

CK-2061

LIUMCHEN EAST 4.2km

2019 Inspection

CBR iPad Offline Ver 0.28



CBR Data

Latitude	Longitude
49°4'16.7"	-121°55'11.9"
Crossing Name	Liumchen Creek
FSR #	5127 Branch # 4
Road Name	LIUMCHEN EAST
User km	4.2
Current Load Rating (tonnes)	54
Structure Class	Permanent Bridge
Portable	N
Superstructure	Compo Girders
Deck Type	Concrete Composite
Abutment Left	Steel Pipe and Precast Pad
Abutment Right	Steel Pipe and Precast Pad
Spans	1
Total Length (m)	26
Deck Width (m)	4.27

Updated Data

Latitude	Longitude
49°4'17.04"	-121°55'12.04"
HD Diff. (m)	10.8 Accuracy (m) 5
CL-625 or 63 tonnes	

Inspection

Date of Inspection 2019-03-20 2:27:06 PM

Inspector Name Tyson Miller

Recommended Next Inspection Year 2020

Inspection Company MFLNRO

Inspector Comments

P.Eng Comments

Brush and grade approaches and post bridge ahead signs. Associated Engineering completed an evaluation of the bridge and has determined that the structure has capacity to support the CL-625 vehicle (63 tonnes). See attached technical memorandum from Associated Engineering Ltd. Load rating is CL-625 or 63 tonnes. Monitor the condition of the entire structure and inspect again in 2020.



P.Eng Seal

CK-2061

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Approach

Alignment Fair

VC left approach

Bridge Ahead Signs
Missing ☐ 0 ☐ 1 ☒ 2

Brushing Required Y

Delineator Missing
Left ☒ 0 ☐ 1 ☐ 2Delineator Missing
Right ☒ 0 ☐ 1 ☐ 2

Fender Condition Good

Posted Load Rating

Not posted

Road Surface Poor

Wilderness road

Abutment

Log/Timber Cribs

Tie Backs

Bin Wall

Concrete

Caps or Sills

Piles or Posts Good

Ballast Wall Good

Wing Wall

Bracing Good

Hardware

Fill Good

Riprap Good

Bearings Good

Corrosion Protection Good

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Deck

Running Surface Good Wilderness road

Running Planks

Sub Deck

Ties

Nails

Deck to Girder Bolts

Concrete Deck Good

Grout Pockets Good

Deck Joints Good

Steel Deck Plate

Gravel Surface

Curb Rail/Blocks/Posts Good

Hand Rails/Walkouts

Hardware Good

Overall Deck Condition Good

Gravel Depth (mm)

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**Steel/Concrete**

Girders Good Composite

Diaphragms Good At center

Bracing

Under Trussing

Hardware

Welded/grouted
shear connectors**Log**

Log Curbs

Needle Beam

Needle Lashing/
Shimming

Needle Beam to Crib (m)

Needle Diameter (mm)

Stringer
Number

Species

Peeled

Diameter
(mm)Rot Depth
(mm)

Condition

Comment

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Hazards

Estimated Present Water Level Depth (m)	1.0	High Water	☐	Debris	☐
Estimated Present Water Level Width (m)	18	Aggradation	☐	Scour	☐
Estimated High Water Level Clearance (m)	2.5	Ice	☐		

Comments

Repairs and Monitoring

Repair

Item	Priority	Repair Description
1	Low	Brush and grade when road opened to industrial activity

2	Low	Post bridge ahead signs with activity
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3		
---	--	--

Item	Monitor Description	Frequency
1		

2		
---	--	--

3		
---	--	--

Sketch
(Select Signature)



Approach from Right Bank when facing downstream



Upstream from Crossing



Deck



Downstream from Crossing



Approach from Left Bank when facing downstream



Left Bank Abutment when facing downstream



Right Bank Abutment when facing downstream

Issue Date:	May 31, 2019	File:	20162884.25.E.05.00
Previous Issue Date	N/A		
To:	Jay Rees, RPF - WCTP		
From:	Nima Mohajer Rahbari, Ph.D., E.I.T.		
Client:	Western Canadian Timber Products Ltd. (WCTP)		
Project Name	Liumchen Creek Bridge		
Project No.	2016-2884		
Subject:	Bridge Load Rating		

TECHNICAL MEMORANDUM

1 INTRODUCTION

Western Canadian Timber Products Ltd. (WCTP) retained **Associated Engineering** (AE) to complete a load rating of **Liumchen Creek Bridge** (Figure 1) in Chilliwack, BC, to determine whether the bridge can support the following Evaluation Vehicles:

- **Evaluation Vehicle A:** Tridem Drive Truck/Tridem Trailer (Max G.V.W. = 55,300 kg) (Figure 2);
- **Evaluation Vehicle B:** Tridem Drive Truck/Triaxle Trailer (Max G.V.W. = 57,400 kg) (Figure 3); and
- **Evaluation Vehicle C:** CL-625 Highway Legal Traffic (Max G.V.W. = 63,730 kg).

For all Evaluation Vehicles, we assumed that an axle load is shared 50%–50% between the wheels that are spaced at 1.80 m c/c.



Figure 1
Liumchen Creek Bridge Elevation

The bridge is a 4.3 m wide and 26.0 m long c/c single-lane bridge which carries the Chilliwack-Little Tamihi FSR over the Liumchen Creek. It comprises two precast compo-girders ® (Figure 4) spaced at 3.0 m c/c. The bridge deck consists of 175~225 mm thick precast concrete panels that are connected to the girders by welded pockets.

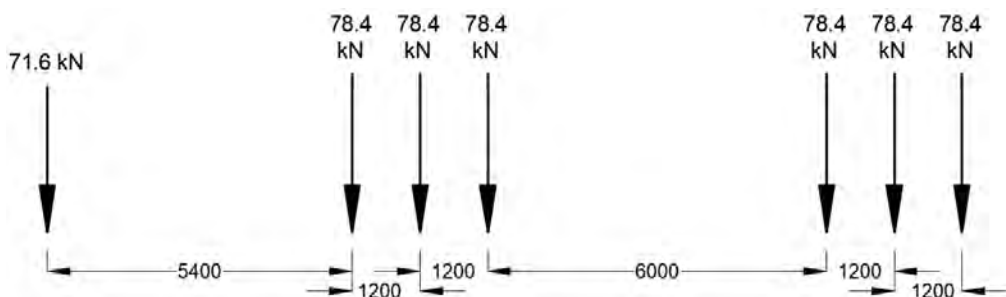


Figure 2
 Evaluation Vehicle A

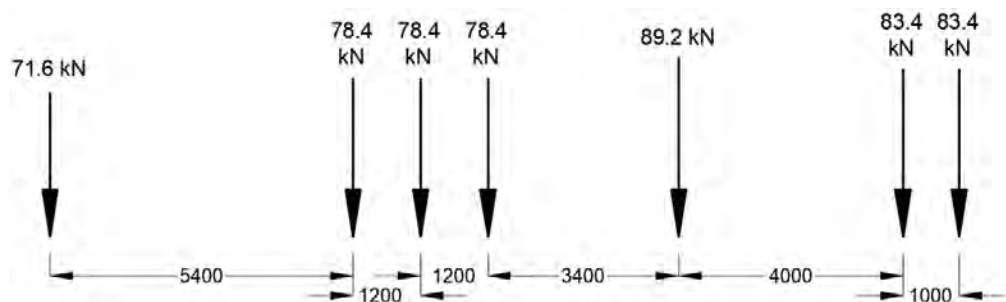


Figure 3
 Evaluation Vehicle B

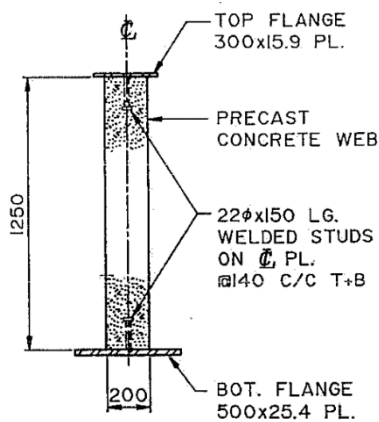


Figure 4
 Girder Detail

We based our analysis on the bridge record drawings and 2016 inspection report provided by WCTP for our analysis.

2 BRIDGE LOAD RATING

We completed the evaluation in accordance with Section 14 of the Canadian Highway Bridge Design Code (CAN/CSA S6-16). Table 1 summarizes the assumed material properties.



Table 1
Material Properties

Material	Strength	Unit Weight
	MPa	kN/m ³
Steel Plate	F _y =350	77.0
Rebar	F _y =400	-
Concrete	f' _c =35	25.0
Timber	-	7.0
Assumed Wearing Material	-	23.5
Notes <ul style="list-style-type: none"> F_y: Yield Strength of Steel f'_c: Compressive Strength of Concrete 		

Table 2 and Table 3 summarize the critical Live Load Capacity Factors (LLCFs) for the girders. An LLCF greater than 1.0 indicates that a girder has sufficient capacity to support the Evaluation Vehicle. A review of Table 2 and Table 3 indicates that the bridge girders are adequate to carry all three Evaluation Vehicles.

Table 2
Load Rating Results for Evaluation Vehicles A & B

<ul style="list-style-type: none">● Analysis Method: Statically Determinate● Traffic: Permit Annual (PA)							<ul style="list-style-type: none">● System Behavior: S1● Inspection: Level II								
D	DLA	F	Element Behaviour	β	Dead Load						Live Load			R _r	LLCF
					α _{D1}	D ₁	α _{D1} D ₁	α _{D2}	D ₂	α _{D2} D ₂	α _L	L	α _L L		
Evaluation Vehicle A															
Shear	1.25	0.72	E2	3.50	1.09	237	259	1.18	24	29	1.48	359	531	1140	1.61
Flexure	1.25		E3	3.25	1.08	1543	1667	1.16	316	367	1.42	2034	2889	6024	1.38
Evaluation Vehicle B															
Shear	1.25	0.72	E2	3.50	1.09	237	259	1.18	24	29	1.48	369	546	1140	1.56
Flexure	1.25		E3	3.25	1.08	1543	1667	1.16	316	367	1.42	2186	3104	6024	1.29
Notes:															
1) DLA: Dynamic Load Allowance															
2) F: Live Load Distribution Factor															
3) β: Reliability Index															
4) α_D: Dead Load Factor															
5) D: Unfactored Dead Load															
6) α_L: Live Load Factor															
7) L: Distributed Unfactored Live Load Including DLA															
8) R_r: Factored Resistance															
9) All units are in kN and m															



Table 3
Load Rating Results for Evaluation Vehicle C (CL-625 Highway Truck)

<ul style="list-style-type: none">● Analysis Method: Statically Determinate● Traffic: Normal							<ul style="list-style-type: none">● System Behavior: S1● Inspection: Level II								
Demand	DLA	F	Element Behaviour	β	Dead Load						Live Load			R _r	LLCF
					α _{D1}	D ₁	α _{D1} D ₁	α _{D2}	D ₂	α _{D2} D ₂	α _L	L	α _L L		
Shear	1.25	0.72	E2	3.50	1.09	237	259	1.18	24	29	1.63	389	634	1140	1.35
Flexure	1.25		E3	3.25	1.08	1543	1667	1.16	316	367	1.56	2166	3380	6024	1.18

We also evaluated the bridge for the occasional crossing of a Madill 120 Swing Yarder (Max G.V.W. = 43,500 kg; Assumed Track Ground Length = 4.0 m). Results obtained show that the bridge has adequate capacity to support the Yarder, if it travels on the centreline of the bridge.

3 CONCLUSION

Based on our evaluation, we conclude that the Liumchen Creek Bridge have sufficient capacity to support the following vehicles:

- Evaluation Vehicle A:** Tridem Drive Truck/Tridem Trailer (Max G.V.W. = 55,300 kg) (**Figure 2**);
- Evaluation Vehicle B:** Tridem Drive Truck/Triaxle Trailer (Max G.V.W. = 57,400 kg) (**Figure 3**); and
- Evaluation Vehicle C:** CL-625 Highway Truck (Max G.V.W. = 63,730 kg).
- Madill 120 Swing Yarder (Max G.V.W. = 43,500 kg)

We trust this memorandum satisfies your immediate requirements. Please do not hesitate to contact us should you have any questions or comments.

Respectfully submitted,
Associated Engineering (B.C.) Ltd.

Prepared by:



Nima Mohajer Rahbari, Ph.D., E.I.T.,
Structural Engineer
NMR/JH/LP

Reviewed by:



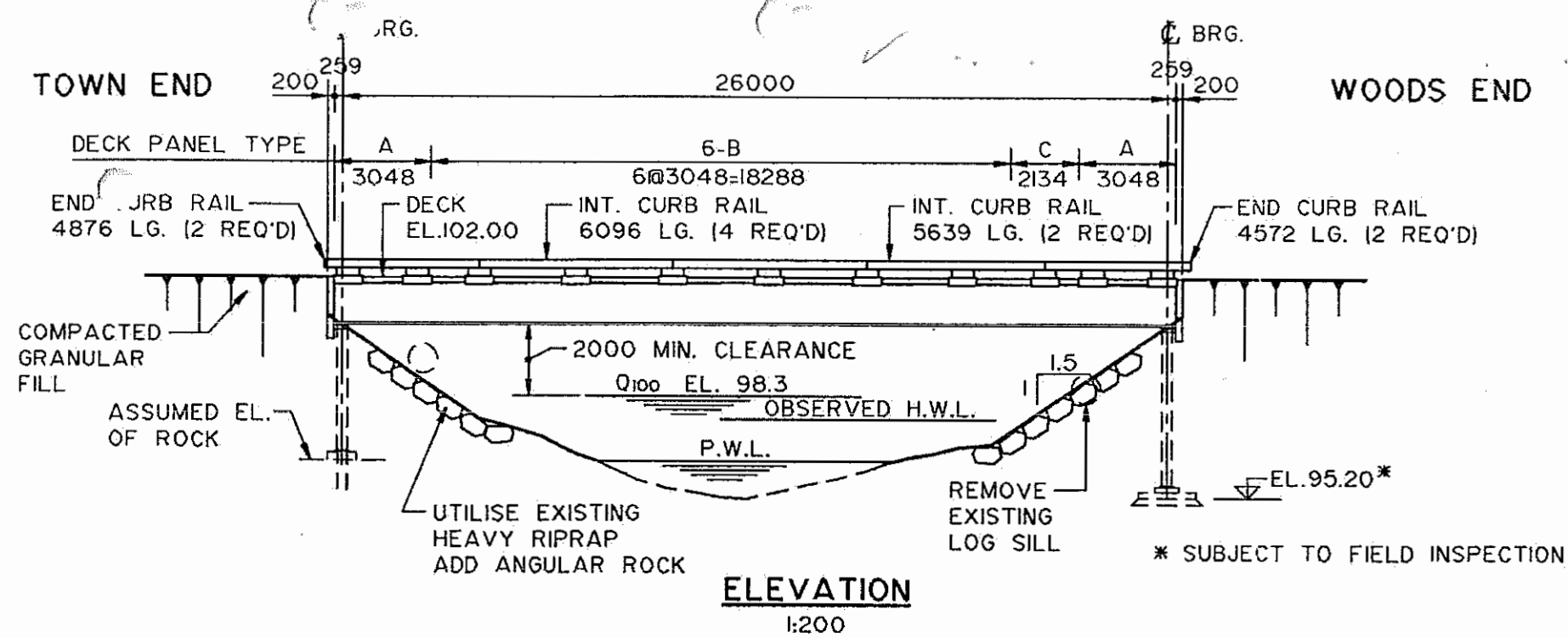
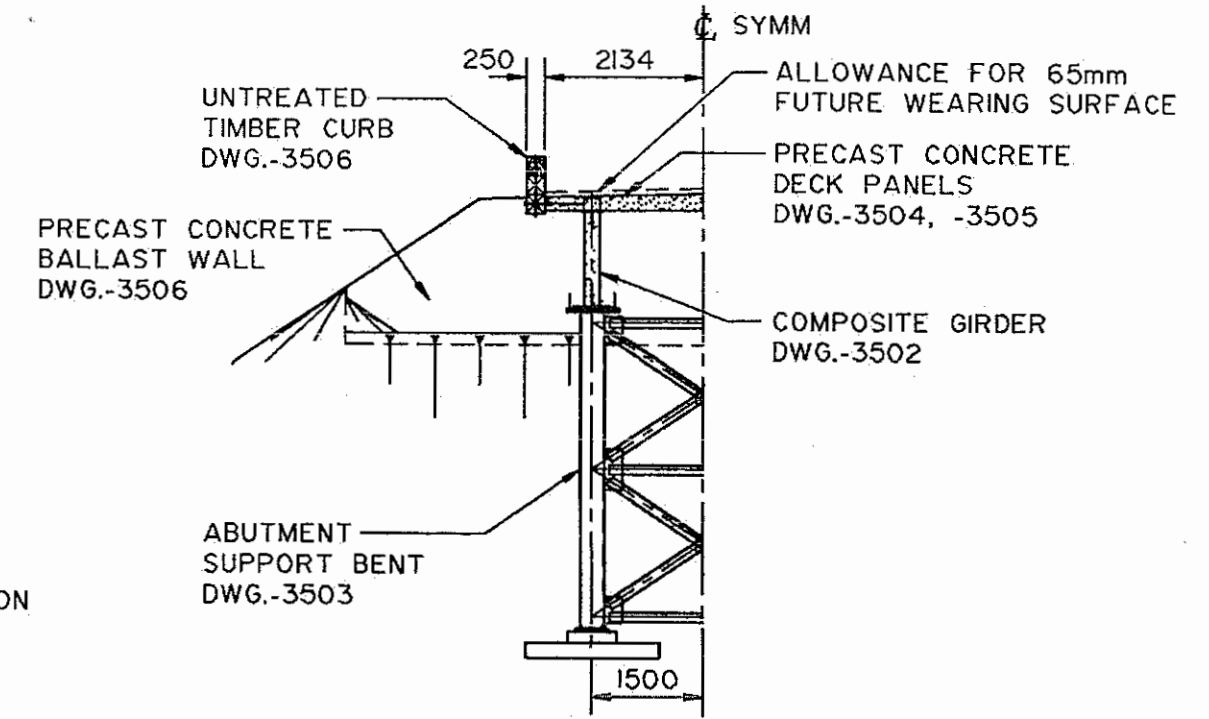
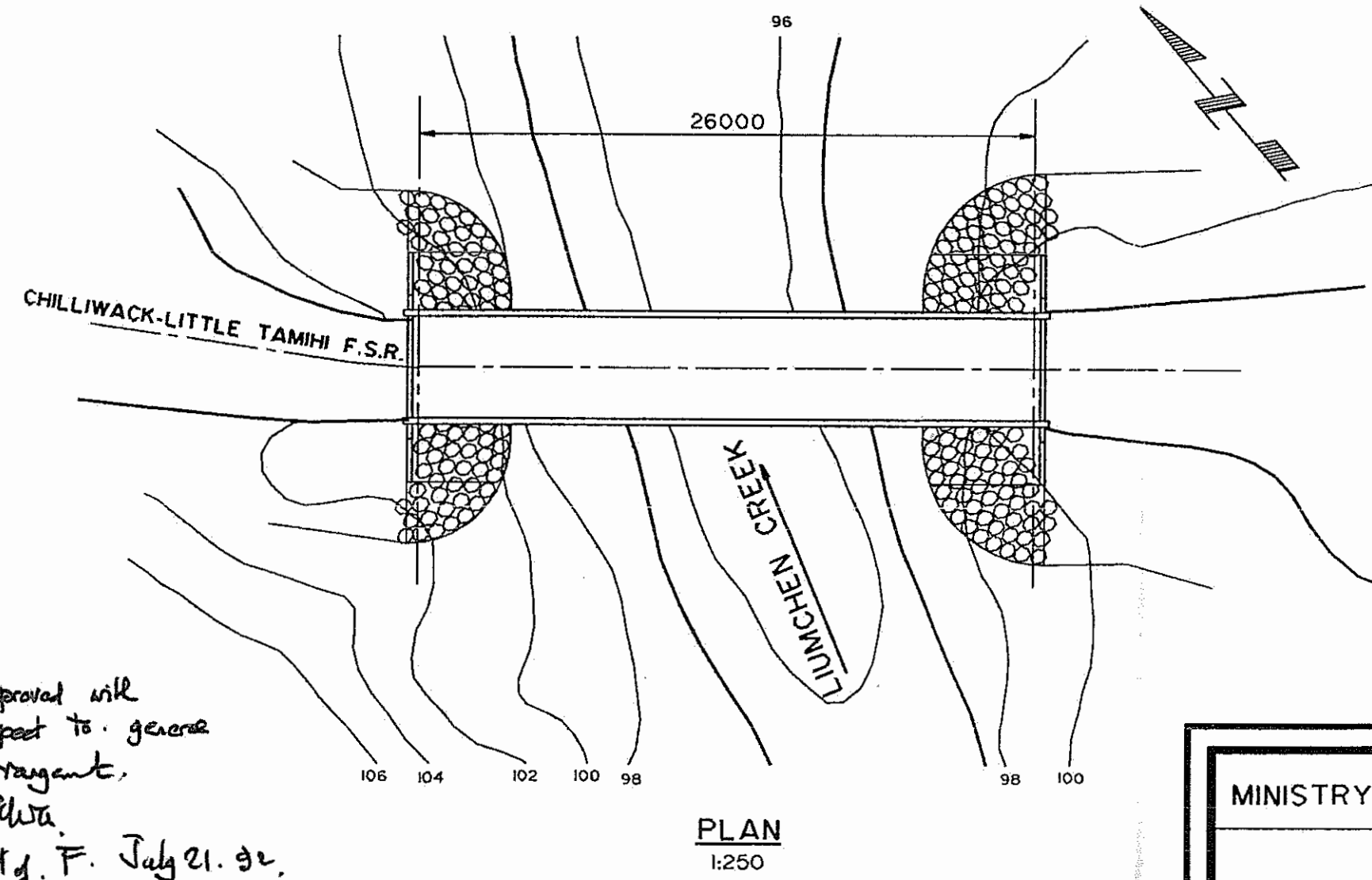
2019.05.31

Julien Henley, M.Sc., P.Eng.
Manager – Municipal Bridges

Attachments:

- Liumchen Creek Bridge Record Drawings
- Liumchen Creek Bridge 2016 Inspection Report

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NOTES:

1. DESIGN: CAN/CSA S6-88 (MODIFIED)
2. LOADING: BCFS L60 (54,430kg G.V.W.), e=400, DIST.=60/40
3. FATIGUE: 500,000 CYCLES
4. STEEL: CSA G40.21M GRADE 350 AT CAT. 3 (PLATE)
GRADE 350A (SECTIONS)
5. PIPE: ASTM A252 GRADE 2
6. CONCRETE: CAN3 A23.1 GRADE 35MPa AT 28 DAYS
7. WELDING: CSA W59 6 F.W. U/N. X-RAY TENSION FLANGE BUTT WELDS
8. STUDS: SHEAR CONNECTOR STUDS TO ASTM A108 GRADE 1020
9. REINF.: CSA G30.12M GRADE 400
10. BOLTS: ASTM A325 TYPE 3 M22 U/N. JOB INSPECTION TORQUE 810Nm
11. TIMBER: D/FIR NO.2 ROUGH SAWN UNTREATED
12. HARDWARE: GALV. CSA G164, BOLTS ASTM A307 GALV.
13. DESIGN SUBGRADE BEARING PRESURE = 200KPa MAX.



Approved with
respect to general
arrangement,
RWA.
M.F. July 21. 92.

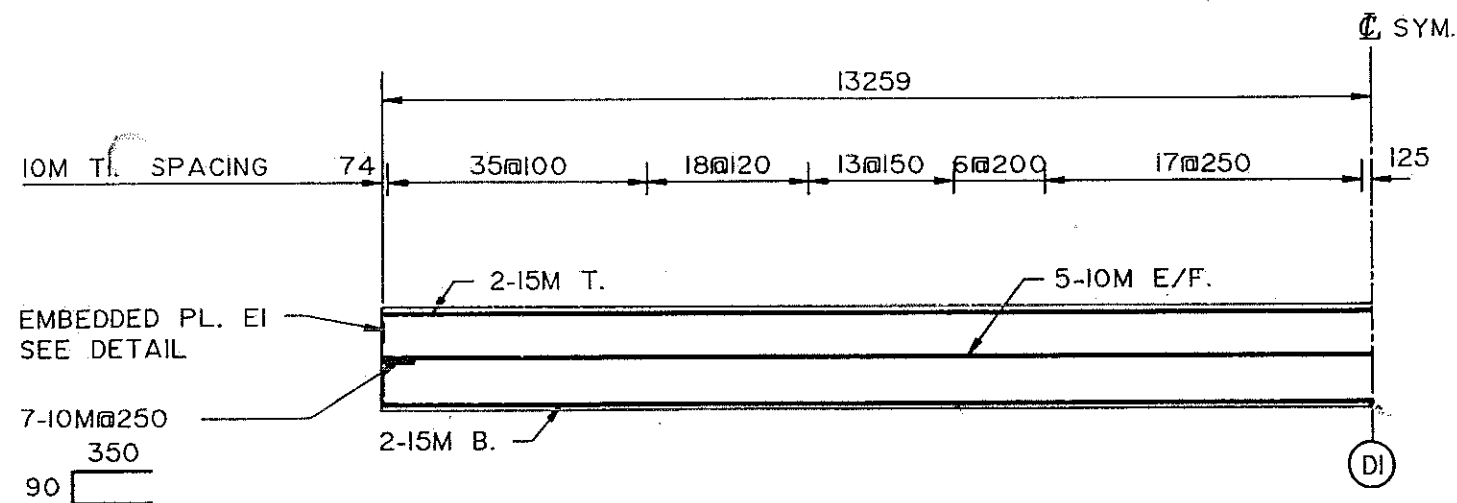
MINISTRY OF FORESTS

ASSOCIATED
ENGINEERING

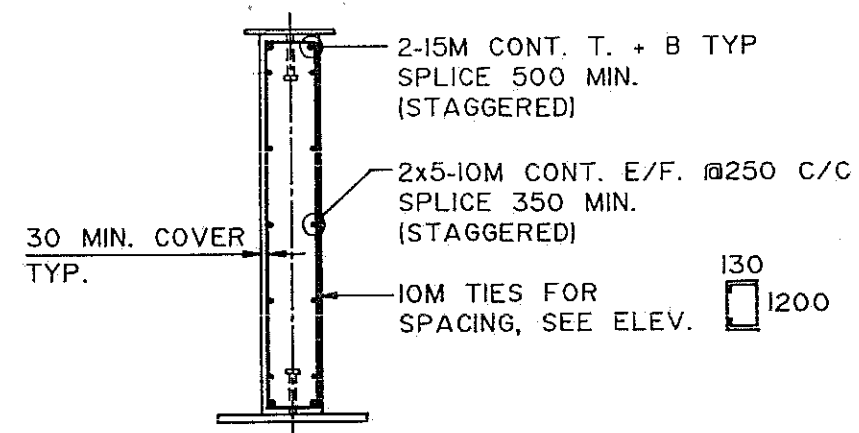


LUMCHEN CREEK BRIDGE
GENERAL ARRANGEMENT

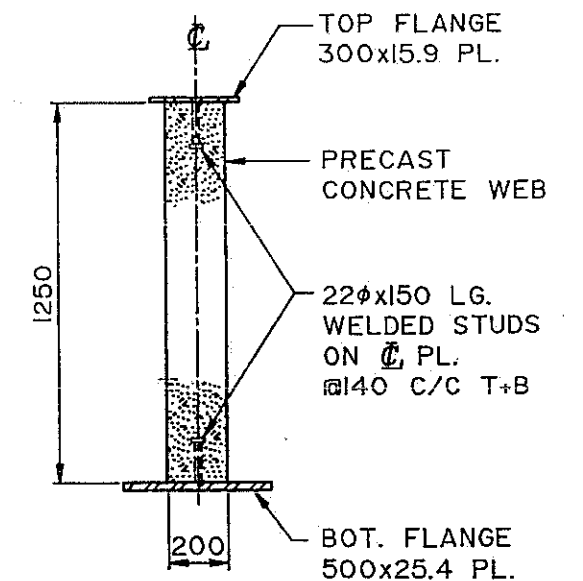
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DATE JULY 1992	DWG No
JOB No VJ87	VJ87-SK-3501



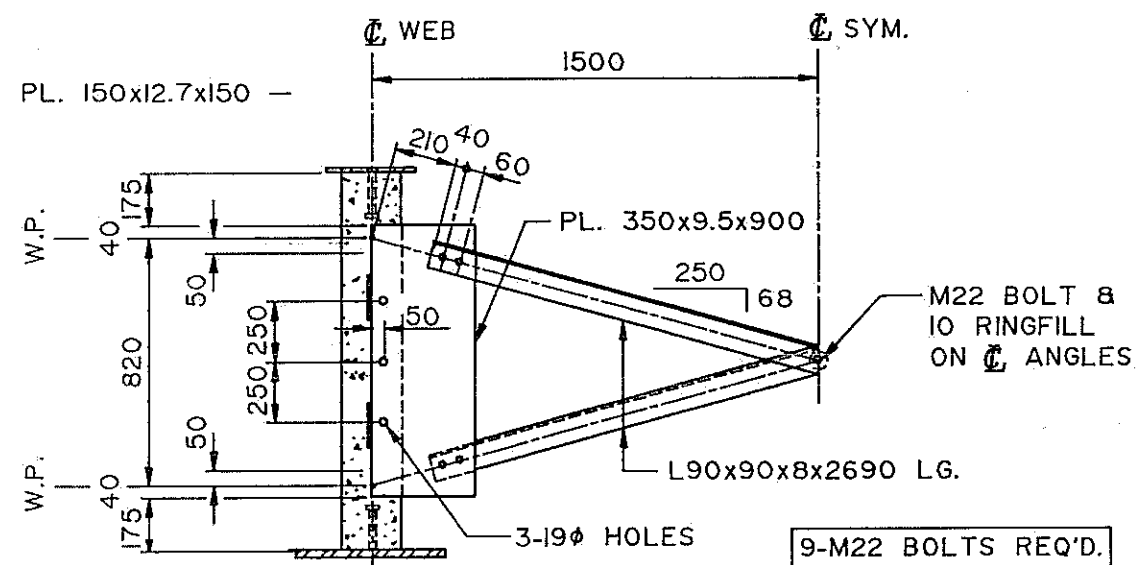
1/2 ELEVATION
1:100



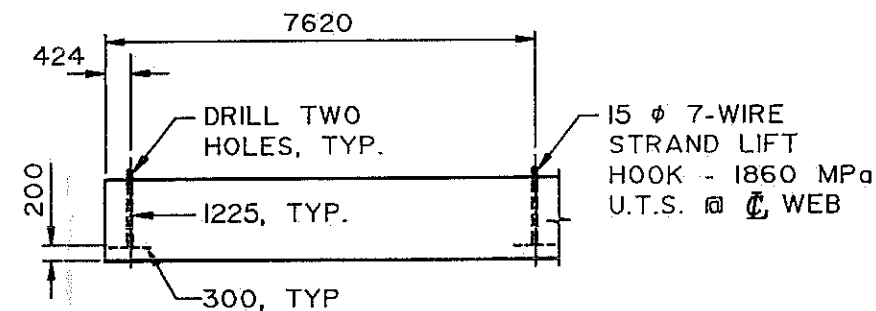
REINF. DETAIL
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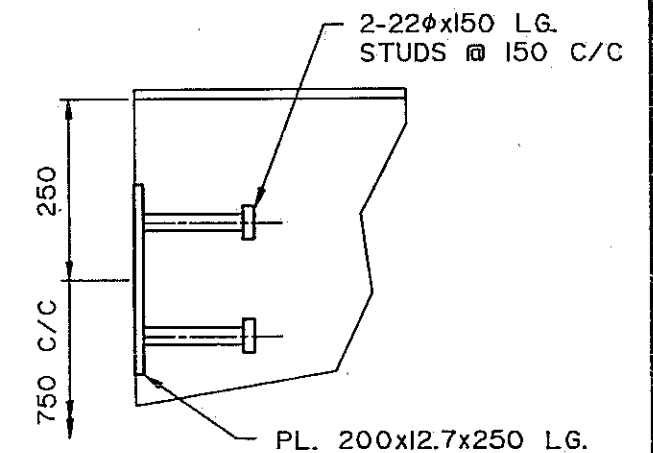
TYPICAL SECTION
1:25



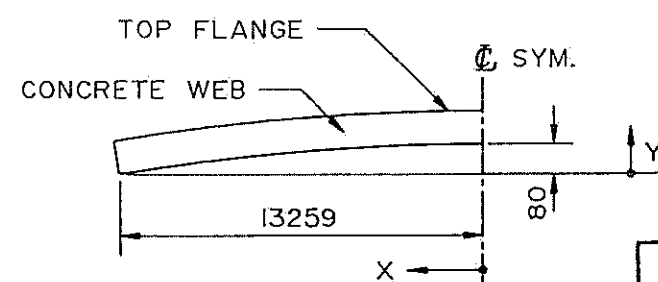
1/2 DI DIAPHRAGM
1:25 (1 REQ'D)



LIFT HOOK DETAIL
1:25
(4 REQ'D PER GIRDER)



EMBEDDED PLATE - EI
1:10 (8 REQ'D)



GIRDER PRECAMBER
N.T.S.

X	0	2000	4000	6000	8000	10000	12000
Y	80	78	71	61	47	31	12

NOTE: $f'_c = 35 \text{ MPa}$ @ 28 DAYS

JUL 17 1992

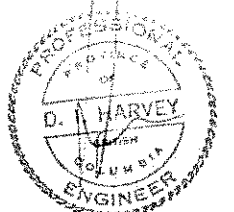
MINISTRY OF FORESTS

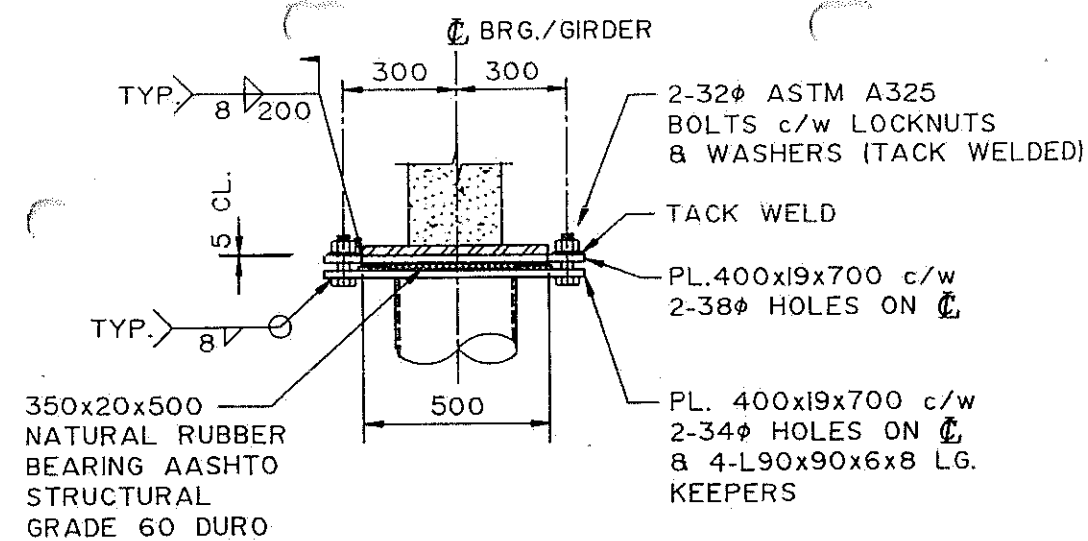
ASSOCIATED
ENGINEERING



LIUMCHEN CREEK BRIDGE
COMPOSITE GIRDER

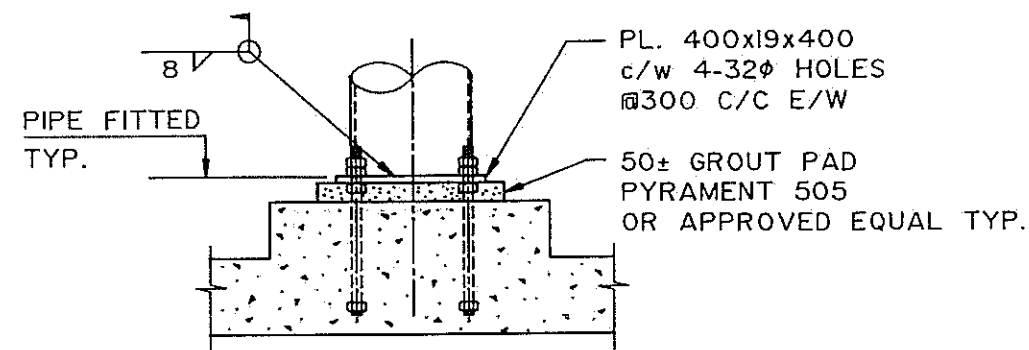
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DATE JULY 1992	DWG No.
JOB No VJ87	VJ87-SK-3502





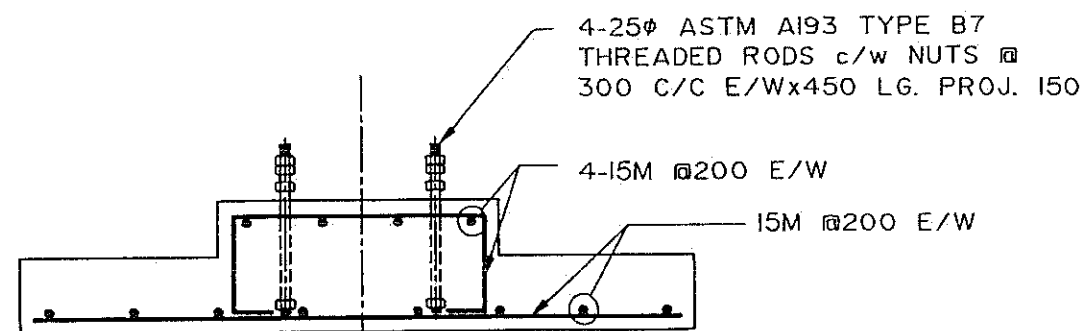
BEARING DETAIL

1:20 (4 REQ'D)



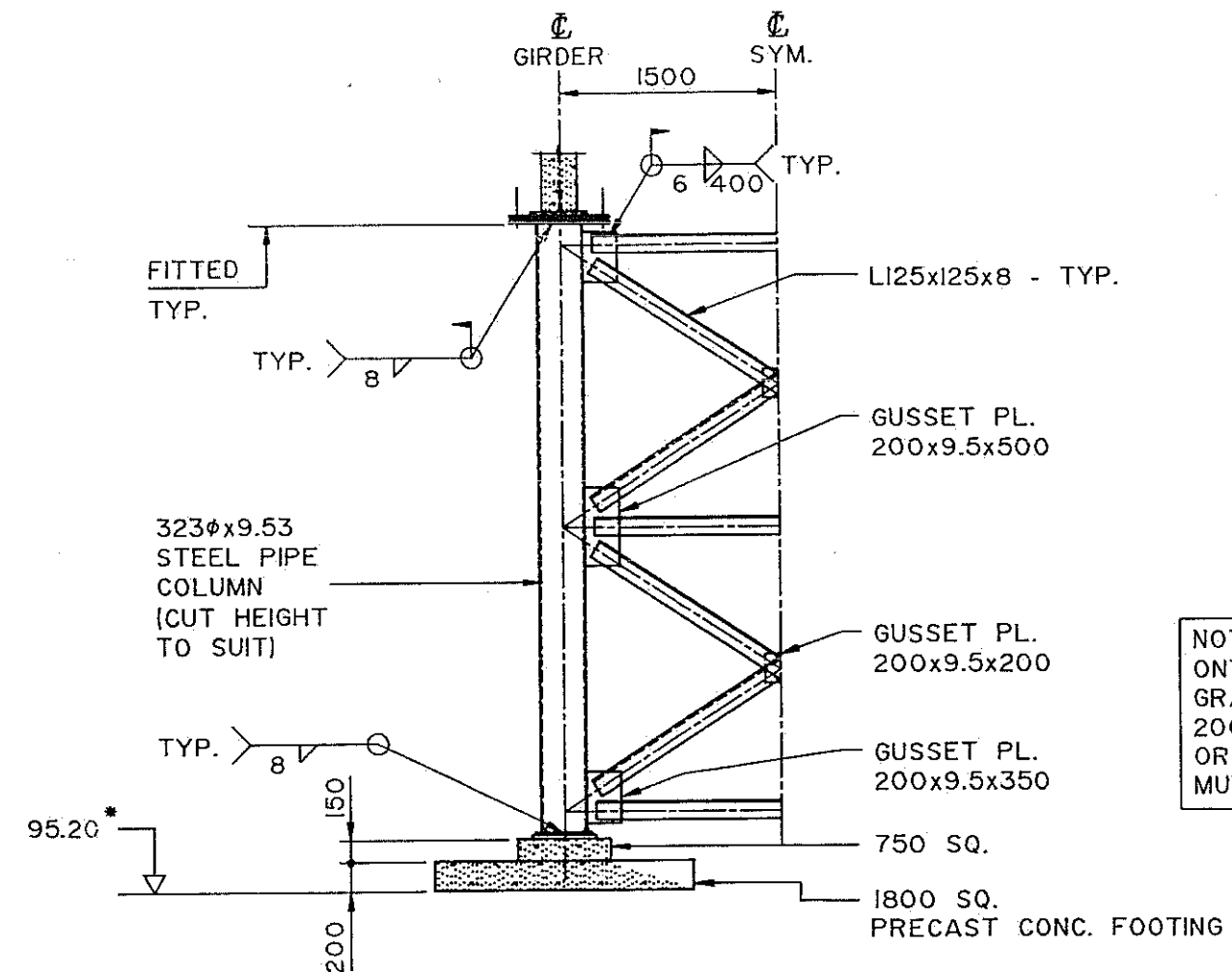
BASE PLATE DETAIL

1:20
(2 REQ'D)



PRECAST PAD DETAILS

1:20
(4 REQ'D)

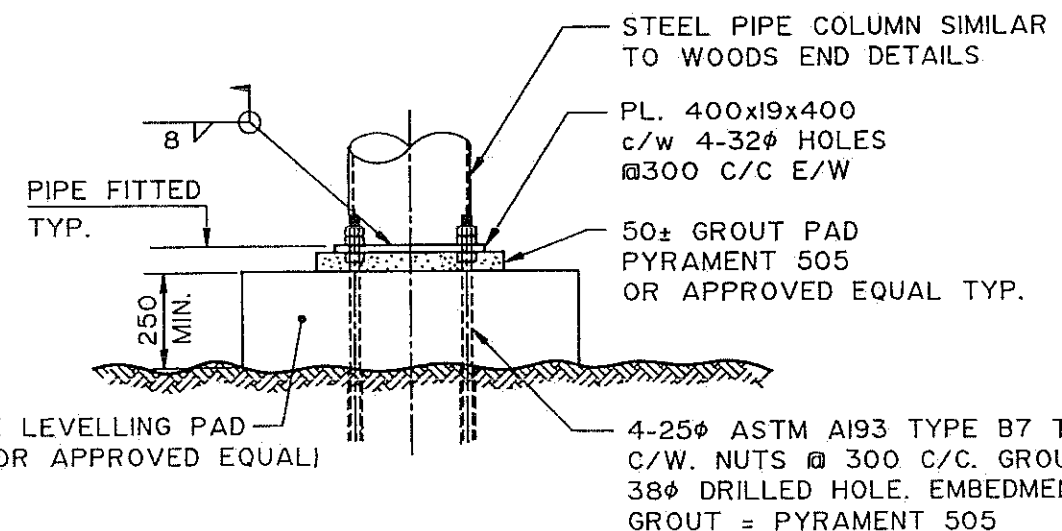


1/2 WOODS END ABUTMENT ELEVATION

1:50

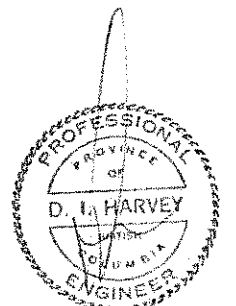
NOTE: BED FOOTING
ONTO COMPACTED
GRANULAR SUBGRADE
200 MIN. THICKNESS
OR WET CONCRETE
MUDSILLS, TYP.

* TO BE CONFIRMED
IN FIELD



TOWN END ROCK FOOTING

1:20



JUL 17 1992

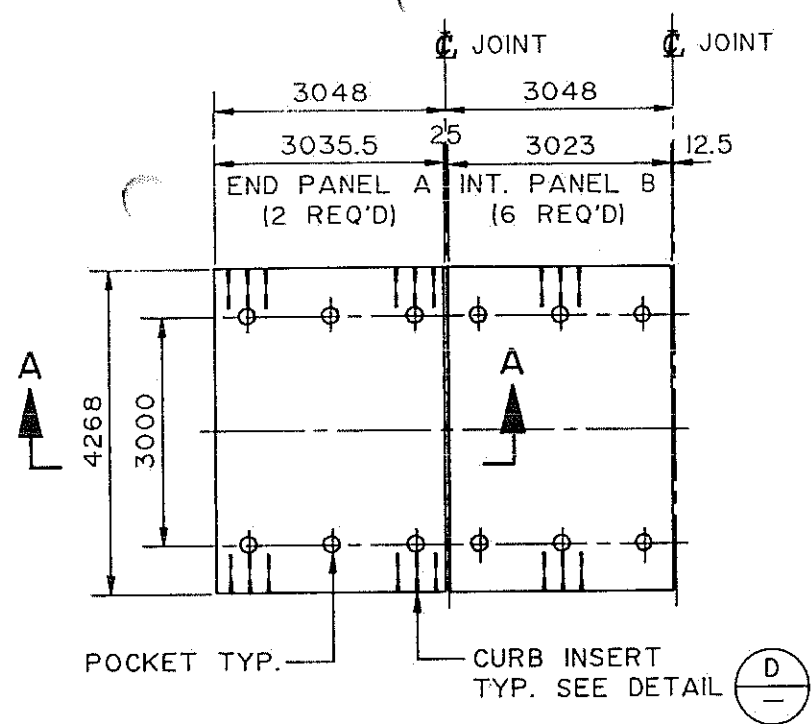
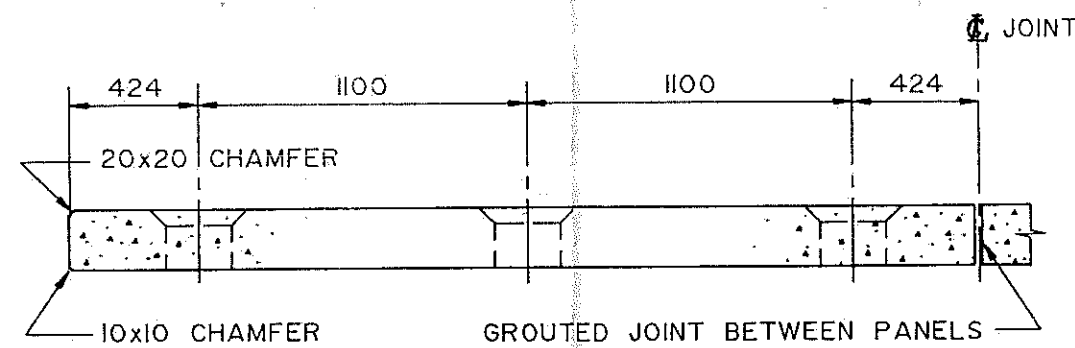
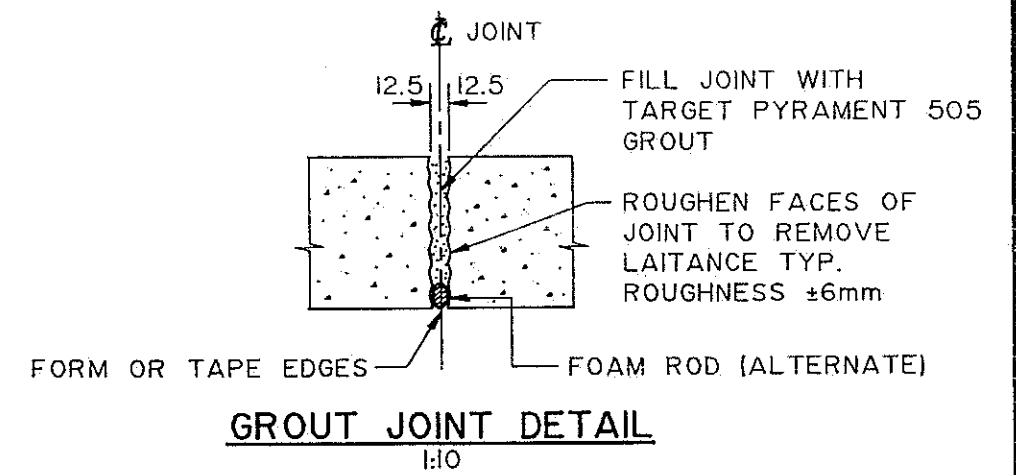
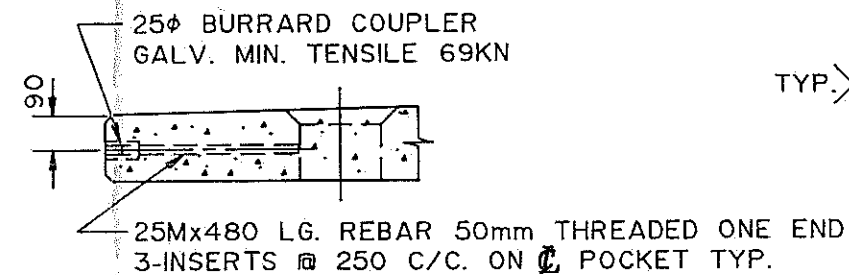
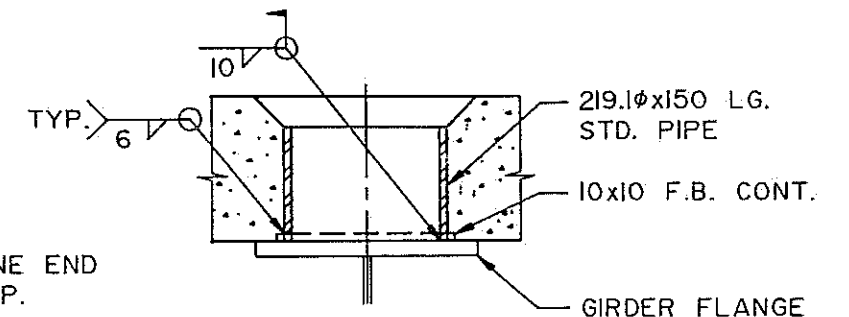
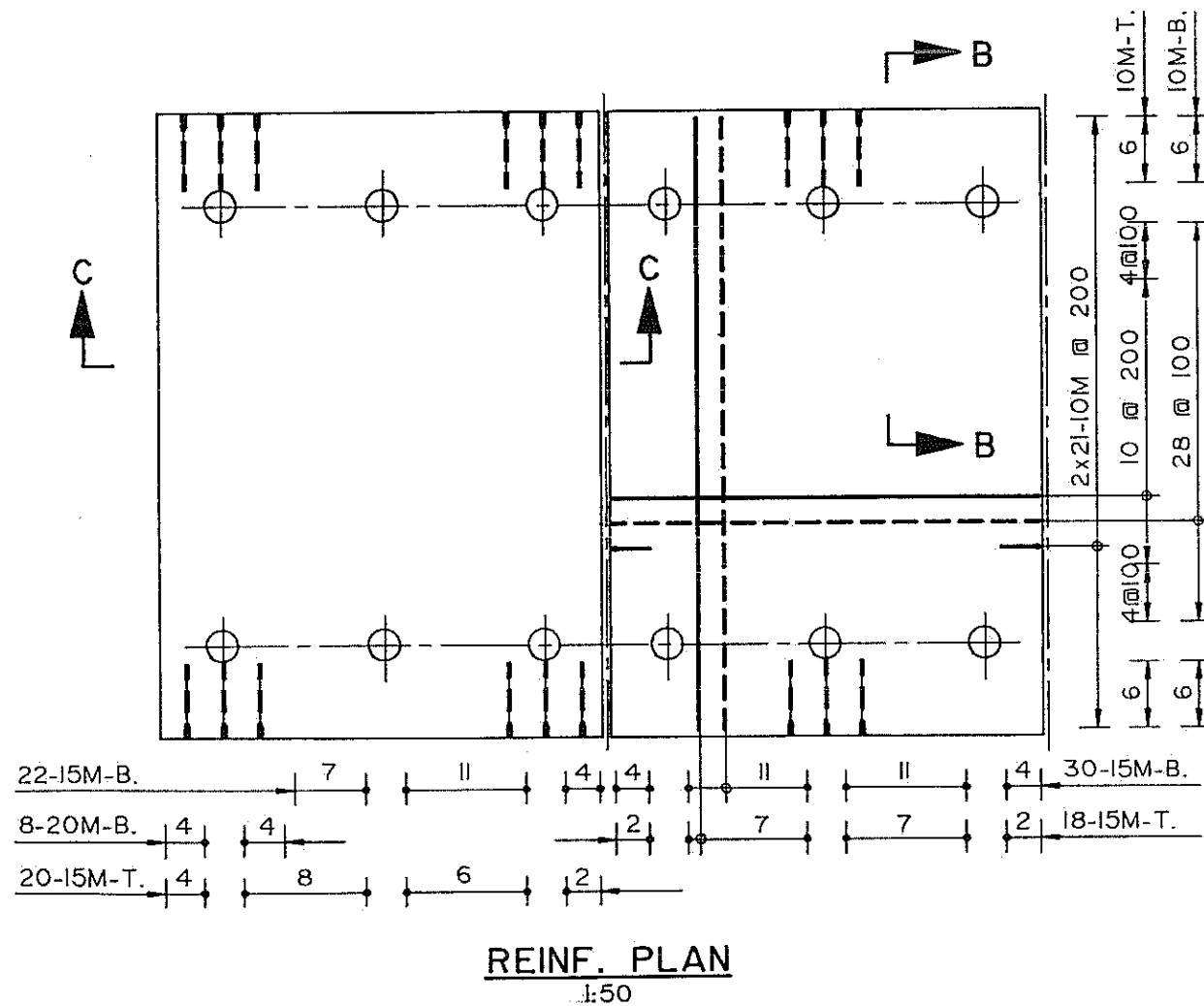
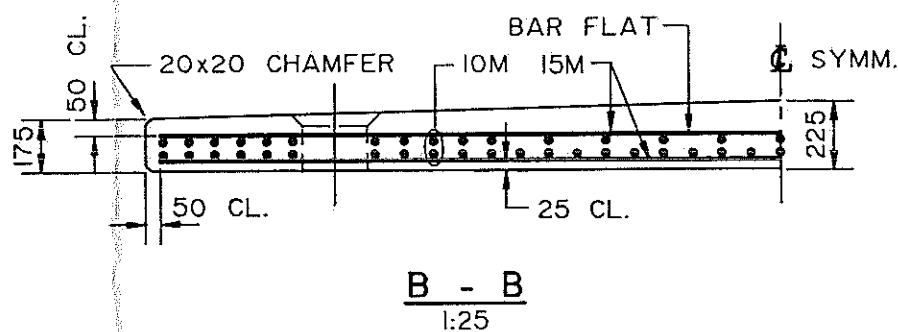
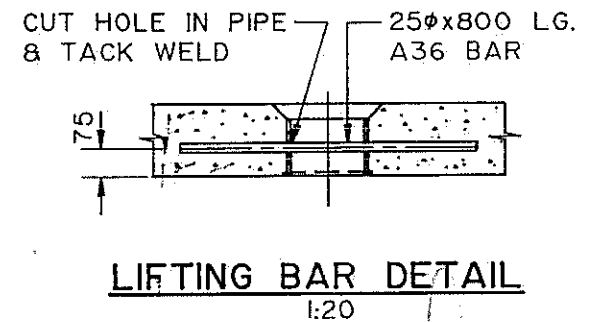
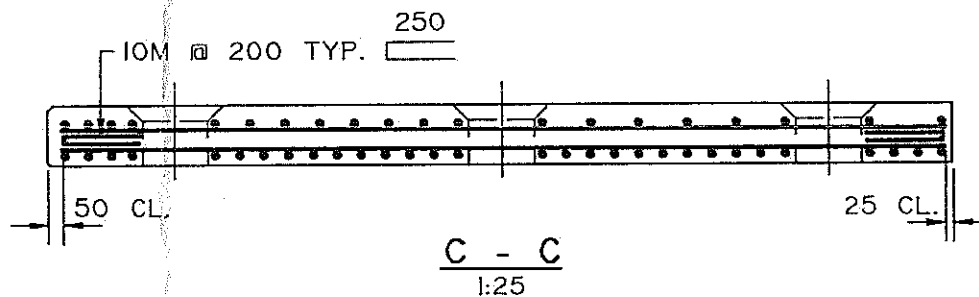
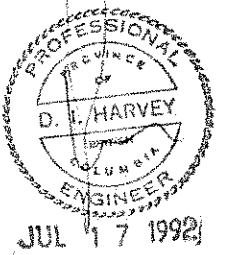
MINISTRY OF FORESTS

LIUMCHEN CREEK BRIDGE
ABUTMENT DETAILS

APPROVED D.H.	SCALE AS NOTED
DATE JULY 1992	DWG No.
JOB No VJ87	V87J-SK-3503

ASSOCIATED
ENGINEERING



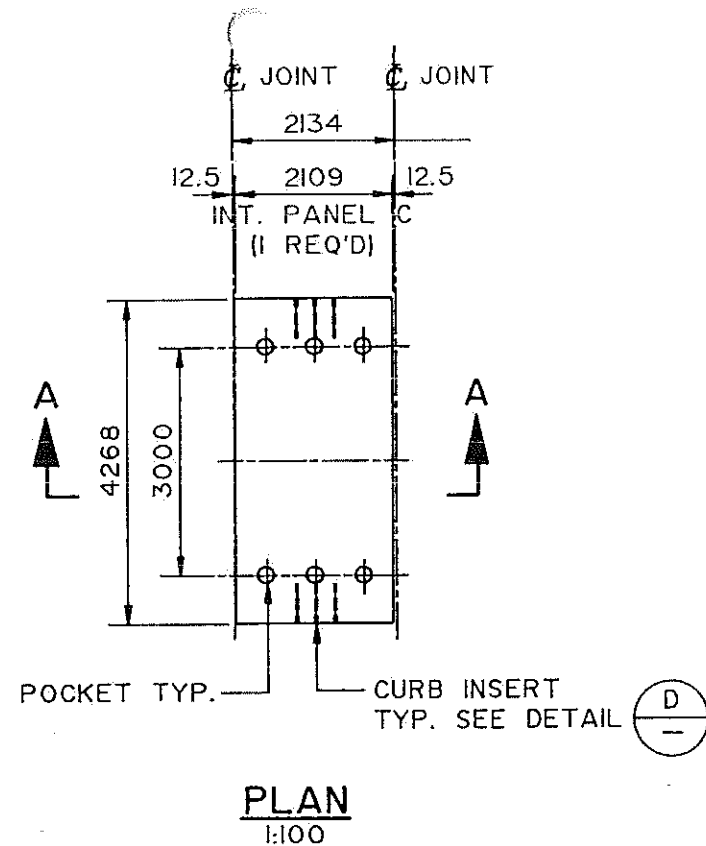
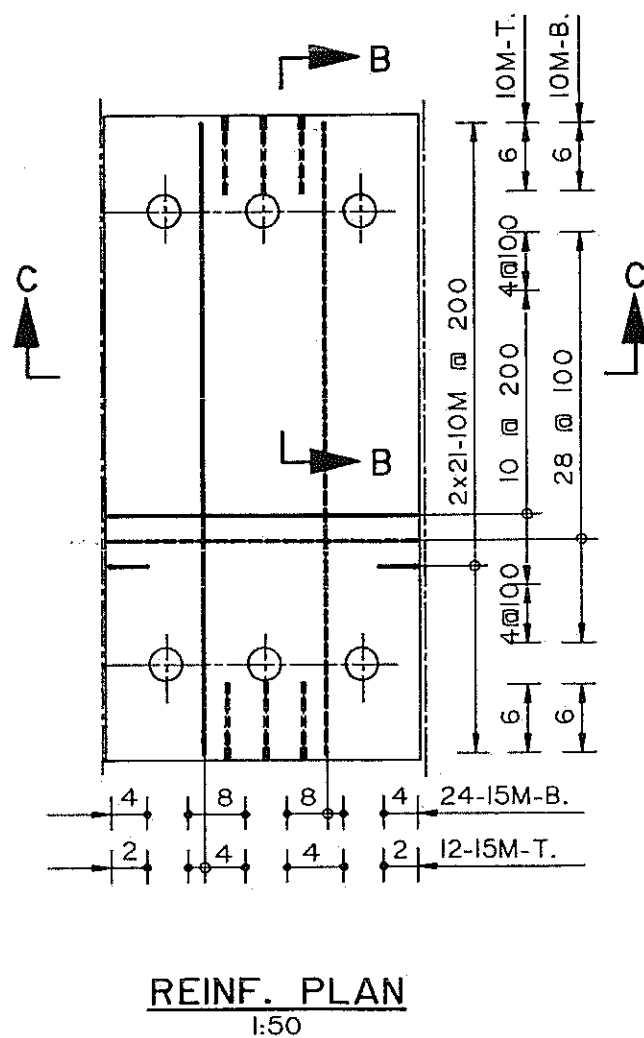
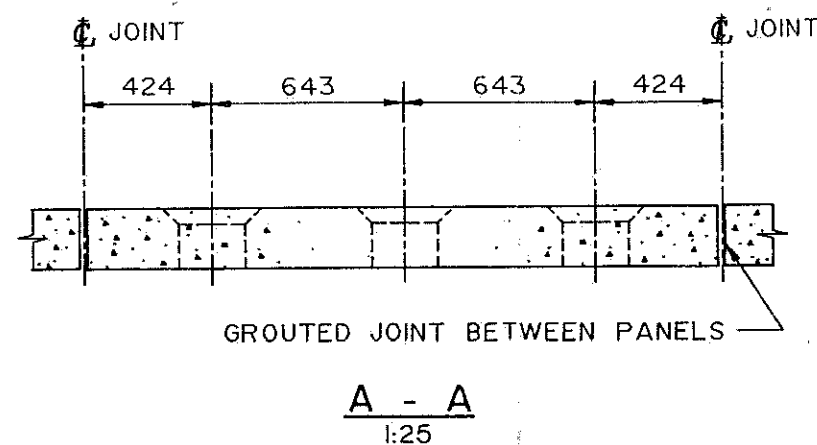
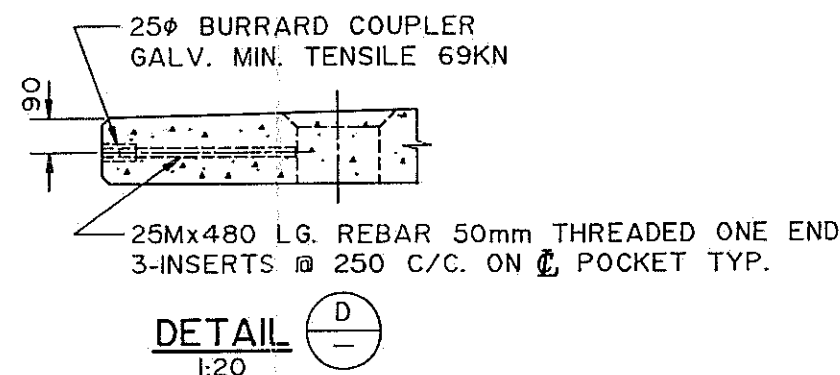
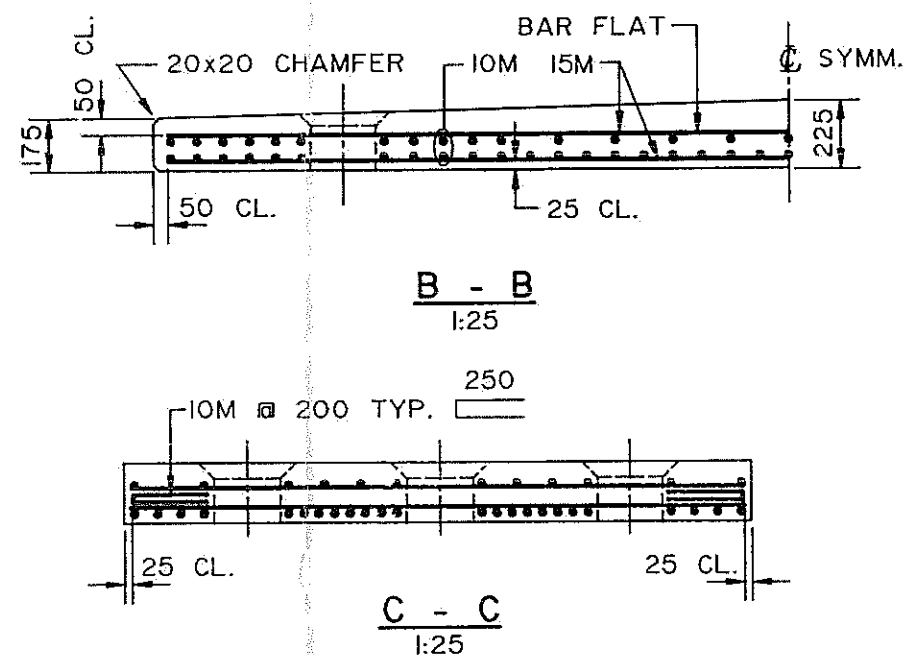
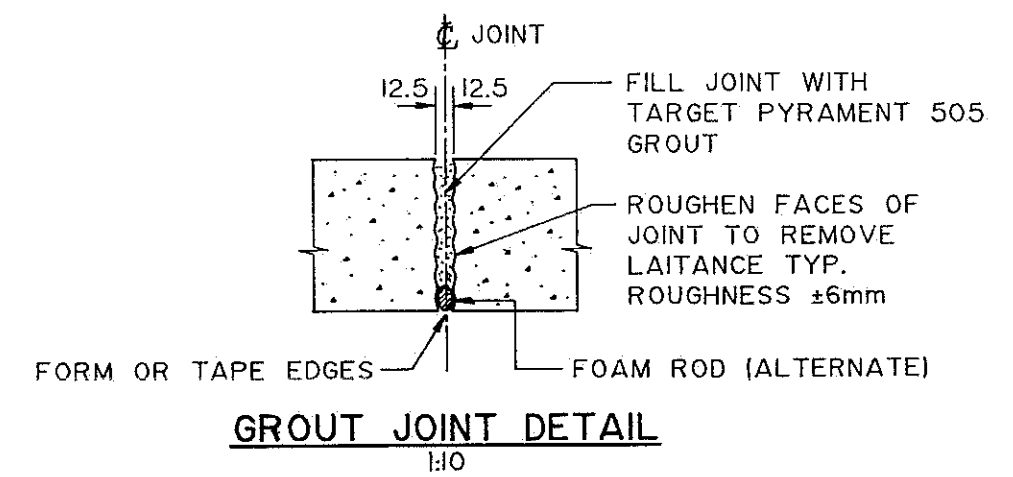
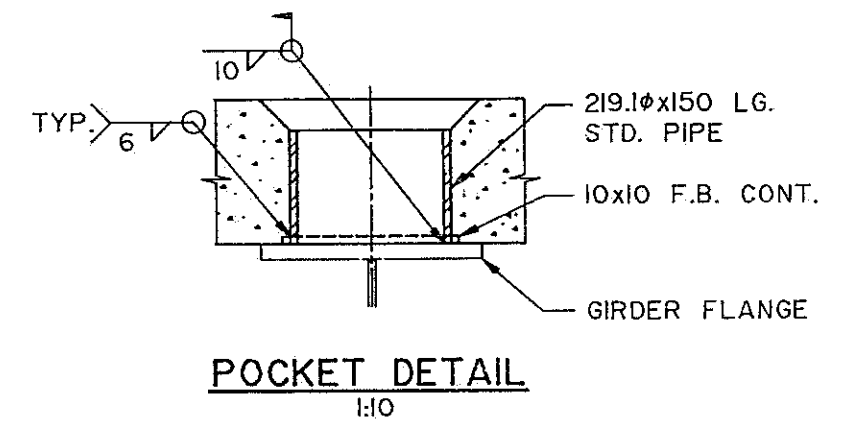
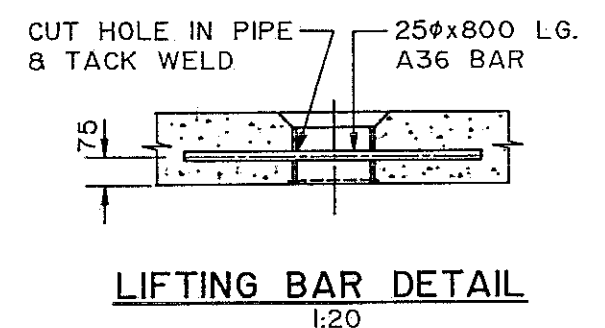
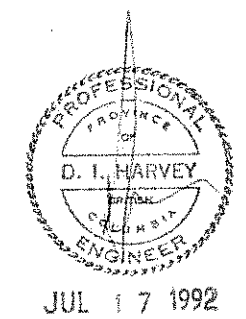


MINISTRY OF FORESTS

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ENGINEERING

LIUMCHEN CREEK BRIDGE
PRECAST DECK PANELS A & B

APPROVED D.I.H.	SCALE AS NOTED
DATE JULY 1992	DWG No.
JOB No VJ87	VJ87-SK-3504



MINISTRY OF FORESTS

ASSOCIATED ENGINEERING

LIUMCHEN CREEK BRIDGE
PRECAST DECK PANEL C

APPROVED D.I.H.	SCALE AS NOTED
DATE JULY 1992	DWG No.
JOB No VJ87	VJ87-SK-3505

BALLAST WALL CONN. DETAIL
1:25

BALLAST WALL REINF. DETAIL
1:25

CURB RAIL DETAIL
1:25

1/2 ELEVATION OF BALLAST WALL
1:50 (2 REQ'D)

PL 250x15.9x300
C/W 2-22Øx100 LG
STUDS @ 200 C/C
ON C

EMBEDDED PLATE DETAIL

1:10 (8 REQ'D)

PROFESSIONAL
ENGINEER
D. I. HARVEY
PROVINCE OF
BRITISH COLUMBIA
JUL 17 1992

MINISTRY OF FORESTS

**ASSOCIATED
ENGINEERING**



LIUMCHEN CREEK BRIDGE
BALLAST WALL & CURB DETAILS

APPROVED D.H.

DATE JULY 1992

JOB No VJ87

SCALE AS NOTED

DWG No.

VJ87-SK-3506

CK-2061

LITTLE TAMIHI WEST 4.2km

2016 Inspection



CBR iPad Offline Ver 0.23

CBR Data

Latitude	Longitude
49°4'16.7"	-121°55'11.9"
Crossing Name	Liumchen Creek
FSR #	5127 Branch # 4
Road Name	LITTLE TAMIHI WEST
User km	4.2
Current Load Rating (tonnes)	54
Structure Class	Permanent Bridge
Portable	N
Superstructure	Concrete Slab Girders
Deck Type	Concrete
Abutment Left	Steel Pipe and Precast Pad
Abutment Right	Steel Pipe and Precast Pad
Spans	1
Total Length (m)	26
Deck Width (m)	4.27

Updated Data

Latitude	Longitude
49°4'17.46"	-121°55'12.85"
HD Diff. (m)	30.4 Accuracy (m) 10

Compo Girders

Concrete Composite

* (770)-704-7055
Tyson Miller.

Inspection

Date of Inspection 2016-11-08 1:04:26 PM

Inspector Name Tyson Miller

Inspection Company MFLNRO

Inspector Comments

(Structural Engineer.)
P.Eng Comments

* Associated

Grade and brush the approaches, post bridge ahead signs and update load rating sign prior to industrial activity. Present load rating of L60 or 54 tonnes to continue.



09/02/2017

P.Eng Seal

CK-2061

LITTLE TAMIHI WEST 4.2km

2016 Inspection



CBR iPad Offline Ver 0.23

Approach

Alignment Fair

Bridge Ahead Signs
Missing ☐ 0 ☐ 1 ☒ 2

Brushing Required Y

Delineator Missing
Left ☒ 0 ☐ 1 ☐ 2Delineator Missing
Right ☒ 0 ☐ 1 ☐ 2

Fender Condition Good

Posted Load Rating 60 ton

Road Surface Fair only public access, no industry

Abutment

Log/Timber Cribs N/A

Tie Backs N/A

Bin Wall N/A

Concrete N/A

Caps or Sills Good

Piles or Posts Good

Ballast Wall Good

Wing Wall N/A

Bracing Good

Hardware Good

Fill Good

Riprap Good

Bearings Good

Corrosion Protection Good

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LITTLE TAMIHI WEST 4.2km

2016 Inspection



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Deck

Running Surface	Good	only public access, no industry
Running Planks	N/A	
Sub Deck	N/A	
Ties	N/A	
Nails	N/A	
Deck to Girder Bolts	N/A	
Concrete Deck	Good	
Grout Pockets	Good	
Deck Joints	Good	
Steel Deck Plate	N/A	
Gravel Surface	N/A	
Curb Rail/Blocks/Posts	Good	
Hand Rails/Walkouts	N/A	
Hardware	N/A	
Overall Deck Condition	Good	
Gravel Depth (mm)		

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Steel/Concrete

Serial/ID Plate

Girders Good

Diaphragms Good

Bracing N/A

Under Trussing N/A

Hardware N/A

Welded/grouted
shear connectors N/A**Log**

Log Curbs

Needle Beam

Needle Lashing/
Shimming

Needle Beam to Crib (m)

Needle Diameter (mm)

Stringer
Number

Species

Peeled

Diameter
(mm)Rot Depth
(mm)

Condition

Comment

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Hazards

Estimated Present Water Level Depth (m)	1.0	High Water	☐	Debris	☐
Estimated Present Water Level Width (m)	18.2	Aggradation	☐	Scour	☐
Estimated High Water Level Clearance (m)	2.0	Ice	☐		

Comments

Repairs and Monitoring

Repair Item	Priority	Repair Description
1	Low	grade out potholes when active
2	Low	brush when active
3	Medium	update load rating sign and post bridge ahead signs

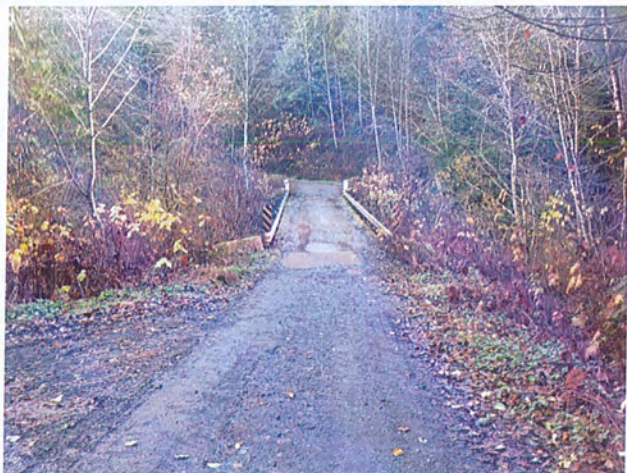
Item	Monitor Description	Frequency
1		
2		
3		

Sketch
(Select Signature)

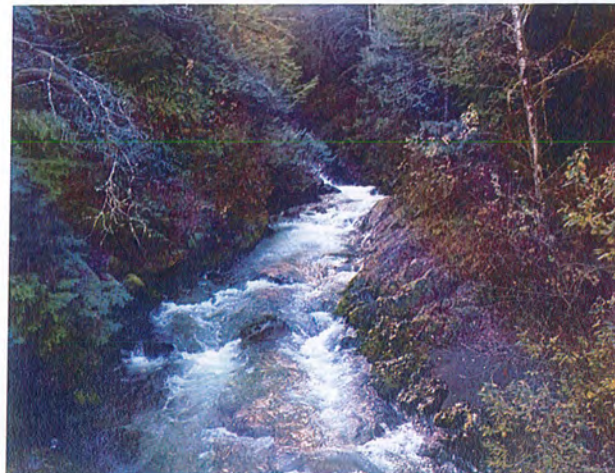
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LITTLE TAMIHI WEST 4.2km

2016 Inspection



Approach from Left Bank when facing downstream



looking upstream



Deck



looking downstream

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LITTLE TAMIHI WEST 4.2km

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Approach from Right Bank when facing downstream



Left Bank Abutment when facing downstream



Downstream Profile



composite superstructure

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LITTLE TAMIHI WEST 4.2km

2016 Inspection



Right Bank Abutment when facing downstream