MINISTRY OF TRANSPORTATION

KINSOL TRESTLE

REVIEW OF REPORT & PROPOSED TIMBER TRESTLE RECONSTRUCTION

Prepared by:
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Ministry of Transportation
3rd Floor – 2100 Labieux Road
Nanaimo, BC V9T 6E9

Attention: Martin Menzel, P.Eng.

Re: Kinsol Trestle
Review of Report and Proposed Timber Trestle Reconstruction

We are pleased to submit our review of the Kinsol timber trestle report and reconstruction method proposed by Klett Consulting Services Inc (KCS).

Our findings are incorporated into this report, which includes discussions on accuracy, any overlooked issues, potential modifications to the design and the risks associated with leaving the structure in its present condition.

Two contractors were approached to provide more accurate cost estimates for both dismantling and reconstructing the trestle to its original design specifications and to the modified design proposed by KCS.

Yours very truly,

Per:
J.G.McCall, P.Eng.
McCALL ENGINEERING LTD.

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1. INTRODUCTION

Kinsol Trestle Facts:

- Located on the historic CN Railway right-of-way (now the Trans Canada Trail) north of Shawnigan Lake & 51.1 miles from Victoria;
- Largest railway trestle of its kind in the British Commonwealth;
- Construction began in 1911 but was not completed until 1920. It has been altered and modified many times since the original construction;
- Named after nearby King Solomon's (Abbreviated to Kinsol) copper mine which was abandoned in 1907;
- Only passenger train to use the trestle was for a tour by a convention of model railway builders in 1954;
- Last used on May 30, 1979 by the CN1000 Extra West diesel locomotive;
- Officially abandoned on June 30, 1979;
- Measures 615 feet (187m) in length;
- Spans the Koksilah River at an elevation of 125 feet (38.1m)
- The alignment is a horizontal curve of 7.0 degrees left;

Objective:

- Restore the Kinsol Trestle to become part of the Vancouver Island's Trans Canada link between Victoria and Nanaimo;
- Provide safe access for pedestrian, cyclist, equestrian and light service & maintenance vehicles;

This Report is written in response to a request by the Ministry of Transportation (**MoT**) to review the work previously carried out by Klett Consulting Services Inc. (**KCS**) on the Kinsol Trestle and to suggest improvements or modification to their assessment.

McCall Engineering prepared the Report solely for the use of the **MoT**.

2. REVIEW OF EXISTING REPORTS AND DOCUMENTS

We have reviewed the following documents and reports:

a. "Preliminary Bridge Inspection Report" – by John F. Unsworth, P.Eng.

b. Drawings #101 to #134 & #140 (The Howe Truss Rehabilitation Drawings #135 to #137 have not been done) - Prepared by KCS;

c. "Kinsol Trestle Reconstruction Technical Specifications for Construction" - Prepared by Cowichan Valley Regional District (CVRD);

d. "Preliminary Ecological Resources Assessment and Regulatory Review" – Prepared by Jacques Whitford Ltd.;

e. "Preliminary Geotechnical Assessment" – By Jaques Whitford Ltd.;

a. Prior to receiving this report, we made a visual inspection of the Kinsol Trestle and concluded that the existing trestle structure had deteriorated to a stage that it was no longer economically viable to repair. However, we did think that the 6 Howe Trusses spanning the Koksilah River were in good condition and could be brought back to a sound structural condition. (This has still to be proved by a detailed inspection) The concrete foundations also appeared to be in good condition but again a more detailed inspection is required.

We also quickly realised that it would not be necessary to build the trestle to its original specifications as the proposed loading (pedestrian, cylists, equestrian and maintenance vehicles) would be much lighter than locomotive loadings. To keep the same aesthetic appearance as the old trestle structure we could build the bents to the same shape as the existing trestle but remove every second bent.

This in essence is what John Unsworth has concluded in his report.

b. We reviewed the "Timber Trestle Reconstruction" drawings produced by KCS and found them to be very well detailed and well laid out and liked the fact that the timber material lists and hardware lists were included with each drawing.

We would have preferred that the wood preservative treatment be different than that specified in the "General Notes and Material Specifications":

We would suggest that the creosote treatment for all the main timber members be changed from creosote to ACZA (Chemonite) for the following reasons:

- Extract from Fisheries & Oceans guidelines "For most estuarine and all freshwater installations the use of alternatives to creosote is recommended";

- Creosote is a fire accelerant;
- ACZA is as good a preservative as creosote but has the added advantage of being very leach resistant and is slightly more difficult to ignite than untreated lumber.

We would also suggest that the treatment of the handrail components and the plank decking be changed from ACQ-B to ACZA for the following reasons:

- Most of the Trans Canada Trail decks and handrails are using ACZA;
- ACQ-B is not registered for use in Canada;

Information about Chemonite ACZA is included in Appendix B "Facts about Chemonite (ACZA) Treated Wood".

c. We found that the Technical Specifications were comprehensive and we agreed with the contents. (Other than the Preservation Treatment of the timbers)

d. The Preliminary Ecological Resource Assessment and Regulatory Review report appears to be well thought out and the findings indicate that there are 2 potential environmental constraints to the development.

- "The proximity to the Koksilah River could be a constraint as any work in or around a watercourse requires provincial authorization under Part 7 of the Water Regulation, and any alteration, disturbance or destruction to fish habitat requires a Fisheries Act Section 35 approval from DFO."
- "The identification of woodland penstemon adjacent to the Project Site may be a constraint to the project, however, with proper mitigation and/or compensation, the issue of biodiversity preservation can be resolved. With respect to wildlife and wildlife habitat, bird nests and breading birds are likely the primary constraint, and can be mitigated by ensuring that clearing takes place outside of the local bird breading window." (Breading season March 1 to July 31)

e. The Preliminary Geotechnical Assessment prepared by Jacques Whitford Ltd. Makes the following conclusions and recommendations:

- The local ground is suitable for the construction of the proposed replacement trestle (allowable bearing pressure 150kPa on soil and 750kPa on rock) and the existing concrete foundations should be suitable for reuse to support the replacement structure. (compressive strength still to be checked)
- Dismantle the existing mudsills and crib walls and replace with poured concrete foundations placed on prepared fill surface or founded on the shallow bedrock surface.
- Slope stability should be OK as deep seated failure is unlikely on either slope; Foundations on the south side should be pinned to the competent bedrock;

3. DISCUSS ACCURACY OF COSTS

We have created a spreadsheet which shows KCL's cost estimate and the estimates we received from 2 independent contractors we hired for the purpose.

New Proposed Structure

As can be seen the total cost of the project does not change appreciably between the three estimates but the price for individual items in some instances vary a lot. What is significant is how close the two contractors are in their estimates for the individual items and the final total. This suggests that KCL may have underestimated the cost of the timber and overestimated the cost of the removal of the existing structure.

Mainroad's estimate for the removal of the existing structure is higher than that of Forbes Industrial's estimate. I have been informed by Forbes that an allowance for the salvage value of the timbers is reflected in their cost. If the demolition was carried out as a separate contract the cost between the 2 contractors might well be very close as the mobilization & demobilization costs would be distributed quite differently. It is our considered opinion that the cost of the demolition if it was tendered as a separate contract would be in the order of $450,000. (Assuming machinery is allowed into the site)

KLC have based their pricing on the Myra Canyon projects but we consider that the rates for Kinsol should be lower for the following reasons:

- Access to the site is much better for the Kinsol Trestle;
- If the work is done over the winter months the chances are that there will be less time wasted on ice and snow removal;
- Delivery costs should be less;
- If we allow machinery into the site the labour costs should be less;

This reduction in rates is reflected in the Contractor's total estimates, which are approximately $400,000 less than the KLC estimate.

Replace as Existing Structure

We don't think that anyone is seriously thinking of replacing the existing structure to the same specifications that the original trestle was constructed. What is interesting in this cost exercise is the cost savings that can be achieved by adopting the new proposed modified trestle.

Again the total cost of the project does not change appreciably between the three estimates and the conclusions reached above apply equally to the new proposed trestle.

4. POTENTIAL WAYS TO MODIFY DESIGN, CONSTRUCTION OR DEMOLITION

1. Design

The Kinsol trestle is historically very important as it is purported to be the largest trestle in the British Commonwealth. It is important that any improvements to the structure retain the overall look of the existing structure. To this end the proposed structure fits this criterion as it is on the same alignment, has the same overall appearance as the existing, uses the same materials and is at the same elevation as the existing. There is no other form of structure or material that will create a product that fits the stipulated end result.

2. Construction

A similar project is being undertaken at the present time in the Okanagan, where the Myra Canyon Trestles, which had been destroyed during a devastating forest fire, are being constructed by two contractors: namely 'Surespan Construction Ltd' and 'Seismic 2000 Construction Ltd'.

'Surespan's' approach to the erection of the new trestle structures has been to use an overhead cable structure to transport individual pieces of timber and connect them together at each bent location.

'Seismic 2000's' approach to the construction of the trestles was to have a very large work area for prefabricating the individual modules (a module is generally 20' in height) of the bents. The base module is erected on the concrete foundations and the bent is completed by sequential erection and field bolting of subsequent modules. Following erection of each bent, longitudinal bracing, longitudinal girts, stringers and diaphragms are installed.

The feedback from the Myra Canyon project is that the 'Seismic 2000's' approach is the fastest and best way to tackle this kind of project. To be fair to 'Surespan' they had a much more restricted site and did not have the luxury of a large work area.

3. Demolition

The demolition of the existing Kinsol trestle bents will be a challenging task for 3 main reasons:

- The individual bents will be very unstable as the timber members and connections making up the bents are so badly deteriorated. We would suggest that the bents be demolished in groups to maintain some degree of stability during demolition. The contractor should work from one end of the trestle and work toward the other end in a reversal of the erection procedure. The group of bents should firstly be isolated from the remainder of the trestle and demolished carefully by toppling them away from the remaining structure. The debris should then be removed prior to demolishing the next set of bents.
- Another challenge will be demolishing the bents supported by the Howe Trusses without damaging the trusses themselves. The bents for this section will need to be demolished in smaller sections than the rest of the trestle. Sections can be hooked on to a crane and lifted out taking care that no debris falls on workmen below.

- The final challenge will be to prevent debris falling into the Koksilah River during the demolition process and satisfying the environment monitors that the work progresses with minimal impact on the environment.

5. OVERLOOKED ISSUES

1. Historical Artefacts

At the Myra Canyon project the Contractors are not allowed to use machinery within the job site in an effort to retain the old bolts and debris from the original project. This has meant that each excavation has to be dug by hand. Most of these 'artefacts' will not be visible form the height of the trestle walkway in any case.

This stipulation should not be part of this project's specifications as the cost would be significant for an undertaking of this magnitude.

2. Access road

Every effort should be made to allow machinery access for the dismantling and construction of the Kinsol Trestle. An access road could be constructed on the north side from the old railway grade down to the edge of the Koksilah River. If machinery is banned from the site the above costs discussed in section 4 will be significantly higher. The parameters for the construction of this road should be worked out and included in the contract documents. There appears to be no major environment reason for banning machinery from the site.

2. Disposal of the demolished timbers

Will the contractor be allowed to burn the demolished timbers on site? The answer to this question should be stipulated in the contract documents. Most of the timbers from the original project are untreated so disposal by burning is a possibility. Some of the timbers will be salvageable and the fact that they are untreated will allow a sawmill to mill other sections out of the old wood.

6. RISKS ASSOCIATED WITH LEAVING EXISTING STRUCTURE IN ITS PRESENT CONDITION & DISCUSS ANY MITIGATING PROCEDURES

The biggest threat to the Kinsol trestle would be if it were to experience hurricane force winds or if we had a significant seismic event in the lower half of Vancouver Island. Should the structure experience such forces the danger would not only be to anyone in the immediate vicinity of the structure being killed but if the Howe Trusses spanning the Koksilah River were destroyed in the process.

There is no way to actually analyse the structure for the aforementioned forces as everything would be a guess as to the extent of the rot in the existing timber members. As previously pointed out the trestle is in very poor condition with some or all of the following defects evident at each bent:

- Many posts exhibit advanced decay and in some instances the ends don't exist;
- Most sills exhibit advance decay;
- Most of the bracing members are checked, split, decayed and/or broken – especially on the outside faces of the trestle;
- The areas around the many fasteners show evidence of decay to varying degrees;
- Some timber mudsills (north end especially) are decayed and rotten.

Other than a major event as mentioned above there are still risks associated with leaving the trestle in its present condition for the following reasons:

- Individual members could fall at any time on anyone unfortunate enough to be underneath the trestle at the time;
- There is still the danger from fire destroying the trestle as happened in the Okanagan in Myra Canyon. There is no access to the trestle to fight a fire and it could only be tackled safely from the air. This structure has already experienced fire damage in three locations.
- It is much easier for vandals to damage members that are already showing signs of distress with very poor rotted connections;

The only way to mitigate this would be to repair the most damaged members. This process would be very costly and there would be a great element of risk on the part of the contractor undertaking such an enterprise. By hammering and manoeuvring the damaged members from the structure during the repair process one might precipitate a section of trestle from being dislodged above the workmen and creating a falling hazard. This would be a huge undertaking and in our opinion will only be postponing the inevitable.

7. RECOMMENDATIONS

Knowing that the Kinsol Trestle is in very poor condition and living in a world of ever-increasing litigation and damage awards, we recommend that the **MoT** take the following course of action:

- Demolish the existing trestle (except the Howe trusses spanning the Koksilah River) and remove all the debris from the site. Ensure that the Contract Documents for the demotion are written with all the necessary safeguards for protection of the environment but allow for machinery access to the site. Do not provide any access over the Howe Trusses.

- Inspect the remaining trusses for damage and repair as necessary. Consider using a fumigant fungicide, such as 'TimberFume' to prevent fungal deterioration especially at the joint areas of the trusses.

- Actively encourage that the new modified trestle be built as soon as possible using the design drawings and specification previously prepared by **KCS**.

- Prior to the award of contract for the demolition of the trestle ensure that there is sufficient signage warning the public of the potential hazard from falling timbers – especially along the path on the north side of the trestle.

APPENDIX 1

General Arrangement Drawings

APPENDIX 2

Contractor’s Estimates & Spreadsheets

APPENDIX 3

Facts about Chemonite (ACZA) Treated Wood