Report



Government of Yukon

Yukon Government - Energy, Mines & Resources

Load Rating of Mount Nansen Bridge at Diversion Channel

Final Report (Rev 1)

March 2012



ASSOCIATED ENGINEERING	٦
	.
QUALITY MANAGEMENT SIGN-OFF	1
Signature alfull	-
Date. 0 23-Mar-2012	
	_

#06-12-018

CONFIDENTIALITY AND © COPYRIGHT

This document is for the sole use of the addressee and Associated Engineering (B.C.) Ltd. The document contains proprietary and confidential information that shall not be reproduced in any manner or disclosed to or discussed with any other parties without the express written permission of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd. Information in this document is to be considered the intellectual property of Associated Engineering (B.C.) Ltd.

This report was prepared by Associated Engineering (B.C.) Ltd. for the account of Government of Yukon. The material in it reflects Associated Engineering (B.C.) Ltd.'s best judgement, in light of the information available to it, at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Associated Engineering (B.C.) Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

REPORT

Table of Contents

SECTIO	ON		PAGE NO.
Table o	of Cont	ents	i
1	Execu	itive Summary	1
2	Descr	iption of Structure	1
3	Asses	ssment Criteria	2
	3.1 3.2	Design Criteria Assessment Vehicles	2 2
4	Rating	g Procedure and Assumptions	4
5	Evalu	ation Results	5
6	Concl	usions	5
7	Closu	re	6
Appen	dix A -	Load Rating Summary	1
Appen	dix B -	Alternative Assessment Vehicles	1
Appen	dix C -	Mount Nansen Bridge Drawings	1



This page intentionally blank. Formatted for double-sided printing.

REPORT

1 Executive Summary

Associated Engineering (AE) was retained by the Yukon Government to complete the load rating of the Mount Nansen Bridge. This 9.4 m single-span, simply-supported bridge was rehabilitated in 2011. Three steel W-beam girders and a timber deck form the superstructure, which is supported on lock block abutments. An elevation of the bridge is shown on the cover page. This report presents the findings of the structural analysis and load rating evaluation of the bridge.

We completed the load rating in accordance with the CAN/CSA-S6-06 Canadian Highway Bridge Design Code (CHBDC). We assessed the bridge based on the CL-625-ONT vehicle, and three alternate assessment vehicles: a CAT 329E Hydraulic Excavator, a CAT D6T Track-Type Tractor, and a Ford F-550 Flat Bed Truck.

The structural evaluation was carried out using in-house software designed for industrial bridges. We performed the analysis in accordance with CHBDC, Section 14 - Evaluation.

The assessment has confirmed that the Mount Nansen Bridge has adequate capacity to carry the CL-635-ONT truck and the alternate assessment vehicles.

No bridge strengthening is required. However, we recommend radiography testing (RT) of the fullpenetration butt welds at the mid-span of the girders, to confirm their integrity. Our load rating calculations are based on the assumption that the weld splices are adequate to develop the full capacity of the girders.

2 Description of Structure

Key features of the Mount Nansen Bridge are as follows:

- The Mount Nansen utility bridge provides access to the tailings dam at the abandoned Mount Nansen gold and silver mine, which is 60 km west of Carmacks and 180 km north of Whitehorse.
- It is a 9.4 m long, single-span, simply-supported bridge comprising three steel girders and a timber deck.
- The clear width of the deck between the wheel guards is 3.302 m.
- The bridge was rehabilitated in 2011 with new abutments and timber decking repairs.
- The record drawings were available to us. The record drawings for the bridge are included in **Appendix C** of this report.



3 Assessment Criteria

The following criteria have been used to load rate the bridge:

3.1 Design Criteria

- The load rating was conducted in accordance with the CHBDC, CAN/CSA-S6-06.
- Rating factors were determined in accordance with CHBDC, Section 14 Evaluation.
- Capacity of the existing steel members was determined in accordance with CHBDC, Section 10 - Steel Structures.
- The Inspection Category is INSP2. CSA-S6-06 Clause 14.12.4(b) reads as follows: "Inspection Level INSP2, where inspection is to the satisfaction of the evaluator, with the results of each inspection recorded and available to the evaluator". The evaluation report dated October 2011 was available to the evaluator.
- Normal traffic and Normal traffic (alternative loading) load factors are applicable to the load effects from the CL-625-ONT trucks and alternate vehicles, respectively.
- Highway Class D applies to this road; however, it does not influence the magnitude of the lane loading due to the dimensions of the bridge.
- Reliability indices are based on CHBDC Table 14.5 for normal traffic.
- For the purposes of CHBDC Clause 14.12.5, the structure is not considered as "important", and the typical live load factors are therefore not increased further.
- Serviceability and fatigue limit state checks are not required for the Assessment Vehicles, in accordance with Section 14 of CHBDC.

3.2 Assessment Vehicles

The assessment vehicles requested by the Yukon Government are:

- CL-625-ONT (63,500 kg gross weight).
- CAT 330 Hydraulic Excavator (31,289 kg gross weight).
- CAT D6 Track-Type Tractor (23,119 kg gross weight).
- Ford F-550 Flat-Bed Truck (7,937 kg gross weight).

The CL-625-ONT is defined in CHBDC Section 3. The remaining vehicles required the following assumptions:

• There are no longer CAT 330 Hydraulic Excavators in production and the specifications are not readily available. Accordingly, we completed the assessment based on the CAT 329E Hydraulic Excavator. Of the various options for this vehicle, we selected the options that provided the most demanding load on the structure.

- There are several models of CAT D6 that vary greatly in dimension and weight. We completed the assessment based on the CAT D6T Track-Type Tractor, which is the heaviest of all of the models.
- There are several variations of the Ford F-550 Truck that vary in Gross Vehicle Weight Rating (GVWR), payload capacity, and wheelbase. We completed the assessment assuming the shortest available wheelbase, and the largest GVWR. We assumed the rear axle supports the full payload, and the net vehicle weight is divided equally between the front and rear axles.

For the detailed description of the Assessment Vehicles refer to Appendix B of this report.

Given the length and width of the bridge, we assumed single-lane loading with one vehicle at a time for all Assessment Vehicles.



4 Rating Procedure and Assumptions

The following methodology and assumptions were used for the evaluation:

- Member sizes and the geometry of the spans were taken from the existing drawings, some of which are included in **Appendix C**.
- The minimum yield strength of the structural steel of the bridge is 250 MPa. This is in agreement with the recommended steel grade specified in CHBDC.
- The structural evaluation was carried out using in-house software designed for industrial bridges.
- We ignored the contribution of the centre girder to the capacity of the bridge as the stiffness of the existing diaphragms is negligible, and does not achieve any redistribution of forces between girders.
- Multiple analyses have been performed for the various Loading Conditions in accordance with CHBDC, Section 14 Evaluation.
- We did not rate the bridge substructure or timber deck.
- As mentioned in the inspection report from November 18, 2011, each girder has a complete penetration butt-welded splice with a poorly welded cover plate. The reason for the cover plate is unknown, but does raise questions of why it was installed. For the purposes of this load rating, we assumed the splices are sufficient to develop the full capacity of the girders. RT is recommended to confirm the integrity of the original butt-welds.
- As the girder is a Class 1 rolled I-section, we have taken advantage of the plastic section properties in our calculations, instead of the elastic section properties for which the girders would have originally been designed. Figure 1 illustrates the advantage of using the plastic stress distribution, and shows (i) the elastic stress distribution, (ii) the plastic stress distribution, and (iii) the plastic stress distribution with combined shear, respectively:



Figure 1 Section Stress Distribution

5 Evaluation Results

The load rating summary page is shown in Appendix A.

Live Load Capacity Factors (LLCF) are shown on the bottom of the tables.

The LLCF is defined as:

 $LLCF = \frac{Factored Capacity - Factored Dead Load Effect}{Factored Live Load Effect}$

LLCF greater than unity indicates adequate capacity of the member for the live load effect assessed.

6 Conclusions

The bridge is suitable for all of the assessment vehicles, assuming a speed restriction of 10 km/hr for the tracked vehicles. The CL-625-ONT and Ford F-550 vehicles travelling at unrestricted speeds result in LLCFs greater than unity. We assume that the Alternate Loading assessment vehicles are reasonable representations of the equipment to be used on site. This assessment is also based on the assumption that the welded splices are adequate to develop the full strength of the girders. We recommend RT testing of the welds.



7 Closure

The services provided by Associated Engineering in preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession practicing under similar conditions. No other warranty expressed or implied is made.

Prepared by:

Reviewed by:

Michaela Horner, EIT Bridge Engineer

MH/CS/mc

SCHAPEB 27629 larch 2012 22

Craig Schaper, P.E., P.Eng. Project Manager / Senior Bridge Engineer



Appendix A - Load Rating Summary



This page intentionally blank. Formatted for double-sided printing.



Load Rating Summary: Mount Nansen Bridge Load Condition 1: CL-625-ONT (625 KN) with Normal Traffic

Location	Exterior Girder	Exterior Girder
Mode	Flexural	Shear
Dynamic Load Allowance	0,3	0,25
Transitory Loads	Normal	Normal
Resistance Adjustment Factor R	0.96	1.02
System Bahavior Category	S2	S2
Element Behavior Category	E3	E3
Inspection Level	INSP2	INSP2
Target Reliability Index (β)	3	3
Dead Load Factor (D1)	1.07	1.07
Dead Load Factor (D2)	1.14	1.14
Live Load Factor (Normal)	1.49	1.49
Factored Dead Load	46 kN-m	20 kN
Factored Live Load	652 kN-m	304 kN
Factored Capacity	806 kN-m	756 kN
LLCF APEX Custom Trailer	1.12	2.47
Assessor	Michaela Horner	Michaela Horner
Assessor Signature	£Q.s	Eas
Checker	Craig Schaper	Craig Schaper
Checker Signature	les	65



Load Rating Summary: Mount Nansen Bridge Load Condition 2: 330 CAT (307 KN) with Normal Traffic (Alternative Loading)

Location	Exterior Girder	Exterior Girder
Mode	Flexural	Shear
Dynamic Load Allowance	0.3	0.3
Transitory Loads	Normal (Alternative Loading)	Normal (Alternative Loading)
Resistance Adjustment Factor R	0.96	1.02
System Bahavior Category	<mark>S</mark> 2	S2
Element Behavior Category	E3	E3
Inspection Level	INSP2	INSP2
Target Reliability Index (β)	3	3
Dead Load Factor (D1)	1.07	1.07
Dead Load Factor (D2)	1.14	1.14
Live Load Factor (Normal)	1.75	1.49
Factored Dead Load	46 kN-m	20 kN
Factored Live Load	646 kN-m	240 kN
Factored Capacity	806 kN-m	756 kN
LLCF APEX Custom Trailer	1.13	3.13
Assessor	Michaela Horner	Michaela Horner
Assessor Signature	2Qus	. Des
Checker	Craig Schaper	Craig Schaper
Checker Signature	bs	bs



Load Rating Summary: Mount Nansen Bridge Load Condition 3: D6T CAT (227 KN) with Normal Traffic (Alternative Loading)

Location	Exterior Girder	Exterior Girder
Mode	Flexural	Shear
Dynamic Load Allowance	0.3	0.3
Transitory Loads	Normal (Alternative Loading)	Normal (Alternative Loading)
Resistance Adjustment Factor R	0.96	1.02
System Bahavior Category	S2	S2
Element Behavior Category	E3	E3
Inspection Level	INSP2	INSP2
Target Reliability Index (β)	3	3
Dead Load Factor (D1)	1.07	1.07
Dead Load Factor (D2)	1.14	1.14
Live Load Factor (Normal)	2.00	1.49
Factored Dead Load	46 kN-m	20 kN
Factored Live Load	546 kN-m	178 kN
Factored Capacity	806 kN-m	756 kN
LLCF APEX Custom Trailer	1.33	4.22
Assessor	Michaela Horner	Michaela Horner
Assessor Signature	2045	50.s
Checker	Craig Schaper	Craig Schaper
Checker Signature	bs	bs



Load Rating Summary: Mount Nansen Bridge Load Condition 4: Ford F-550 (79 KN) with Normal Traffic (Alternative Loading)

Location	Exterior Girder	Exterior Girder
Mode	Flexural	Shear
Dynamic Load Allowance	0.3	0.3
Transitory Loads	Normal (Alternative Loading)	Normal (Alternative Loading)
Resistance Adjustment Factor R	0.96	1.02
System Bahavior Category	<mark>S2</mark>	S2
Element Behavior Category	E3	E3
Inspection Level	INSP2	INSP2
Target Reliability Index (β)	3	3
Dead Load Factor (D1)	1.07	1.07
Dead Load Factor (D2)	1.14	1.14
Live Load Factor (Normal)	2.00	1.49
Factored Dead Load	46 kN-m	20 kN
Factored Live Load	231 kN-m	79 kN
Factored Capacity	806 kN-m	756 kN
LLCF APEX Custom Trailer	3.15	9.51
Assessor	Michaela Horner	Michaela Horner
Assessor Signature	£Qes	tas
Checker	Craig Schaper	Craig Schaper
Checker Signature	bs	hs .

Appendix B - Alternative Assessment Vehicles



This page intentionally blank. Formatted for double-sided printing.

Annex A3.4 (normative) CL-625-ONT live loading

Note: This Annex is a mandatory part of this Code.

A3.4.1 General

In Ontario, the CL-625-ONT Truck shown in Figure A3.4.1 and the CL-625-ONT Lane Load shown in Figure A3.4.2 shall be used instead of the CL-625 Truck and CL-W Lane Load, respectively.



Figure A3.4.2 CL-625-ONT Lane load (See Clause A3.4.1.)

Alternative Assessment Vehicles:



				V		1
 3	600			-	1880	1
FORD	F-550	TRUCK	LOADING			

Appendix C - Mount Nansen Bridge Drawings



This page intentionally blank. Formatted for double-sided printing.

YUKON TERRITORIES

MOUNT NANSEN GOLD AND SILVER MINE



MOUNT NANSEN BRIDGE AT DIVERSION CHANNEL EMERGENCY BRIDGE REPAIR

AE Project Number: 20112890-00

THE INFORMATION CONTAINED ON THIS DRAWING, OTHER THAN CHANGES MADE BY ASSOCIATED ENGINEERING (B.C.) LTD. ORIGINATED FROM SOURCES OTHER THAN THE DESIGN PROFESSIONAL AND ASSOCIATED ENGINEERING (B.C.) LTD., DOES NOT WARRANT OR REPRESENT THAT SUCH INFORMATION IS ACCURATE OR REPRESENTS THE ORIGINAL DESIGN AS CONTAINED IN THE CONTRACT DOCUMENTS.



RECORD DRAWING

	DRAWING LIST		
NUMBER	DESCRIPTION	REV.	DATE
0-00-3-101	GENERAL NOTES	1	2011/11/16
0-00-3-102	GENERAL ARRANGEMENT	1	2011/11/16
0-00-3-103	ABUTMENT DETAILS	1	2011/11/16
0-00-3-104	DECK DETAILS	1	2011/11/16

GLOBAL PERSPECTIVE. LOCAL FOCUS.

DRAWING NUMBER	REV. NO.	SHEET
20112890-00-3-100	1	1 5

GENERAL

- THIS ASSIGNMENT IS FOR AN EMERGENCY BRIDGE REPAIR OF AN EXISTING BRIDGE WITH RESTRICTED TRAFFIC (SEE BRIDGE DESIGN NOTES) USE FOR 2011 WINTER, LOCATED IN THE MOUNT NANSEN GOLD AND SILVER MINE, YUKON TERRITIOTRIES.

- FOR INSTALLATION BY OTHERS; NO RESPONSIBILITY CAN BE ACCEPTED FOR WORK BY OTHERS.

- DEFINITIONS

- YUKON GOVERNMENT REFERS TO THE YUKON GOVERNMENT - ENERGY, MINES AND RESOURCES, YUKON TERRITORIES,

- THE PROVISION OF FABRICATION OF THIS BRIDGE IS NOT INCLUDED IN SCOPE OF SERVICES BEING PROVIDED BY ASSOCIATED ENGINEERING (B.C.) LTD.

- ASSOCIATED ENGINEERING WILL PROVIDE A FINAL INSPECTION OF THE BRIDGE AFTER CONSTRUCTION IS COMPLETE. ASSOCIATED ENGINEERING REQUIRES FIVE (5) DAYS NOTICE.

- DESIGN AND CONSTRUCTION TO CONFORM TO THE MINISTRY'S "FOREST SERVICE BRIDGE DESIGN AND CONSTRUCTION MANUAL" 1999 AND THE "FOREST ROAD ENGINEERING GUIDEBOOK" 2002.

- ANY DESIGN CHANGES PROPOSED DURING CONSTRUCTION SHALL REQUIRE PRIOR WRITTEN APPROVAL FROM THE COORDINATING REGISTERED PROFESSIONAL.

GEOTECHNICAL

- GEOTECHNICAL ENGINEERING AND TERRAIN STABILITY FIELD ASSESSMENTS ARE NOT INCLUDED WITHIN THE SCOPE OF SERVICES BEING PROVIDED BY ASSOCIATED ENGINEERING (B.C.) LTD. THEREFORE THIS DESIGN HAS BEEN PREPARED WITHOUT THE BENEFIT OF GEOTECHNICAL FIELD INVESTIGATION OR TERRAIN STABILITY FIELD ASSESSMENT ADVICE. GROUND CONDITIONS MAY VARY. THE APPROACH ROAD AND BRIDGE CONCEPT MAY NEED TO BE MODIFIED TO ACCOMMODATE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. ASSOCIATED ENGINEERING (B.C.) LTD. ACCEPTS NO LIABILITY OR RESPONSIBILITY FOR DELAY OR ADDITIONAL COSTS THAT MAY RESULT IF GROUND CONDITIONS VARY FROM THOSE ASSUMED OR THE SUBSEQUENT FAILURE OF THE ROAD EMBANKMENT, BRIDGE EMBANKMENT AND BRIDGE FOUNDATIONS DUE TO UNFORSEEN GROUND CONDITIONS.

HYDROLOGY AND HYDRAULIC ASSESSMENT

- HYDRAULIC ANALYSIS HAS NOT BEEN ASSESSED FOR THIS SITE. ASSOCIATED ENGINEERING ACCEPTS NO LIABILITY OR RESPONSIBILTY FOR DELAY OR ADDITIONAL COSTS THAT MAY RESULT FROM FAILURE OF THIS CROSSING DUE TO HYDRAULIC CONDITIONS.

BRIDGE DESIGN

- TO CAN/CSA-S6-06 (MODIFIED) AND THE MINISTRY'S, "FOREST SERVICE BRIDGE DESIGN AND CONSTRUCTION MANUAL", 1999.

- LOADING: LOAD SPECIFICATIONS OF THIS EMERGENCY BRIDGE REPAIR IS RESTRICTED TO A CAN/CSA-S6-06 - MAINTENANCE VEHICLE AND CAT IT28B LOADER TO A MAXIMUM OF 10,600 KGS. (G.V.W.). AND SHALL BE POSTED PRIOR TO TRAFFIC USE OF BRIDGE.

MATERIALS

	· STEEL:	TO ASTM PLATE: GRADE A36 (Fy = 2	250MPa)	- 001
	- CURB ANCHORS:	ASTM A307 GALV.		
	· LAG SCREWS:	TO CONFORM TO CSA B3 DRIVE LAG SCREW. INST/	34. PREDRILL HOLES AND SCREW INTO WOOD - DO NOT ALL FLUSH WITH TOP OF WOOD SURFACE, TYPICAL.	
	· STEEL FABRICATION:	ALL WELDS TO BE COMPI ALL BUTT WELDS TO BE I WITH CSA W59. FABRICATOR TO BE CERT MIN. 6mm FILLET WELD U FIELD WELDING BY COMP	LETED IN ACCORDANCE WITH CSA W59. NSPECTED BY ULTRASONIC EXAMINATION IN ACCORDANCE TIFIED FOR DIVISION 1, 2 OR 3 IN ACCORDANCE WITH CSA W47.1 NLESS OTHERWISE NOTED. PANY CERTIFIED TO CSA W47.1, DIVISIONS 1, 2 OR 3.	
	· TIMBER:	TIMBER CURBS: ANY SPE TIMBER TIES: COAST D/FI TREATED IN ACCORDANC PLANK SUB-DECK: COAST DECK PROVIDED; UNTRE/ PLANK WEAR DECK: ANY	CCIES, ROUGH SAWN NO. 2 OR BETTER, UNTREATED IR ROUGH SAWN NO. 2 OR BETTER, TO BE ACZA CE WITH CSA 080. I D/FIR, ROUGH SAWN, NO. 2 OR BETTER, (TREATED IF WEAR ATED IF NO WEAR DECK) SPECIES, ROUGH SAWN NO. 2 OR BETTE, UNTREATED.	
	RECORD DRAWING			
-	ISSUED FOR CONSTRUCTION			Associated
	0.00			

SITE PREPARATION AND INSTALLATION

FOOTING EXCAVATIONS

- EXCAVATIONS FOR ALL FOOTINGS SHALL BE KEPT FREE OF WATER DURING CONSTRUCTION. FOR EXCAVATION IN MATERIAL OTHER THAN ROCK, CARE SHALL BE TAKEN NOT TO DISTURB THE BOTTOM OF THE EXCAVATION.

- WHERE FOUNDATION MATERIALS ENCOUNTERED DO NOT MEET THE DESIGN ASSUMPTIONS SHOWN ON THE DRAWINGS OR IN THE CONSTRUCTION SPECIFICATIONS, THE COORDINATING REGISTERED PROFESSIONAL SHALL BE CONSULTED PRIOR TO INSTALLATION OF FOUNDATIONS. THE COORDINATING REGISTERED PROFESSIONAL SHALL BE RESPONSIBLE TO STIPULATE MEASURES TO MEET DESIGN REQUIREMENTS AND CONSULT THE BRIDGE DESIGN ENGINEER AS REQUIRED. THE COORDINATING REGISTERED PROFESSIONAL SHALL INCLUDE THE PRESCRIBED MEASURES IN THE CERTIFICATION DOCUMENT.

LOCK BLOCK INSTALLATION AND BACKFILLING

- FOUNDATION SUB-BASE: DO NOT COMMENCE BACKFILLING UNTIL SUBMITTED PHOTOS AND COMPACTION RESULTS HAVE BEEN APPROVED BY ASSOCIATED ENGINEERING (BC) LTD.

- FOUNDATIONS HAVE BEEN DESIGNED TO 200 kPa MAXIMUM ALLOWABLE BEARING PRESSURE.

- PROVIDE COMPACTION RESULTS TO ASSOCIATED ENGINEERING PRIOR TO THE PLACEMENT OF LOCK BLOCKS.

- REMOVE SNOW, ICE, CONSTRUCTION DEBRIS, ORGANIC SOIL AND STANDING WATER PRIOR TO BACKFILL.

- LOWER COURSE OF LOCK BLOCKS TO BE PLACED ON LEVELLING PAD CONSISTING OF 19mm (3/4" CRUSHED) MINUS WASHED COMPACTED LEVELLING COURSE.

- COMPACT EXISTING SUBGRADE AND LEVELLING PAD UNDER FOOTING TO A MINIMUM OF 95% MODIFIED PROCTOR (ASTM D-1557).

- PLACE BACKFILL, FILL MATERIAL IN 300mm LIFTS. ADD WATER AS REQUIRED TO ACHIEVE SPECIFIED DENSITY. MAINTAIN EVEN LEVELS OF BACKFILL AROUND STRUCTURES AS WORK PROGRESSES, TO EQUALIZE EARTH PRESSURES

- BACKFILL MATERIAL (WITHIN 3.0 M OF REAR FACE OF WALL) TO BE CLEAN SAND AND GRAVEL WITH A MAXIMUM AGGREGATE SIZE OF 100mm AND A MAXIMUM FINES CONTENT (SILTS CLAY PARTICLES) OF 5%. EACH LAYER OF MATERIAL TO BE COMPACTED TO A MINIMUM OF 95% MODIFIED PROCTOR (ASTM D-1557).

- BACKFILL MATERIAL (OUTISDE 3.0 M OF REAR FACE OF WALL) TO BE CLEAN SAND AND GRAVEL WITH A MAXIMUM AGGREGATE SIZE OF 200 mm AND A MAXIMUM FINES CONTENT (SILTS CLAY PARTICLES) OF 10%. EACH LAYER OF MATERIAL TO BE COMPACTED TO A MINIMUM OF 90% MODIFIED PROCTOR (ASTM D-1557).

GRADING

- GRADE SO THAT WATER WILL DRAIN AWAY FROM THE BRIDGE APPROACHES TO CATCH BASINS AND OTHER DISPOSAL AREAS APPROVED BY THE DESIGN ENGINEER OR COORDINATING REGISTERED PROFESSIONAL.

CONSTRUCT APPROACH FILLS TO LINES AND GRADES SHOWN ON DRAWINGS.

HE INFORMATION CONTAINED ON THIS DRAWING,
OTHER THAN CHANGES MADE BY
ASSOCIATED ENGINEERING (B.C.) LTD.
ORIGINATED FROM SOURCES OTHER THAN
THE DESIGN PROFESSIONAL AND
ASSOCIATED ENGINEERING (B.C.) LTD.,
DOES NOT WARRANT OR REPRESENT THAT SUCH
INFORMATION IS ACCURATE OR REPRESENTS THE
ORIGINAL DESIGN AS CONTAINED IN THE
CONTRACT DOCUMENTS.

						PROJECT No. 20112890-00 SCALE AS SHOWN DRAWN WAYNE RILEY	2011/
1	2011	11/11/16	C.S. J.H.	C.Z. W.R.	RECORD DRAWING ISSUED FOR CONSTRUCTION	Associated DESIGNED JULIEN HENLEY	2011/09/2
NO.	. D/	DATE	ENG.	BY	SUBJECT	Engineering CHECKED CRAIG SCHAPER	2011/11/1
					REVISIONS	APPROVED DATE INITIAL	L

RECORD DRAWING

KON TERRITORIES JNT NANSEN GOLD & SILVER MINE	MOUNT NANSEN BRIDGE AT DIVERSION CHANNEL EMERGENCY BRIDGE REPAIR			
RAL NOTES	DRAWING NUMBER	REV. NO.	SHEET	
	20112890-00-3-101	1	2 5	



Of The Client And Proj Kind Are Made To Othe The Use Of Any I ្រុទ ខ្ល ËŞ

This Drawing Is For The Use Of The Client And Project Indicate to Representations Of Any Kind Are Made To Other Parties





ON TERRITORIES	MOUNT NANSEN BRIDGE AT DIVERSION CHANNEL EMERGENCY BRIDGE REPAIR		
DETAILS	DRAWING NUMBER	REV. NO.	SHEET
	20112890-00-3-104	1	5 5

THE INFORMATION CONTAINED ON THIS DRAWING, OTHER THAN CHANGES MADE BY ASSOCIATED ENGINEERING (B.C.) LTD. ORIGINATED FROM SOURCES OTHER THAN THE DESIGN PROFESSIONAL AND ASSOCIATED ENGINEERING (B.C.) LTD., DOES NOT WARRANT OR REPRESENT THAT SUCH INFORMATION IS ACCURATE OR REPRESENTS THE ORIGINAL DESIGN AS CONTAINED IN THE CONTRACT DOCUMENTS.

RECORD DRAWING

1:10

38 x 203 EXISTING TIMBER NAILER PLANK RETAINED (REQUIRES REPLACEMENT IN YEAR 2012 WITH 100x300 NAILER PLANK SECURED TO GIRDER)