Committee of the Whole Report
For the Meeting of March 23, 2017

To:	Committee of the Whole	**Date:**	March 17, 2017
From:	Jonathan Huggett, P. Eng.		
Subject:	Johnson Street Bridge Replacement Project Quarterly Update		

RECOMMENDATION:
That City Council receive this report for information.

EXECUTIVE SUMMARY
Quarterly reports are prepared on the Johnson Street Bridge Replacement Project throughout the year to keep Council and the community updated on this important project. This is first quarterly report for 2017, with the next one scheduled for June 2017. Should any emergent issues arise, staff will provide an immediate update to Council.

Work on the steel fabrication continues at two locations in China, these being:

- The main bridge structures, including the falsework to support all of the steel while the bridge is erected in Victoria, are under fabrication by ZTSS at JingJiang near Shanghai; and
- The span support structures which connect the main bridge steel to the machinery that moves the bridge are being fabricated by QuayQuip in Tianjin.

Fabrication of the main bridge structure at ZTSS has now reached vertical fit up. This is the stage where the entire steel bridge is assembled in China and a full dimensional check and inspection is carried out. After successful completion of the vertical fit up, the various parts are disassembled and sent for painting before shipping to Victoria. The Project Director, PCL, H&H and MMM met in early January at both plants to review progress and schedule. A further meeting with all parties was held in Seattle in February and weekly conference calls involving all parties are continuing. The updates included in this report on these matters are as a result of the meetings in China as well as the continuous collaboration amongst all parties.

Regarding the span support structure, fabrication is in progress at QuayQuip and this work is on schedule. The welding of the span support segments has been completed and dimension checks and stress relief of the various components is underway. To expedite the schedule, PCL have now elected to attach the span support structure to the rings in Victoria, using local contractors commencing in July. A detailed overview of the bascule span installation is discussed further into this report.

Onsite activities, including roadworks and civil activities continue. The new sidewalk was opened on the south west corner of Harbour and Esquimalt Roads, providing additional access to the public. An additional cycle ramp from the pedestrian bridge to the eastbound bridge lanes which will enhance cycle traffic flow is under design.

PCL received shop drawings back from MMM for the on-bridge handrail posts at the end of February – and these handrails are currently in fabrication. Shop drawings for the off-bridge handrail posts were submitted to MMM for review in the week of March 6, 2017. PCL will be looking to start installation of the on-bridge hand railing (i.e. anything on the approach spans) near the end of June as this activity needs to be coordinated with electrical installation.

The fendering remains a critical component of the project and is being worked through on an ongoing basis. Meetings have been held with Seaspan and Transport Canada and the revised design criteria has been finalized. MMM are working through various design concepts, with the input of specialist fendering contractors. The key challenges to producing a cost effective and acceptable design include:

- Schedule constraints related to both Fisheries windows and the erection of the main steelwork due to begin in September;
- Maintaining safe passage;
- Ensuring water access to adjacent properties;
- Avoiding a major communications duct bank immediately north of the bridge;
- Aesthetics; and
- Competitive pricing and procurement alternatives.

The bridge remains scheduled to be open to traffic by the end of December 2017 and project completion is scheduled for March 31, 2018. As noted earlier, the schedule is under constant review to identify opportunities to pull back delays encountered during the fit up of the various components.

On May 5, 2016 Council approved $8.206 million in additional project funding from the Building and Infrastructure Reserve as part of the 2016 Financial Plan Bylaw, resulting in a current budget of $105.06 million (see Appendix D).

There will be two more planned project budget increase requests for fendering and public realm. Should additional unforeseen events occur before the completion of the project, Council will be advised.

A conceptual design for the public realm areas surrounding the new Johnson Street Bridge was finalized by Connect Landscape Architecture on February 21, 2017. Staff are currently engaging a cost consultant to provide more detailed costing of the works to help inform future budget and phasing considerations. A separate report to present the Public Realm design will be brought forward to Committee of the Whole on April 13, 2017.

Significant progress regarding the Janion plaza construction has been made, with completion anticipated for late March. The stairs leading from the Janion plaza will allow access to the standby generator and will eventually connect to the David Foster Harbour Pathway, once that section of the pathway has been completed.

Staff continue to stay in contact with businesses and stakeholders on the Vic West and Downtown sides of the project as well as harbour stakeholders. As construction continues to take place overseas, images are being posted on the bridge project website to help demonstrate the progress in steel fabrication. When safe, media opportunities have been accommodated on site to raise awareness and understanding about ongoing construction.

Throughout the project, staff have continued to maintain correspondence with stakeholders and media in an effort to keep the public informed about ongoing construction and answer questions about the bridge project.

PURPOSE

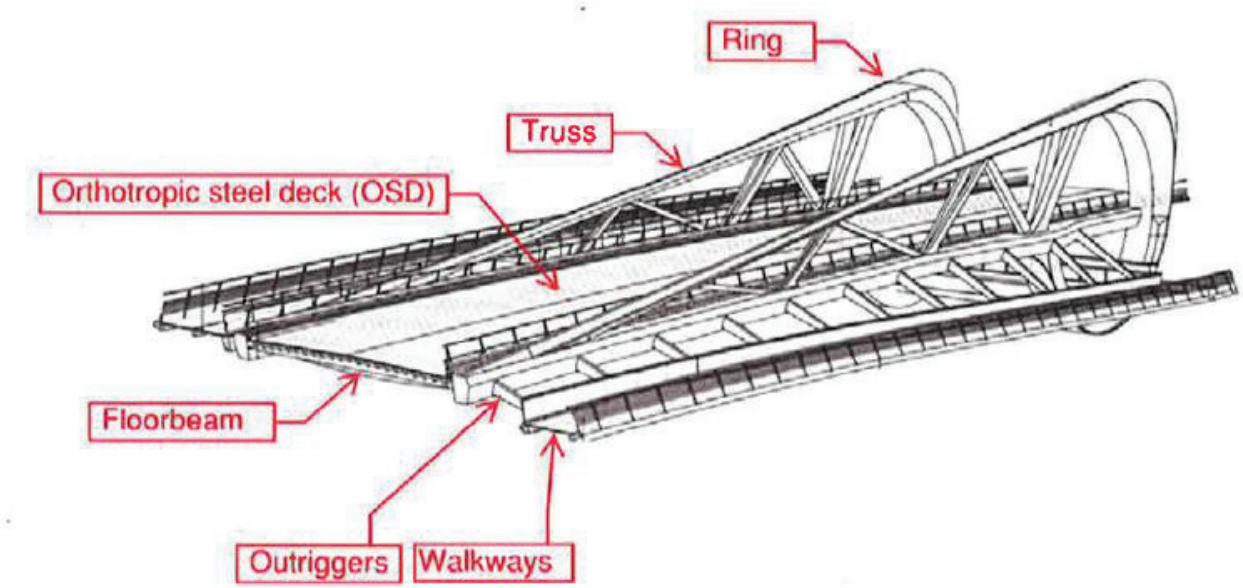
As directed by Council, staff provides quarterly reports on the Johnson Street Bridge Replacement Project throughout the year. This is the first report for 2017, with the next update scheduled for June 2017.

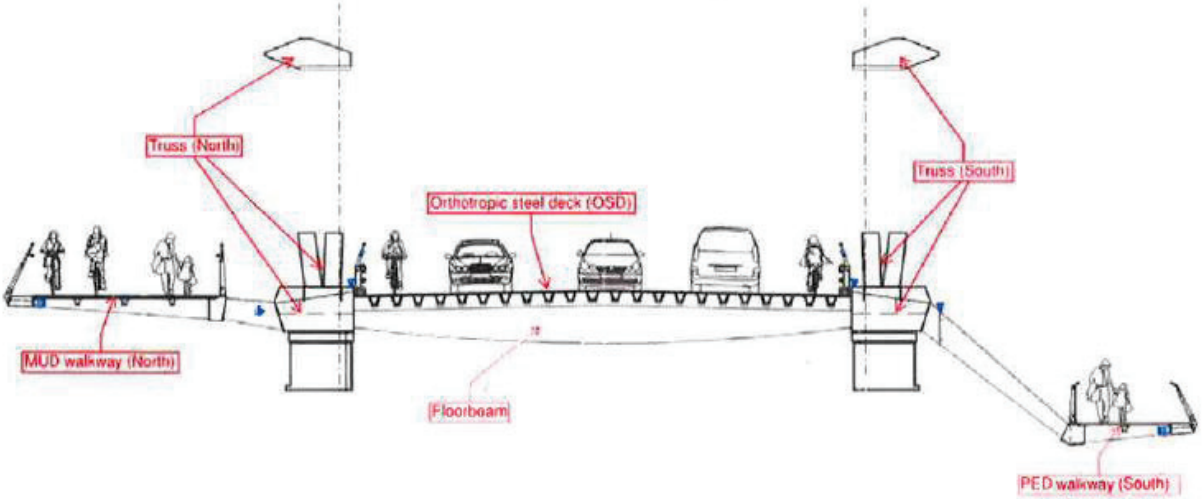
STEEL PROGRESS/ FABRICATION/QUALITY ASSURANCE

Work on the steel fabrication continues at two locations in China, these being:

- The main bridge structures, including the falsework to support all of the steel while the bridge is erected in Victoria, are under fabrication by ZTSS at JingJiang near Shanghai; and
- The span support structures which connect the main bridge steel to the machinery that moves the bridge being fabricated by QuayQuip in Tianjin.

The following diagrams provide visual clarity of the main steel components being fabricated for the new bridge by ZTSS:





STEEL FABRICATION BY ZTSS

Work is progressing steadily at the fabrication plant (ZTSS) in China. The Project Director, PCL, H&H and MMM met in early January at both plants to review progress and schedule. A further meeting with all parties was held in Seattle in February and weekly conference calls involving all parties are continuing. Fabrication of the various elements such as the trusses, rings, walkways and counterweights are complete, and attention is now focussed on the vertical fit up work.

Vertical Fit Up

PCL have satisfied themselves regarding the horizontal fit up and have elected to move to vertical fit up where additional checks are required. In vertical fit up the trusses and their rings are stood upright to the position they will finally be installed in and are supported at each end. Many of the critical components such as the deck cross beams and counterweights are installed and the dimensional checks then resume. This is the first time that the relative dimensions of the truss and ring on the north side can be checked in relation to their positions on the south side. It also allows engineers to check their theoretical calculations on deflections and to ensure that the fabrication meets the design intent.

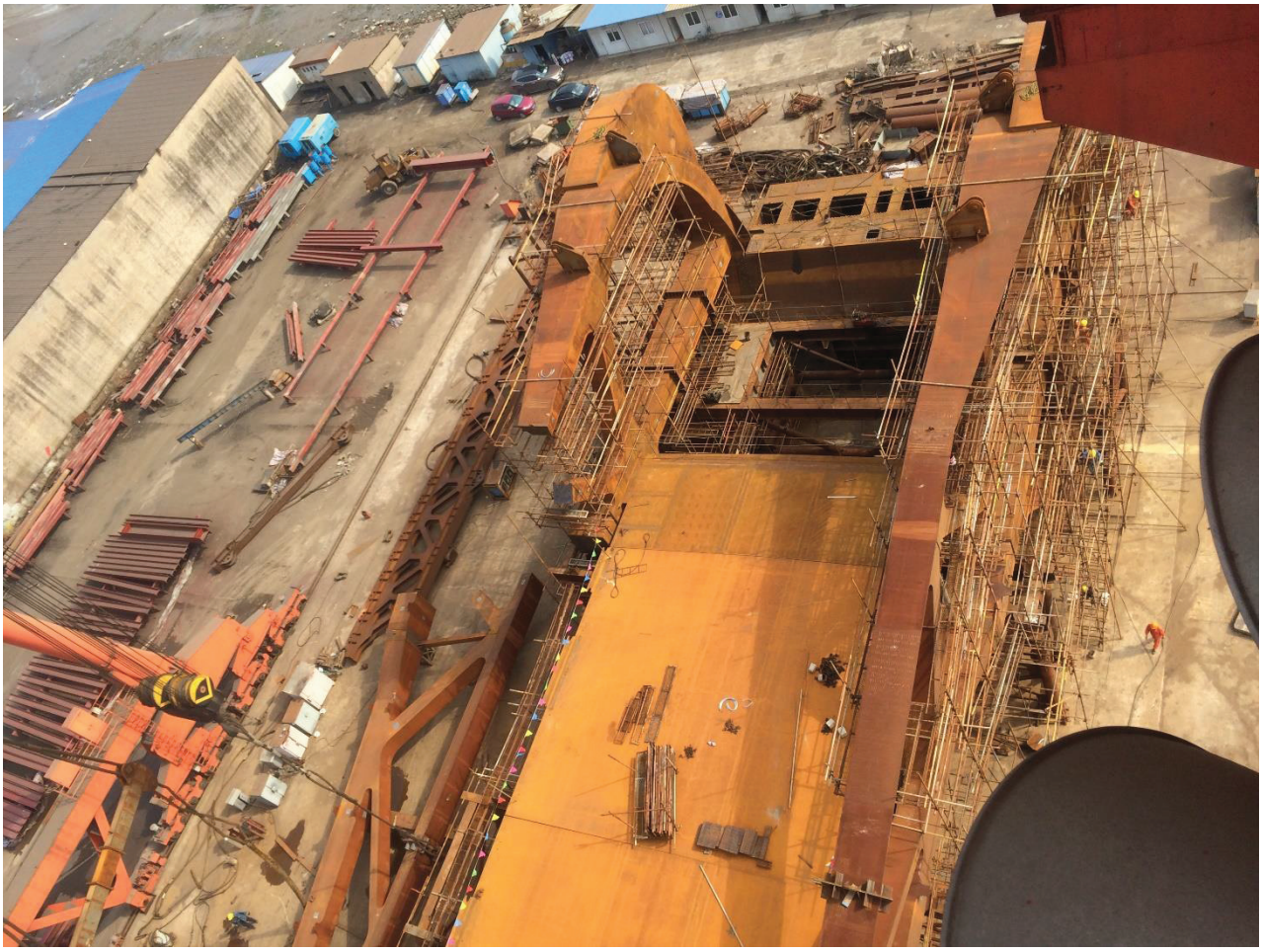


Figure 1 – Top View of Vertical Fit Up as of 16 March 2017

Figure 2 - Vertical Fit Up – Back View Showing Lower Counter Weight as of 16 March 2017

Figure 3 – Side View of Vertical Fit Up as of 16 March 2017

The following outlines the planned schedule for the remaining bridge fabrication activities at ZTSS in China:

OVERALL TRIAL ASSEMBLY	Duration (days)	Start Date	Finish Date
Assembly of South and North Rings & Floorbeam Lower Counterweight	8	Saturday, February 18, 2017	Friday, March 03, 2017
Assemble South and North Trusses	8	Saturday, March 04, 2017	Sunday, March 12, 2017
Connection Between Rings and Lower Counterweight Floor beam	18	Saturday, March 04, 2017	Wednesday, March 22, 2017
Assemble Orthotropic Steel Deck panels	17	Tuesday, March 14, 2017	Friday, March 31, 2017
Assemble Curb	3	Saturday, April 01, 2017	Tuesday, April 04, 2017
Inspection of Profile (Including condition	2	Wednesday, April 05, 2017	Friday, April 07, 2017

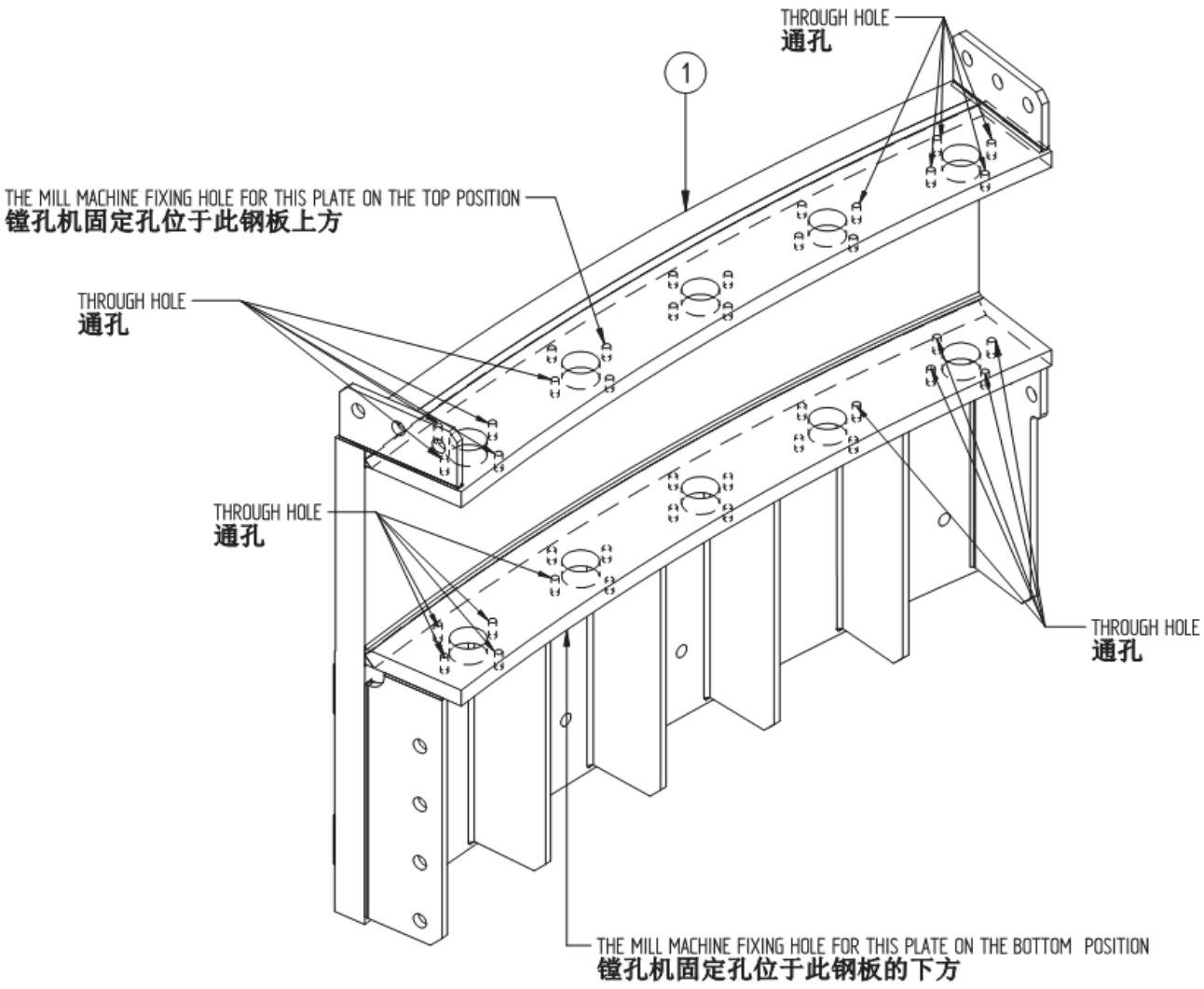
OVERALL TRIAL ASSEMBLY	Duration (days)	Start Date	Finish Date
similar to complete bridge in Victoria)			
Disassemble	1	Saturday, April 08, 2017	Sunday, April 09, 2017
Trial Assembly of Truss / Deck and Walkway	38	Monday, April 10, 2017	Thursday, May 18, 2017
PAINTING			
Ring Coating	22	Saturday, April 08, 2017	Sunday, April 30, 2017
Floorbeam Lower Counterweight Coating	22	Saturday, April 08, 2017	Sunday, April 30, 2017
Coating of Truss and Deck	26	Friday, May 19, 2017	Wednesday, June 14, 2017
Walkway Coating	35	Friday, May 19, 2017	Friday, June 23, 2017
1ST SHIPMENT	40	Monday, May 29, 2017	Monday, July 3, 2017
2nd SHIPMENT	40	Friday, June 30, 2017	Friday, August 04, 2017

SPAN SUPPORT STRUCTURE

The span support structure connects the main steel structure to the machinery and the following diagrams illustrate the complexity of this work:

Figure 4 - Entire Span Support Structure

Figure 5 - One Segment of the Span Support Structure



All of the span support segments (the bridge machinery component that attaches to the structural steel and on which the bridge opens) have been fabricated. The next stage is to carry out stress relieving of all components. Machining induces stresses in parts. The bigger and more complex the part, the more the stresses. These stresses can cause distortions in the part long term. If the parts are clamped in service, then cracking could occur. Hole locations can also change causing them to go out of tolerance. For these reasons, stress relieving is necessary.

See Appendix A for a current production planning progress report from March 3, 2017, regarding the north and south trusses, provided by QuayQuip.

The images below display the production status of the span support segments as of the beginning on March 2017.

Figure 6 - Completed Span Support Segments

Figure 7 - Close Up of Span Support Segments

FINAL ASSEMBLY OF BASCULE SPAN

The final assembly of the bascule span is currently scheduled to begin in July 2017 when the span support segments will be attached to the rings in Victoria. Following completion of that task the rings with the span support structure will be installed in the bascule pier.

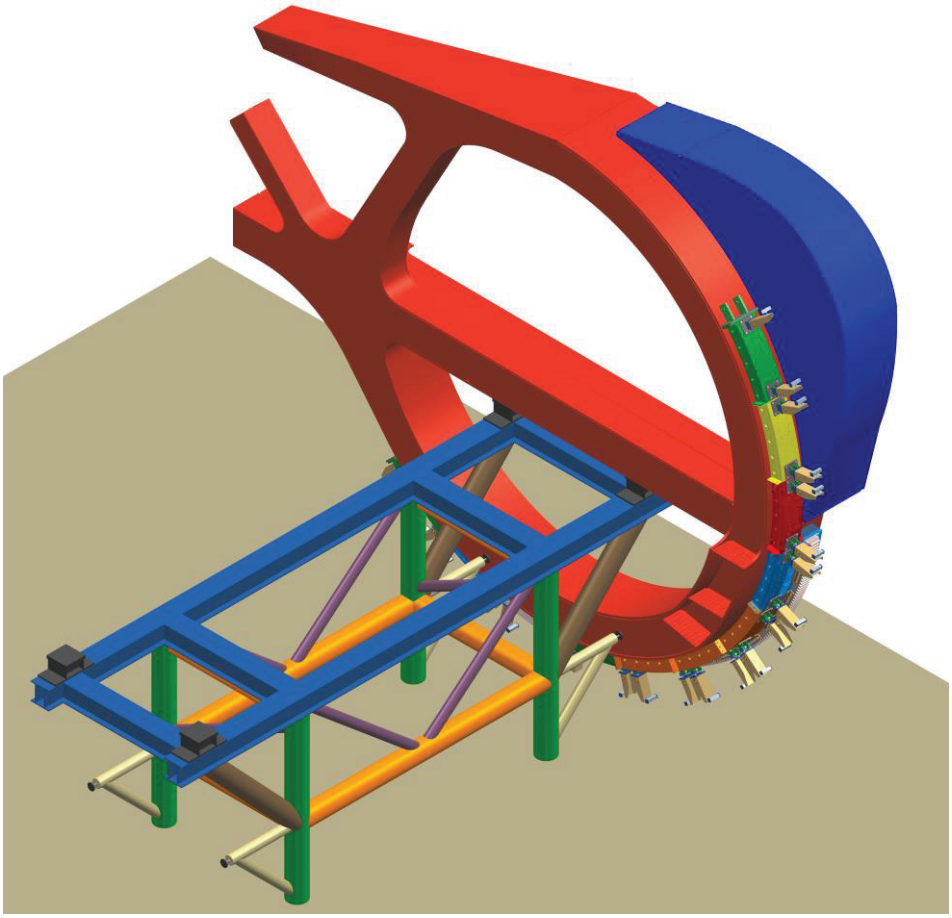


Figure 8 - Diagram of Ring Installation in Bascule Pier

CONSTRUCTION PROGRESS – SITE AND ROAD WORKS IN VICTORIA

Traffic and Civil Updates

Onsite activities, including roadworks and civil activities continue. The new sidewalk was opened on the south west corner of Harbour and Esquimalt Roads, providing additional access to the public. An additional cycle ramp from the pedestrian bridge to the eastbound bridge lanes which will enhance cycle traffic flow is under design. Detailed design of the handrails has been finalized and fabrication has commenced.

Handrails

A summary of the status of the handrails is as follows:

1. PCL received the reviewed shop drawings back from MMM for the on-bridge hand rail posts at the end of February 2017; these works are currently in fabrication.
2. Shop drawings for the off-bridge handrail posts were submitted to MMM for review at the beginning of March.
3. PCL will be looking to start installation of the on-bridge hand railing (i.e. anything on the approach spans) near the end of June 2017 as this activity needs to be coordinated with electrical installation.

FENDERING UPDATE

Background

The original indicative design scope prepared by MMM included a proposed fendering system for the MMM indicative designed bridge. The City invited proposals from contractor/designer groups to optimize this design and to reduce the costs of the bridge. In the optimized design proposed by PCL, various changes were made including the reconfiguration of the rest pier from one with inclined supports to one with vertical columns. This change in the rest pier configuration significantly impacted the fendering layout for the west in-channel fendering system. Nevertheless, PCL in its proposal to the City identified fendering as one of the systems which held potential for “further cost” savings.

The RFP for the procurement of an optimized Johnson Street Bridge stated that the fendering was going to be designed and constructed by the contractor. During the final contract negotiations at the end of 2012 the design of the fendering was put back into MMM’s scope of work and the contracts were signed on that basis. PCL included $1,599,000 for fendering in its bid. When the contract was signed with PCL, the fendering is stated in the contract as follows:

- Appendix B - The fendering system has been developed to a conceptual level
- Appendix G – the design will be by the consultant (meaning MMM)

The $1,599,000 was an estimate supposed to cover all fendering costs.

In March 2014, the issued for construction drawings for the fendering was given to PCL by MMM. The timing was important because at that time, it was important to install the fendering under the steel span before the steel span was installed. Delays to the steel span had not occurred on that date. However the north side fendering had still not been finalized, largely because it was recognized that the likely costs considerably exceeded the available funds. From March 2014 onwards significant effort was put into investigating more cost effective solutions. Those investigations included MMM hiring a specialist fendering designer, investigating likely vessel operation to determine speeds and loads, and looking for design solutions that would meet the required criteria.

Extensive changes have been made to the fendering from the indicative design. This has included a “camel” shown in the picture below to protect the rest pier.

In the original project contingency (Appendix C to the construction contract), a $462,500 amount was allocated under the heading “Additional structural support for fendering” for, amongst other things, socketing the fendering support piles into bedrock. MMM’s indicative design drawings for the fendering system did not indicate the founding conditions for the fendering piles. For this reason, PCL clarified its bid (as documented in the construction contract Appendix G, Section 3.0) to indicate its assumption that “Fender piles brought to bedrock elevation.”

Late in the 2013, MMM advised the City that the fendering design had been simplified through the use of a floating camel protection system amongst other things, thus reducing the number of piles associated with the fendering system. At that time, MMM also informed the City that the cost estimate for the November 2013 fendering system was similar to the indicative design cost estimate but the design was contingent on a reduction in vessel transit speeds which would require discussion with the Marine Users Group. On December 5, 2013 the $462,500 contingency was moved into “unallocated contingency”.

As the design progressed it became very clear that the north side fendering could not be constructed for the $1,599,000 that PCL has indicated it had allocated in its bid or anything close to that.

There are other issues that have impacted the design of fendering. The City undertook two areas of work ahead of construction of the Johnson Street Bridge. These were:

1. The diversion of the Telus duct bank. The duct bank had to be diverted to remove it from the bridge construction and it was moved some distant to the north. However, due to property constraints on either side of the river, it was not moved sufficiently far enough to

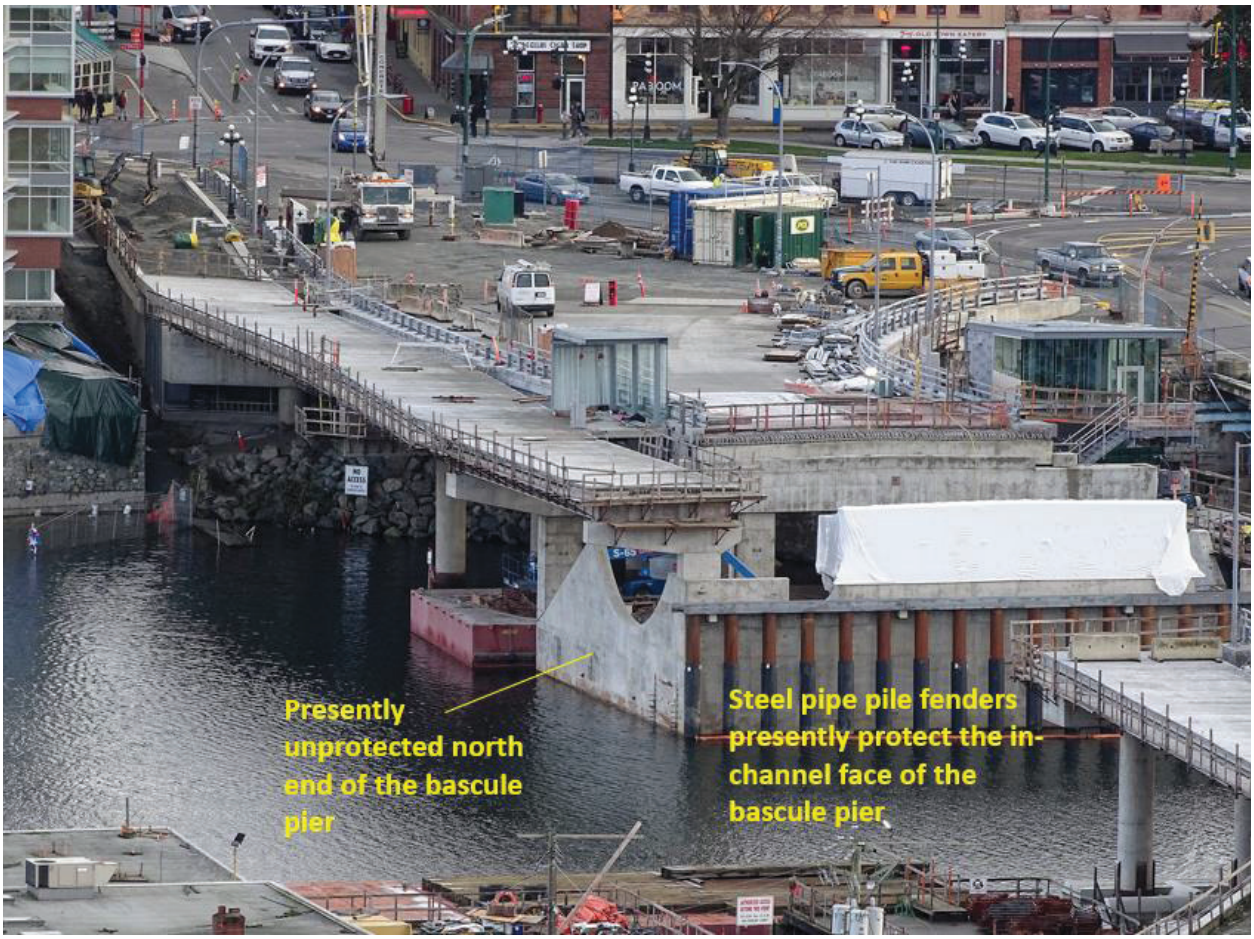
allow for easy construction of fendering systems. Without additional protection measures, piles cannot be driven close to the duct bank as in the event of a ship collision the piles might move and damage the duct bank.

2. The City sold 203 Harbour Road to Ralmax as it was assumed the land was not needed for the construction of the bridge. This impacts an economical design since access to the water side frontage of 203 Harbour Road must be preserved.

Design Issues

A key issue in the design of fendering is the energy that the vessel imparts to the fendering on impact. The impact energy is a function of the mass of the vessel and the square of the speed, meaning that selection of impact speed is critical (i.e. a vessel travelling at 4 knots will impact 4 times more energy than a vessel travelling at 2 knots). The angle at which the vessel strikes the bridge is also important. MMM's original IFC design for the north side fendering assumed a head on collision with a 6,300 tonne barge travelling at 5.5 knots unloaded and 3 knots loaded. When the design transit speeds were increased at the City's direction the updated October 2015 north approach fender design resulted in massive parallel motion fender "crash walls" which were then tendered by PCL to estimate costs. When various bidders indicated that the north side fendering would be very expensive and that the physical appearance of these structures may be considered to be detrimental to the new bridge, the tendering work was halted.

Given the cost and complexity of the updated design, the City decided to explore other avenues which might lead to a less extensive and more cost effective solution.



The PMI Study
The Maritime Institute of Technologies and Graduate Studies, Pacific Maritime Institute (MITAGS-PMI) in Seattle was contracted by the City to undertake various studies regarding tug and barge movements through the bridge. The Johnson Street Bridge Maritime Simulation Study involved one day of hydrodynamic and vessel modeling validation on May 13, 2016, followed by two phases of simulation-based testing on May 23-26, 2016. Seaspan and Ledcor attended those simulations as did the City and MMM representatives.

The Johnson Street Bridge project studied the severity of forces on the new Johnson Street Bridge and its associated structures resulting from impacts during tug and barge transits through the waterway between the Upper and Lower Harbours. The study also looked at the best practices of conducting such tug and barge transits in order to reduce the probability and severity of such impacts.

Phase 1 involved an assessment of possible impact forces to the bridge structure by errant vessels transiting to/from the upper harbor past the bridge. The scenarios simulated barge strikes of the bridge fendering structure and recorded the various impact and shearing forces imparted to the bridge, in order to provide data to consider in designing suitable protection systems for the bridge structure itself (e.g. dolphins, absorption barriers, etc.). A total of 90 runs were performed in the Phase 1 Impact Forces testing.

Phase 2 involved an exploration of operational considerations (speed, number of tugs, towing configurations, barge displacement, environmental conditions etc.) that affect the potential for and severity of bridge strikes. This entailed the use of a tug operating expert to help explore various combinations/numbers of tugs, tow configurations, and any speed or operational constraints that will factor into recommended best practices. A total of 25 runs were performed in the Phase 2 Best Practices testing.

A combined total of 115 runs in this maritime simulation study yielded the impact speed, direction, orientation and position of vessels at the time of impact from which fendering solutions, with further analyses and simulation could be designed and implemented to protect the bridge structure, as well as a set of best practice and operational guideline recommendations to further mitigate the likelihood and severity of bridge strikes. The PMI report commented on the safe speed for vessel transits. It concluded that the safe speed is not a fixed number but varies throughout the transit. Furthermore, the safe speed depends on how the “tugs are made up” or connected to the barge. The simulator trial data indicated a range of 2.5 to 4.5 knots as the speed over the bottom associated with successful transits. Speed varied widely from light (unloaded) barges to loaded and towing alongside versus towing astern. The data indicates that vessel transits under Johnson Street Bridge presents a moderate maneuvering challenge that requires experienced tug operators and tugs positioned in a towing configuration that enables positive control of both the leading and trailing end of the tow.

Design Criteria for Fendering
WSP Coastal and Port Engineering (WSP | Parsons Brinckerhoff, South Africa) was appointed by MMM Group Ltd. in Vancouver to further analyze the output data from the PMI studies to determine fender forces of a barge collision on the crash fenders, the reactions on the fender supporting structures and to determine the Basis of Design (BOD) for the fendering systems with the objective to provide adequate protection to the bridge at less cost.

The scope of work for the crash dolphin on the north side included:

- Fender force analyses which includes:
  - Updates to the numerical ship motion model Quaysim
  - Processing and analyses of PMI simulation data

- Preparation of barge numerical models
- Numerical model testing and comparison with PMI rigid body collision models
- Set-up of collision model scenarios with fenders in place
- Modelling and analyses of results

- Development of Fender Basis of Design (BOD).
- Conceptual fender options considering alternative types of fendering systems to the parallel motion fender (October 2015) design.

The scope of work also included numerical ship motion modelling of an empty barge colliding with the in-channel camel fendering to determine if a barge would submerge the camel fender and ride up and over the camel fendering system. This will assist in determining the likelihood of the barge coming into contact with the piles of the rest pier on the west side of the new Johnson Street Bridge.

The WSP | PB Basis of Design Report provides for the following:

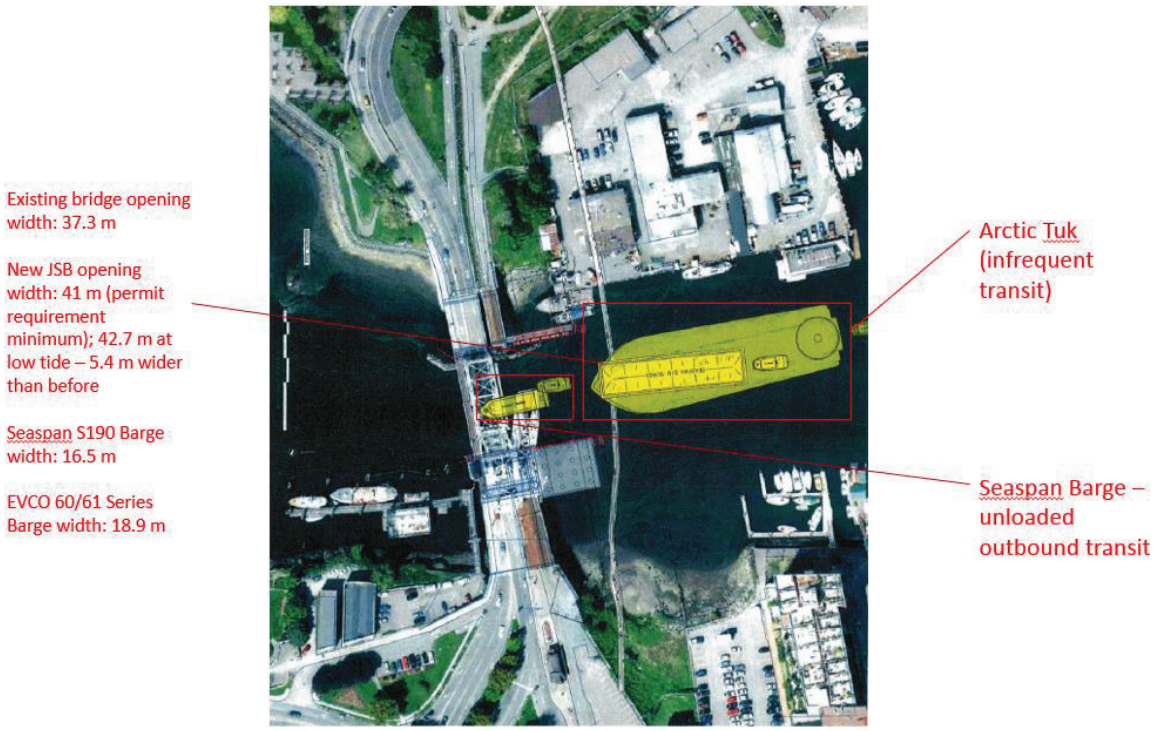
Design Vessel - inbound loaded
At the present time the largest barges which regularly come into Victoria Harbour (under / through the Johnson Street Bridge) are the EVCO 60/61 series (18.9m x 78.03m x 5.3m, 6300 tonne loaded displacement with 4.3m draught).

Design Vessel - outbound loaded

At this time the Seaspan S190 series barge (16.49m x 72.02m x 5.0m, 4140 tonne loaded displacement with 3.45m loaded draft) is the heaviest design vessel for loaded outbound transits which needs to be considered to be in strict compliance with the code requirements.

Design Velocity - inbound and outbound

An approach velocity of 3 to 3.5 knots for a loaded barge and 4 to 4.5 knots for an unloaded barge is appropriate for designing the Johnson Street Bridge fendering.



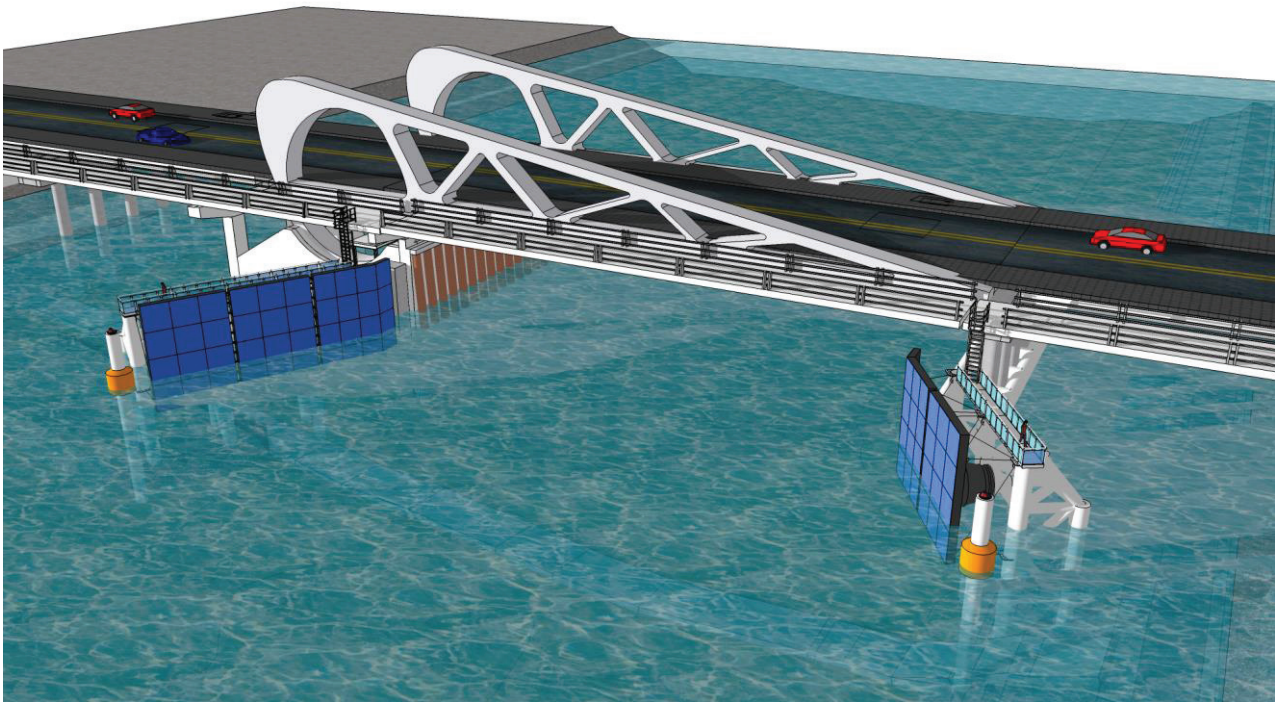


Figure 9 - One Option for North Side Fendering

Safety Considerations
There are a number of safety considerations in the design of the fendering system for the bridge:

a) The City is not under a duty to design the fendering to withstand an impact at 5 knots simply because the maximum Harbour speed is 5 knots. The 5 knot speed limit does not entitle a marine user to traverse any waters in the Harbour at 5 knots. It is a maximum speed in the Harbour waters, but at all times an operator of a vessel is obligated to adjust its speed as reasonably necessary to take account of conditions, obstructions and other vessels. The City's Project Director and MMM have met with Seaspan and have agreed a design speed of 3 to 3.5 knots is a reasonable design assumption and the letters between Seaspan and the City are attached to this report.

b) The City does have responsibility as owner of the bridge to construct the bridge so that it is safe for use by the pedestrians and vehicles that the City invites or permits to use the bridge.

Consultation with Marine Stakeholders
The City has, and continues to consult with the various marine stakeholders and the regulator, Transport Canada. In particular two recent meetings are of note:

1. A meeting with the Vice President, Operations of Seaspan was held on Friday 10 February 2017 at which agreement was reached on the design criteria for the north side fendering
2. A meeting with Transport Canada senior management in Vancouver on Friday 24th February 2017 at which Transport Canada supported the basis on which the design of the north side fendering was proceeding.

Refer to Appendices B and C regarding letter correspondence between Seaspan (in December 2016 and the City of Victoria (February 2017).

Next Steps
In moving forward to implement the procurement of the north side fendering, there are a number of considerations:

1. The City will want to use a competitive process to obtain the best value for money.
2. A number of different solutions would satisfy the requirements and the objective is to not limit the process to one particular design.
3. The steelwork for the bridge will be installed during September through November 2017 and that will significantly restrict access for others to install the fendering. The installation of the bridge steel must take priority.

SCHEDULE UPDATE
Consistent with the previous update to Council on December 8, 2016 the bridge is scheduled to be open to traffic by the end of December 2017 and project completion is scheduled for March 31, 2018. The critical elements for achieving schedule remain the ring structures and span support structures being fabricated in China.

In order to maintain schedule, PCL have now elected to install the span support structure to the rings in Victoria, rather than at ZTSS.

Financial Implications
Council approved $8.206 million in additional project funding from the Building and Infrastructure Reserve as part of the 2016 Financial Plan Bylaw on May 5, 2016, resulting in a current budget of $105.06 million (see Appendix D).

As of January 31, 2017 actual costs of $79.595 million have been incurred, including the following:

Vendor	Services	Budgeted	Invoiced	% Invoiced
MMM	**Main Professional Services Contract:** Project Management, design, procurement, administration, geotechnical engineering, permits	$ 9,362,377	$ 9,358,887	99.96%
MMM	**Additional Professional Services:** Subsequent changes to the contract such as: owner's quality control for steel fabrication; review of non-conformance reports; Hardesty & Hanover settlement payments; supplementary services; safety review; fendering,; Janion design; etc.	$ 2,464,748	$ 2,222,263	90.16%
PCL	**Main Bridge Contract:**	$ 63,235,000	$ 46,826,205	74.05%
PCL	**Additional Construction Services:** Subsequent changes to the contract such as: hazardous waste and soil removal; installation of rip rap; pedestrian overpass modifications; increase to the environmental cash allowance; precast girder gaskets; safety revisions; Janion Plaza, handrail changes etc.	$ 2,485,512	$ 2,291,575	92.20%

The table below summarizes the allocation of the approved project completion contingency (see Appendix E for a detailed account of the contingency):

Original Project Completion Contingency	$ 2,515,000
Add: Value Engineering Savings	300,000
Approved Funding March 2015	1,500,000
Approved Funding July 2015	2,554,000
Approved Funding May 2016	2,050,000
Project Completion Contingency January 2017	**$ 8,919,000**
Less Committed Contingency	(7,509,424)
Unallocated Contingency January 2017	**$ 1,409,576**

There will be two more planned project budget increase requests for fendering and public realm. Should additional unforeseen events occur before the completion of the project, Council will be advised.

BRIDGE MANAGEMENT UPDATE

JSB Project support staff are working on a bridge management program to capture administrative, operational, and maintenance procedures regarding the new bridge; once completed, these will be referenced by relevant (current and future) staff. The structure of the program has been developed; it covers the following:

- Asset description;
- Bridge administration;
- Operational programs and procedures;
- Maintenance programs and procedures;
- Security and safety;
- Upgrade, reconfiguration/modification;
- Replacement and disposal plans.

Administration of the bridge management program will be developed in house. Development of the operations and maintenance of the program will take place closer to the end of the project.

Staff are working on the details of the administration and operational sections of the program. The remaining section will be completed as the new bridge construction progresses and the bridge manual developed by the contractor.

PUBLIC REALM UPDATE

A conceptual design for the public realm areas surrounding the new Johnson Street Bridge was finalized by Connect Landscape Architecture on February 21, 2017. Staff are currently engaging a cost consultant to provide more detailed costing of the works to help inform future budget and phasing considerations. A separate report to present the Public Realm design will be brought forward to Committee of the Whole on April 13, 2017.

JANION DEVELOPMENT

Significant progress regarding the Janion plaza construction has been made, with completion anticipated for late March. The stairs leading from the Janion plaza, featured in the two images below, will allow access to the standby generator and will eventually connect to the David Foster Harbour Pathway, once that section of the pathway has been completed.

Image: stairs leading from Janion plaza between Janion building and new JSB

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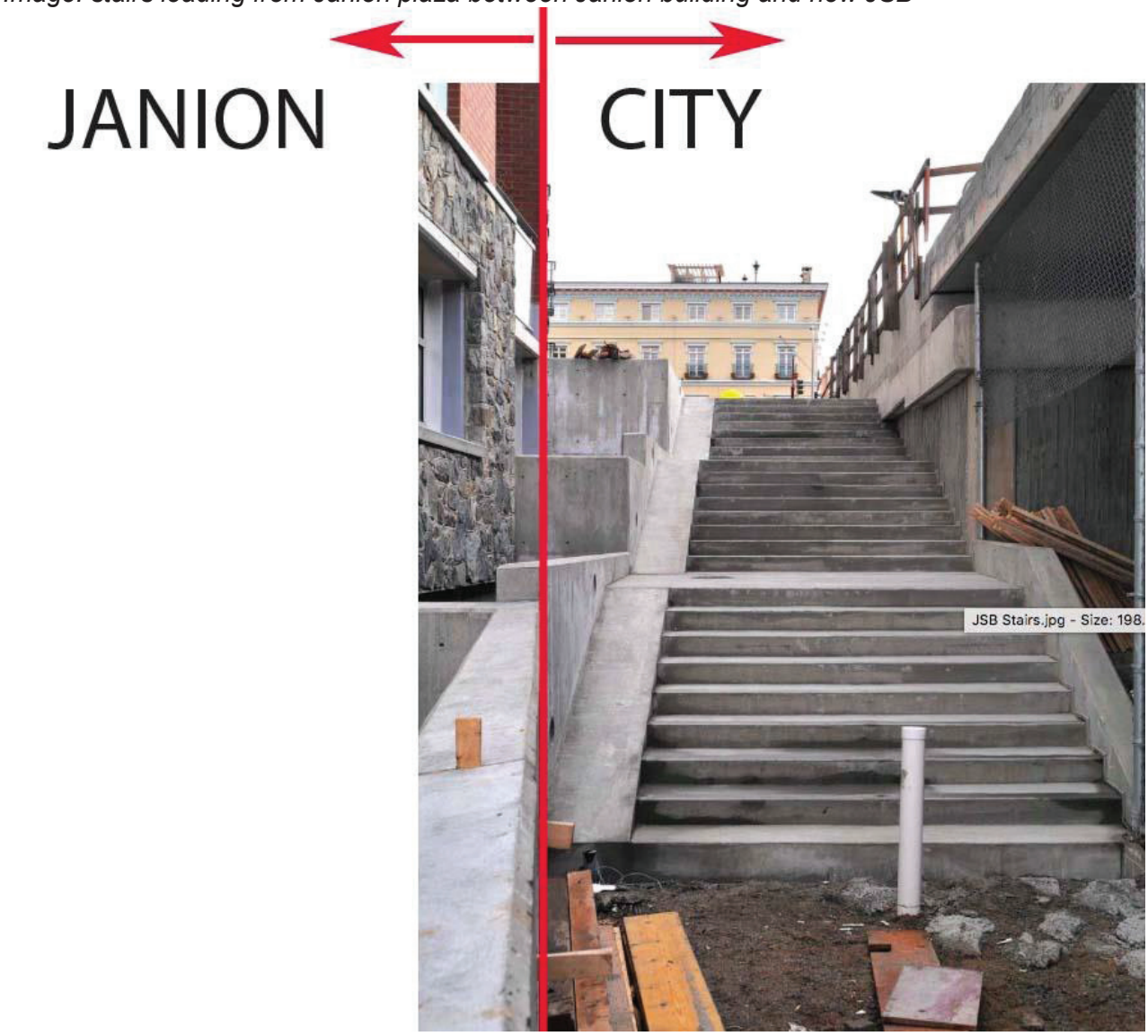

CITIZEN ENGAGEMENT UPDATE

Staff continue to stay in contact with businesses and stakeholders on the Vic West and Downtown sides of the project as well as harbour stakeholders. As construction continues to take place overseas, images are being posted on the bridge project website to help demonstrate the progress in steel fabrication. When safe, media opportunities have been accommodated on site to raise awareness and understanding about ongoing construction.

Throughout the project, staff have continued to maintain correspondence with stakeholders and media in an effort to keep the public informed about ongoing construction and answer questions about the bridge project.

SAFETY AND ENVIRONMENT

Environmental monitoring is being conducted by Hemmera field representatives on a regular basis. An archaeological monitor from Stantec and a First Nations representative are on-site during the excavation works at the west and east side of the Project.

UPDATE ON RISK MANAGEMENT

Effective risk management requires continuous monitoring and updating.

The primary risk issues, all of which have the potential to impact the project schedule, are as follows:

1. Completion of the steelwork fabrication at the ZTSS plant

The following are the primary risks being dealt with in China, specifically at the ZTSS plant:

a) Geometry – the steel components are now being assembled. Horizontal fit up took much longer than planned. ZTSS are now in vertical fit up which is more complex. The overall geometry must match the design. There are many factors that could cause the overall geometry to be unacceptable.
b) Painting – when the geometry is accepted the bridge will be taken apart, painted and shipped.

Weekly progress meetings regarding the steel fabrication occur with representatives from China, PCL, MMM, H&H and the City on the calls.

2. Steelwork Installation in Victoria

PCL have elected to move the assembly of the span support structure to the rings to a Victoria location, to better manage schedule and risk. A two day meeting with PCL, MMM, H&H and the City was recently held in Seattle to review all of the erection procedures.

3. Fendering

A more detailed discussion of the fendering work is presented elsewhere in the Quarterly Update. The following details the specific risks related to fendering which are being managed:

a) Budgetary – the cost of the north side fendering is likely to be significant. Risk management has focussed on:
    - Stakeholder consultation to determine a full range of options
    - Preparing a detailed understanding of marine operations
    - Ensuring all options are considered
    - Choosing a procurement strategy that focusses on value for money
b) Installation – the installation of the north side fendering could conflict with the main steel span erection from a schedule perspective
c) Approvals - Approvals from Environment Canada and Transport Canada will be required for the north approach. Approval requirements will depend on which fendering option is to be procured and if it has the potential to impact the Telus duct bank. Extended approval periods

may result depending on the complexities of the protection systems proposed for the Telus duct bank.

Next Steps

Priority tasks over the next three months include the following:

1. Continue to monitor steel fabrication by ZTSS in JingJiang as this is critical to achieving the current schedule;
2. Monitor the span support structure fabrication and installation by QuayQuip in Tianjin;
3. Resolve the north side fendering design issues and bring a report to Council regarding next steps;
4. Report on public realm progress at the April 13, 2017 Committee of the Whole meeting.

Respectfully submitted,

Jonathan Huggett, P. Eng.
Project Director

Report accepted and recommended by the City Manager: _____

Date: _____

List of Attachments

- Appendix A – Production Planning Progress Report from QuayQuip – March 3, 2017
- Appendix B – Seaspan Letter – December 13, 2016
- Appendix C – Letter to Seaspan from City of Victoria – February 14, 2017
- Appendix D – Budget Update
- Appendix E – Project Completion Contingency

Appendix A - Quay Quip Status Report - Span Support Structure

51556 PROGRESS REPORT 2017-03-03

960012385 10931-E4-NORTH TRUSS

ITEM	MACHINING DRAWING NO.	SECTION	WELDING DRAWING NO	QUANTITY	MATERIAL PROCUREMENT	RETESTING MATERIALS	MATERIAL PREPERATION	MATERIAL PREPERATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	MACHINING	TEST FITTING	CORROSION PROTCTION	READY FOR SHIPMENT
RACK&RAIL SEGMENT						COMPLETION	START	COMPLETION	START	ASSEMBLING	WELDING	STRESS RELIEF	INSPECTION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION
10931-23-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012366M-01	NORTH	960012366W-01	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/23	100% Finished	100% Finished	2017/01/13						
10931-22-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012373M-01	NORTH	960012373W-01	1	100% finished	100% finished	2016/10/20	100% finished	2016/11/29	100% Finished	100% Finished	2016/12/17						
10931-11-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374M-01	NORTH	960012374W-01	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/12	100% Finished	100% Finished	2017/01/13						
10931-11-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374M-02	NORTH	960012374W-02	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/15	100% Finished	100% Finished	2017/01/13						
10931-11-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374M-03	NORTH	960012374W-03	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/18	100% Finished	100% Finished	2017/01/21						
10931-11-1B-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374MB-01	NORTH	960012374W-04	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/21	100% Finished	100% Finished	2017/01/21						

ITEM	MACHINING DRAWING NO.	SECTION	WELDING DRAWING NO	QUANTITY	MATERIAL PROCUREMENT	RETESTING MATERIALS	MATERIAL PREPERATION	MATERIAL PREPERATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	MACHINING	TEST FITTING	CORROSION PROTCTION	READY FOR SHIPMENT
RACK&RAIL SEGMENT						COMPLETION	START	COMPLETION	START	ASSEMBLING	WELDING	STRESS RELIEF	INSPECTION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION
10931-16-1-RAIL SUPPORT SEGMENT-MACHINING	960012376MA-01	NORTH	960012376W-01	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/22	100% finished	100% Finished	2017/01/21						
10931-13-1-RAIL SUPPORT SEGMENT-MACHINING	960012376MB-01	NORTH	960012376W-02	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/29	100% finished	100% Finished	2017/02/22						
10931-14-1-RAIL SUPPORT SEGMENT-MACHINING	960012376MC-01	NORTH	960012376W-03	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/02	100% finished	100% Finished							
10931-16-1B-RAIL SUPPORT SEGMENT-MACHINING	960012394M-01	NORTH	960012394W-01	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/28	100% finished	100% finished	2017/01/21						
10931-16-1C-RAIL SUPPORT SEGMENT-MACHINING	960012394MB-01	NORTH	960012394W-02	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/03	100% finished	100% finished	2017/02/22						

960012416 10931-E3-SOUTH TRUSS

ITEM	MACHINING DRAWING NO.	SECTION	WELDING DRAWING NO	QUANTITY	MATERIAL PROCUREMENT	RETESTING MATERIALS	MATERIAL PREPERATION	MATERIAL PREPERATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	MACHINING	TEST FITTING	CORROSION PROTCTION	READY FOR SHIPMENT
RACK&RAIL SEGMENT						COMPLETION	START	COMPLETION	START	ASSEMBLING	WELDING	STRESS RELIEF	INSPECTION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION
10931-23-1B-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012366MB-01	SOUTH	960012366W-02	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/25	100% Finished	100% Finished							
10931-22-1B-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012373MB-01	SOUTH	960012373W-02	1	100% finished	100% finished	2016/10/20	100% finished	2016/12/25	100% Finished	100% Finished	2017/02/22						
10931-11-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374M-04	SOUTH	960012374W-05	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/05	100% Finished	100% Finished							
10931-11-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374M-05	SOUTH	960012374W-06	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/07	100% Finished	100% Finished							
10931-11-1-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374M-06	SOUTH	960012374W-07	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/07	100% Finished	100% Finished							
10931-11-1C-RACK&RAIL SUPPORT SEGMENT-MACHINING	960012374MC-01	SOUTH	960012374W-08	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/15	100% Finished	100% Finished							

ITEM	MACHINING DRAWING NO.	SECTION	WELDING DRAWING NO	QUANTITY	MATERIAL PROCUREMENT	RETESTING MATERIALS	MATERIAL PREPERATION	MATERIAL PREPERATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	FABRICATION	MACHINING	TEST FITTING	CORROSION PROTCTION	READY FOR SHIPMENT
RACK&RAIL SEGMENT						COMPLETION	START	COMPLETION	START	ASSEMBLING	WELDING	STRESS RELIEF	INSPECTION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION	ESTIMATED COMPLETION
10931-16-1-RAIL SUPPORT SEGMENT-MACHINING	960012376MA-02	SOUTH	960012376W-04	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/05	100% finished	100% Finished							
10931-13-1-RAIL SUPPORT SEGMENT-MACHINING	960012376MB-02	SOUTH	960012376W-05	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/05	100% finished	100% Finished	2017/02/22						
10931-14-1-RAIL SUPPORT SEGMENT-1MACHINING	960012376MC-02	SOUTH	960012376W-06	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/05	100% finished	100% Finished							
10931-16-1B-RAIL SUPPORT SEGMENT-MACHINING	960012394M-02	SOUTH	960012394W-03	1	100% finished	100% finished	2016/10/20	100% finished	2014/01/06	100% finished	100% Finished							
10931-16-1C-RAIL SUPPORT SEGMENT-MACHINING	960012394MB-02	SOUTH	960012394W-04	1	100% finished	100% finished	2016/10/20	100% finished	2017/01/15	100% finished	100% finished	2017/02/22						

Appendix B - December 13, 2016 Letter from Seaspan

Seaspan Marine Corporation
10 Pemberton Avenue
North Vancouver, BC V7P 2R1
Canada

(604) 988-3111
(604) 984-1613 fax
www.seaspan.com

December 13, 2016.

Taaj Daliran
Victoria City Hall Engineering
1 Centennial Square
Victoria, BC. V8W 1P6

Dear Mr. Daliran,

I am writing this letter in reference to the Johnson Street Bridge Fendering System Basis of Design Report Project No. 21285R October 2016 produced by WSP Parsons Brinckerhoff.

I was provided a copy of this report by Mr. Kevin Ashley from our Seaspan Victoria Office. Mr. Ashley and Captain Brent Biggins, a Port Captain out of our Vancouver Office participated in the simulations study of transits through the Johnson Street Bridge performed at Pacific Maritime Institute (PMI) in Seattle.

Seaspan has serious concern regarding Section 3.4 Design Towing Velocity and the conclusions in Section 6 to limit the transits speed to 3.5 knots for loaded barges and 4.5 knots for empty barges. It is our position that restricting the speeds to lessen design criteria of the fender construction over using Master's discretion to transit at variable speed required to safely control the tow increases the risk of an allision with the bridge. A point not previously mentioned is the City has effectively doubled the length of the bridge transits with the decision to leave the abutments of the old bridge in place when the new bridge comes into service. This doubling of the transit distance in combination with the speed limits proposed undermines safety rather than enhances it. The opinion of the Fendering System Report to introduce a maximum speed also contradicts the "Comments About Safe Speed" in the Summary Conclusions on Page 52-53 of the PMI Simulations Study.

Our Tug Masters have on average 26 years' experience in their capacity. They do not take un-necessary risk nor speed to get a job done faster. They use their knowledge and experience to safely move barges through bridges at speeds safe to keep the tow in control. Taking this ability away will increase the risk and liability to our Company and in our opinion make performing these tows unsafe. Given these circumstances, we will have to curtail barge service to businesses above the bridge and cease performing bridge assists to other operators.

I am requesting the City reconsider their position to seek a reduce speed limit from Transport Canada and the Victoria Harbour Master.

Sincerely,

Paul Hilder
VP Marine Operations

Cc. Victoria City Mayor
Victoria City Manager
Victoria City Council
Victoria Harbour Master
Victoria City Engineering Department
Kevin Ashley, Superintendent Marine Operations Seaspan Victoria

Appendix C - February 14, 2017 Letter Response to Seaspan from CoV

Engineering and Public Works Department

#1 Centennial Square
Victoria
British Columbia
V8W 1P6

Tel: 250-361-0300
Fax: 250-361-0311

www.victoria.ca

February 14, 2017

Seaspan Marine Corporation
10 Pemberton Avenue
North Vancouver, BC V7P 2R1

Attention: Paul Hilder, Vice President Operations

Dear Mr. Hilder:

RE: Johnson Street Bridge Fendering

I have waited responding to your letter to the City of 13 December 2016 until we had a chance to meet face to face to discuss your concerns regarding the Johnson Street Bridge Fendering System, Basis of Design. Thank you for meeting with Angus English of MMM and myself on Friday 10th February. We also much appreciate the continued input of Capt. Brent Biggins at our meeting and the ongoing discussions with Kevin Ashley.

As we discussed the remaining part of the fendering system to resolve is the north side protection for the east bascule pier and the west rest pier. This protection is required to deal with outbound marine traffic from the upper harbour. The City intends to leave the existing bridge piers in place on the south side of the new bridge to act as crash protection in that location. In-channel fendering has already been installed for the rest pier and the bascule pier. In dealing with the north side fendering design, the City has put the safety of the travelling public as its highest priority together with ensuring safe access for marine traffic. The City is very grateful for the ongoing and valuable input of Seaspan staff in coming to a prudent solution to protect the north side of the new bridge.

Both Mr. Ashley and Capt. Biggins participated in the simulation exercises for marine traffic in Seattle in May 2016 and their expertise was invaluable. The City needs to ensure safety of the new bridge, but it also does not want to waste money on unnecessary work. During our meeting we came to a common understanding regarding the design criteria. It is clear that Seaspan has outstanding experience in the operation of barge traffic, particularly in this location. To that end, the input of Seaspan captains was very helpful on the issues surrounding safe passage. We discussed the speed limit in the harbour being 5 knots and agreed that does not necessarily mean that the north side fendering should be designed for a 5 knot head on impact. We also agree that imposing local speed limits below the harbor speed limit through the bridge is not necessary since slower speeds may sometimes be necessary for safe passage depending on the conditions - but judgment of the safe speed is best left to experienced Captains.

The City therefore intends to design the north side fendering for a design speed of 3.5 knots with a head on collision as a worst case. We both agreed this is a prudent course of action. The City has now asked MMM to proceed to design the north side fendering and produce concepts that we will continue to refine with Seaspan and other marine stakeholder input.

Once again the City is committed to working with Seaspan and other marine user stakeholders to come to an appropriate and prudent recommendation to put before City Council for approval

Yours truly,

Jonathan R Huggett, P.Eng.
Project Director Johnson Street Bridge Project, City of Victoria

c. Mariah McCooey, Victoria Harbour Master
Malcolm Fiander, Ledcor,
Ian Maxwell, Ralmax
City Manager,

Appendix D - Budget Update

Budget Update	Adjusted Budget	Actuals (Jan 31, 2017)	Remaining Budget
Project Component			
Professional Services			
Design Management, Design & Contract Administration	10.884	10.763	0.121
Design Consultant Optimization	0.250	0.250	-
Development Costs to End 2010	1.333	1.333	-
Approvals & Permitting	1.129	1.125	0.003
Legal/Procurement	2.845	2.489	0.356
Additional Professional Service Costs	2.160	1.726	0.434
Subtotal	18.601	17.687	0.914
Construction Costs			
Main Bridge Contract	62.935	46.826	16.109
Additional Construction Costs	2.786	2.292	0.494
Subtotal	65.721	49.118	16.603
General Construction			
Early Marine Works, Rail Bascule Removal	2.431	2.431	-
Insurance	2.252	1.476	0.776
TELUS Duct Relocation	1.635	1.635	-
BC Hydro Works	1.293	0.891	0.402
Additional General Construction Costs	1.701	0.060	1.641
Subtotal	9.312	6.493	2.819
City Costs	2.936	2.063	0.873
Unallocated Contingency	1.410	-	1.410
Property	1.000	0.997	0.003
Finance Fees	1.000	0.249	0.751
Value Added Tax (HST/PST)	2.619	1.530	1.089
Settlement Agreement	2.462	1.458	1.004
Total	105.060	79.595	25.465

Original Project Completion Contingency		$ 2,515,000
Add: Value Engineering Savings - Shortening of East End Span		300,000
Approved Funding March 2015		1,500,000
Approved Funding July 2015		2,554,000
Approved Funding May 2016		2,050,000
Project Completion Contingency January 31, 2017		**$ 8,919,000**
	Actuals at Jan 31, 2017	**Committed January 2017**
Professional Service Costs		
Professional Consulting Services	$ 1,447,777	$ 1,816,439
Fendering Review	166,924	175,139
Legal Fees	1,331,680	1,711,506
Mediator Fees	43,220	100,000
Construction Costs		
Additional Main Bridge Contract Costs	1,928,496	2,400,972
BC Hydro Work	587,078	587,078
Additional General Construction Costs	49,917	51,160
Insurance	-	70,892
City Costs	595,289	596,238
Totals:	**$ 6,150,380**	**$ 7,509,424**
Remaining Unallocated Contingency		**$ 1,409,576**
		$ 8,919,000