approach span configuration.
- MMM took on the design of the orthotropic deck although in accordance with the structural steel specification in the contract, this was to be designed by PCL.
- PCL's desired review procedure required 4 interim submissions for each design package. This added considerable time to the design schedule. The extent of this PCL caused delay is still being determined.
- PCL's first shop drawing submission was very poor and this resulted in a 4 month delay.

In their letter, PCL states that they have been unable to determine quantities from the design submissions because these have been submitted piecemeal. We note that PCL claims to have been able to accurately estimate quantities associated with their Optimized Design even though it was only, at best, 10% complete. It would seem that with IFD drawings in hand in June 2013 for the truss, ring and mechanical, that in June 2013 PCL should have been able to develop more accurate quantities than during their proposal preparation.

Specific scope changes noted in PCL's letter are addressed in the following:

PCL CLAIM	MMM RESPONSE
Due to the increased weight of the Bascule 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.	PCL is assuming that quantities from a less than 10% design are accurate. The contract is based on an incomplete design and PCL should have accounted for this in their bid.
Increases in concrete strength and rebar throughout the foundation supports. The drilled shaft foundations were not optimized in our Proposal.	(Pile configuration in Indicative Design is substantially different than that shown in PCL's proposal. This in our opinion is an Optimization.

PCL CLAIM	MMM RESPONSE
The prestressed box girders design contains details that include heavier rebar and prestressing strand than those used on similar MMM designs in Canada.	MMM advised PCL before award that the precast beams in PCL's proposal were likely too shallow. As a result PCL proposed including a contingency in the Appendix "C". During design development, PCL preferred to not change the beam depth. This would lead to more reinforcement. PCL's optimization for the approach spans included a very awkward support for the Operator's hut and this would further add to reinforcement requirements for the approach beams. The east approach spans are not like anything we have designed elsewhere.
We believe the ship impact loading criteria to be a factor in the design that was not anticipated in the Indicative design.	Ship impact has nothing to do with the approach structures.

Other comments with regard to PCL's claims about scope growth are:

Scope Growth

- PCL claims that the contract envisions the potential for adjustment in cost since it is based on a defined scope of work
- PCL claims a material growth in scope due to an increase in the bridge weight from Optimized Design to IFD. We note that the scope for the bridge structure is defined by the geometry defined by the optimized concept and the steel weight limit set forth in the agreement (1700 t +/- 5%). These have not changed.
- PCL's proposed optimization focused on change from seven-sided section to trapezoidal or square (rectangular) sections. This was done.
- PCL's proposed optimization cited the use of "proven bridge welding procedures" for the box structures. This was done.
- PCL's proposed optimization cited 35% to 40% reduction in welds and the associated labor cost reduction. This was done.

- With respect to claimed change in scope and material growth, the steel quantity for the movable span is below the 1700 t limit prescribed in the Agreement. There is no growth in this material.
- The IFD of the truss is consistent with the visual character of the Indicative Design and meets the requirements of the Optimized concept of PCL's proposal.

Design Development and Review Procedure

- The design review procedure was initiated as a means to provide input on the design during development. PCL participated fully in this process.
- PCL requested a substantial number of in-progress submittal packages that were not reasonable considering the design schedule
- Design was noted as being supplied in partial packages of information. This was intrinsic to the project plan and Appendix D of the Agreement.
- PCL claims that design information is provided in a "piecemeal" manner and the associated review was difficult. This process was intrinsic to the agreed project delivery model. It should be noted that PCL's fabrication, quality and erection plans consisting of multiple inter-related sections were submitted in much the same manner. This required extensive review and coordination on the part of the design team.
- PCL did not proactively communicate the work dates and no mutually agreed upon dates outside of Appendix D were defined.

Steel and Lead in the Bascule Structure

- It is the understanding of MMM and H&H that a change order was executed for the substitution of the 20 mm orthotropic steel deck plate with 18 ribs to a 16mm plate with 16 ribs.
- With respect to the delay, PCL claims extra cost for "structural grade steel used as counterweight plate". In the credit computation under this section, PCL calculates the credit for the counterweight steel using a reduced steel cost per tonne. This is inconsistent and improperly favors PCL in both regards.

Mechanical System Components

- As agreed in Change Order #1, the optimized concept for the span support system was modified to the Alternative Concept. This concept was advanced through design.
- The Alternative Concept and the associated machinery IFD resulted in a system with less machinery components that required field alignment. The system reduced the number of rails to be aligned from four to two.
- PCL concurred that this revision reduced the risk and effort associated with the field installation and alignment of the rails.
- With respect to the anchor bolts, the Optimized concept drawings do not indicate quantity or type of anchor bolts. The seismic analysis that controls the anchor bolt design was not performed, nor was it reasonable to perform, at the time of the development of the Optimized concept.
- The IFD anchorage bolt system was designed in accordance with the seismic requirements for the project.
- With respect to the claimed extra costs, PCL does not adequately present the costs and assumptions of the cost used for the development of the as-bid cost. Without a full accounting of the assumptions of the as-bid quantities and cost, it is difficult to assess the reasonableness of the claimed extras. More detailed information is particularly important since the system was changed as agreed in Change Order #1. This change impacts material quantities and costs as well as installation effort and associated costs.
- Specific commentary relative to development of current span support system includes:
 - o IFD drawings issued on 14 June 2013. Shop drawings received 25 March 2014
 - o Contractor supported development of the current mechanical design (PCL emails dated 4/4, 4/9, 4/30)
 - o Contractor was involved throughout the design development of current mechanical design (perhaps more so than any other element on the bridge). In addition to the design development review items indicated in PCL's letter, the following design development review took place by PCL:
 - Multiple conference calls with MMM / PCL / SMC to discuss mechanical design development - 4/5, 4/17, 4/18, 5/9, 5/16

- Contractor provided review comments via emails dated 3/17 & 4/9. Responses by H&H to 18 bullet point questions provided on 4/1 & 4/18
 - o PCL indicated that alternative optimized design did not differ in schedule or risk (PCL email dated 4/30)
 - o H&H requested specific clarification on a single support vs. intermittent support. Contractor indicated single support for rack/rail desired (PCL email dated 5/20).
 - o Since issue of IFD, H&H has indicated no material objection to PCL's value engineering alternative concept for span support segment and rack. H&H has worked with Contractor (including PCL visits to NYC) to review and discuss this concept.

Rebar and Shaft Concrete Strength

- Contractor claims that since the shafts were not optimized per their proposal, the Indicative design should have been maintained. This claim is incorrect. The design of the shafts for the bascule pier is dependent on the seismic design of the structure. Optimized design is fundamentally different than the Indicative design and as a result foundation loads are completely different and the Indicative design is not appropriate.
- Foundation design is strongly influenced by seismic design and the global seismic model was developed for the bridge defined by the Optimized Concept. The results of this analysis were used to design the shafts for the bascule pier and the design was required to be consistent with the established design criteria.

PS Box Girders Increased Rebar

- With respect to the box girders for the deck over counterweight, the box girders shown in the design drawings are consistent in size and type with the Optimized concept
- The reinforcement ratio for these boxes is resultant from the limited depth available for the girders above the lower counterweight of the bascule span
- Standard BC boxes do not meet strength / depth requirements to suit deck over counterweight roadway span

8. Conclusion

The Johnson Street Bridge project is an extremely challenging project from both a technical and contractual point of view notwithstanding the fact that the design team includes some of North

America's most experienced designers of moveable bridges. In reviewing PCL's letter of March 17, we note a number of important misquotes of the contract such as replacing "construction" with "Work" and believe that PCL is largely responsible for the delay they are experiencing.

We believe that PCL has experienced considerable difficulties in delivering this project and is delayed for reasons other than those noted in their letter including the following:

- PCL's Optimized Design is fundamentally different from the Indicative Design. Alleged issues with the Indicative Design and quantities associated with the Indicative design are therefore irrelevant.
- PCL's Optimized design was at best 10% complete at the time of award. It appears that PCL has based their bid on either quantities from their bid design or quantities from the Indicative design. In either case this could lead to a significant error in their bid.
- PCL has hampered design delivery through their need for extensive collaboration, requesting changes after issuance of IFD drawings, delay in reviewing/accepting the Alternate mechanical design and more than 180 design submissions in a 7 month period.
- PCL staffed the project with very inexperienced project managers including staff not presented in their proposal.
- To-date PCL does not have a construction schedule and a mutually agreed design schedule has never been established.
- As of end of March more than 70% of the anticipated shop drawings have never been submitted.
- PCL engaged a shop drawing team with no experience in North America or with moveable bridges. Consequently shop drawing quality was initially very poor and proposed details unacceptable. SD production is on PCL's critical path and consequently PCL has experienced delay.
- PCL clearly misunderstood the contract with regard to quantity risk. The contract clearly places all quantity risk with PCL with the exception of steel quantities in the bascule superstructure. There have been no changes in project scope that would justify any quantity risk to the City.

In summary, we believe that PCL's request for a Change Order has no merit and should be rejected.

Yours truly,
MMM Group

A handwritten signature in black ink that reads "J. Meyboom". The signature is written in a cursive style with a large, stylized initial "J".

Joost Meyboom, P.Eng.
Partner
Project Delivery, Western Canada

cc: Dwayne Kalnychuk, City of Victoria
Didier Samouilhan, MMM
Tim Stanley, MMM
Dan Leachman, PCL