SEVERKO www.severko.com	PROJECT NAME: TELKWA 62.2 BULKLEY RIVER CROSSING, WIDENING OF 24.0m SPAN, TPG BRIDGE	JOB NUMBER:	CNRAIL0802
	TASK: 6. SUPERSTRUCTURE ANALYSIS AND DESIGN	DESIGNED DGT	CHECKED
	SUBTASK: 6.12. LIFTING DETAILS	DATE: 5-Aug-08	DATE:

REFERENCES:

6.12.1. LIFTING DEVICE FOR COMPLETE TPG:

LIFTING PLATES 25 mm pl. w/ 2- 19 mm cheek plates
HOLE SIZE 80 mm

6.12.1.1. BEARING

BEARING CAPACITY 0.83 Fy 290.5 Mpa
R= 50400 kg= 494 kN
∑t= 63 mm
σ= R/(Σt*d)= 98.1 Mpa < 290.5 Mpa o.k

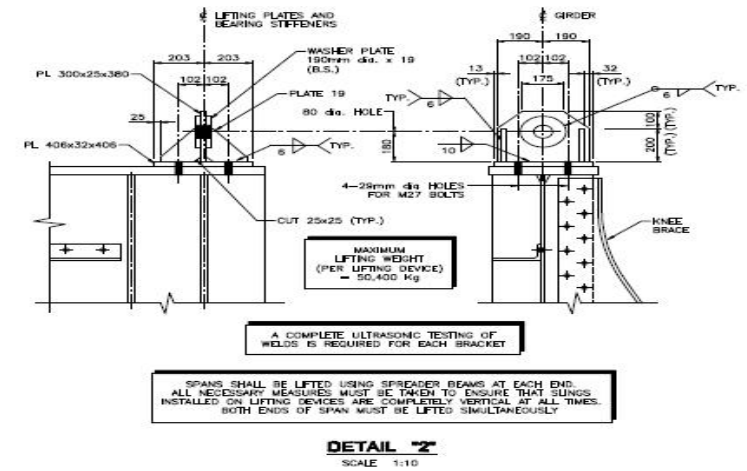
AREMA, CHAPTER 15 § 1.4.2.

Check per Canadian CAN/CSA S-16, § 13.10
Br<(e/d)Φbr*t*n*d*Fu= 804 kN
Br/R= 1.63
e (edge distance)= 100 mm
Φbr= 0.67
Fu= 480-650 Mpa 480 Mpa
Br=1.5*Φ*Fy*A= 2381.4 KN
less of calaculated bearing factored resistances: 804 KN
Factor of safety= 1.63 note: compared service load force against factored resistance!

CAN/CSA S-16-01

6.12.1.2. WELD TO TOP FLANGE

Welding of lifting pl. for top flange;
weld size: 10 mm
weld grade: E49XX electrodes Fu= 450 MPA
As per CAN/CSA S-16, Handbook of Steel Construction, Table 3-25, factored shear resistance on fillet weld is:
1.56 kN/mm (here, weld is in tension but the strength for shear is o.k. to be used!)
Weld length 760 mm
Total weld factored resistance: 1185.6 KN
safety factor= 2.40 note: compared service load force against factored resistance!
As per AREMA , Chapter 15, § 1.4.2., Table 15-1-13, Allowable stresses on welds (and base metal)
for 70 ksi welding tensile strength, f,weld,all= 19000 psi 130.91 MPA
Maximum stress in base metal, 0.35 Fy= 17779.39 psi 122.5 MPA
Actual stress in weld=494*1000/760/10 65.06 MPA
Factor of safety= 1.88 o.k.
note: DESIGNED TO LIFT GIRDERS ONLY WITH 2 CRANES- HOOKS VERTICAL/PLUMB
Since there is a strict requirement to lift the TPG superstructure with the spreader beam and thus always keeping the beams in straight alingment horizontal alignment, and also the hooks being always vertical, no additional/secondary stresses due to lifting will occur in TPG.



DETAIL "2"
SCALE 1:10

6.12.2. LIFTING DEVICE FOR COMPLETE TPG:

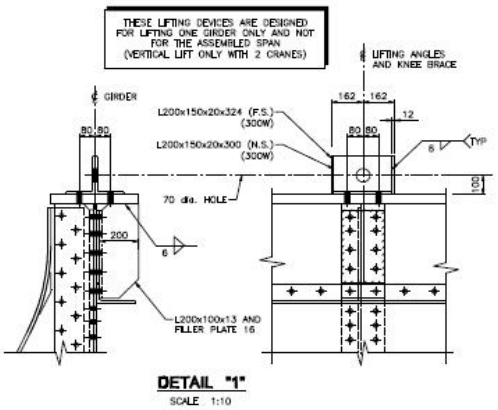
6.12.2.1. LIFTING ANGLES FOR SINGLE GIRDERS W/BEARINGS :

LIFTING PLATES 20 2-PLATES FROM ANGLES L200X150X20
HOLE SIZE 70 mm

6.12.2.1.1. BEARING

BEARING CAPACITY 0.83 Fy 249 Mpa
R= 10500 kg= 103 kN
∑t= 40 mm
σ= R/(Σt*d)= 36.7875 Mpa < 249 Mpa o.k

Check per Canadian CAN/CSA S-16, § 13.10
Br<(e/d)Φbr*t*n*d*Fu= 1286.4 kN
Br/R= 12.49
e (edge distance)= 100 mm
Φbr= 0.67
Fu= 480-650 Mpa 480 Mpa
Br=1.5*Φ*Fy*A= 1134 KN
less of calaculated bearing factored resistances: 1134 KN
Factor of safety= 11.01
note: compared service load force against factored resistance!



6.12.2.1.2. BOLTED CONNECTION TO TOP FLANGE (4-M27, ASTM 325M)

bolt size 27 mm
bolt grade Fu= 725 MPA
As per CAN/CSA S-16, Handbook of Steel Construction, Table 3-4, factored tensile resistance on one bolt is:
285 kN/ea.
number of bolts 4
Total bolted factored resistance: 1140 KN
safety factor= 11.07 note: compared service load force against factored resistance!
As per AREMA , Chapter 15, § 1.4.1., Table 15-1-12, Minimum tension of installed bolts:
for A325 , 1 1/8" bolt: 56 kips 251.16 kN
Total number of bolts: 4 224.00 kips 1004.64 kN

Factor of safety= 9.75 o.k.
note: since the factor of safety is very high, further evaluation of the connection in tension with respect of praying is not required!
note: DESIGNED TO LIFT GIRDERS ONLY WITH 2 CRANES- HOOKS VERTICAL/PLUMB
Since there is a strict requirement to lift the single girder with the vertical ropes and thus always keeping the girder in straight alingment horizontal alignment, and also the hooks being always vertical, no additional/secondary stresses due to lifting will occur in the girder