SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 | SHEET NO. 1 OF

COMPUTATIONS FOR Truss Details | DATE Nov, 63

BY C.J.R. CHKD

Rivet Pitch - AASHO, Art 1.6.22 & Art 1.6.23

Thickness t, in.	Stitching Compr. 12t	Stitching Tension 24t	Sealing 4"+4t
5/16			
3/8			
7/16			
1/2			
9/16			
5/8			
11/16			
3/4			
13/16			
7/8			
15/16			
1			
1 1/16			
1 1/8			
1 3/16			
1 1/4			
1 5/16			
1 3/8			
1 7/16			
1 1/2			

Member U1-L1

Stress : 587^k C

Capacity : 640^k C

1227 ÷ 2 : 614^k avg.

3/4 × 640 = 480

614 ÷ 10.6 = 58$^{(-)}$ 1" reg rivets req'd @ L1

480 ÷ 10.6 = 45 1" " " " @ U1

614 ÷ 15.7 = 39$^{(+)}$ 1" H.S. " " " L1

480 ÷ 15.7 = 31$^{(-)}$ 1" H.S. " " " U1

Upper Laterals

Panel U0-U1 :

Stress = 256^k C @ 125% N.U.S.

Capacity = 275^k C

531 ÷ 2 = 265^k avg.

265 ÷ 8.12 = 33$^{(-)}$ - 7/8 rivets req'd

Panels U1-U2 thru U13-U14 :

Max Stress = 116^k T or C (Panel U3-U4)

Capacity : 176^k C , 310^k T

$\frac{176 + 116}{2}$ = 146^k avg

3/4 × 176 = 132^k

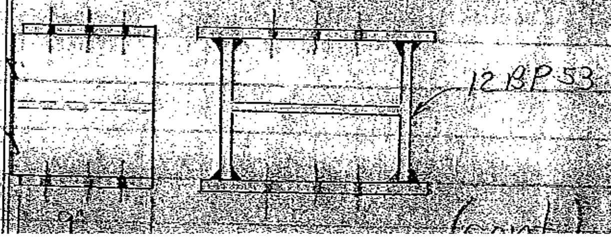
132 ÷ 8.12 = 16$^{(+)}$

18 rivets × 8.12 = 146$^{(+)k}$ > 146^k

∴ Use 18 - 7/8" rivets

18 Furn. - Pattern 3.3.3

Weld Req'd for Conn. Pls. @ ends of Laterals (Panels U1-U2 thru U13-U14)



(Cont.)

SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 — SHEET NO. 2 OF

COMPUTATIONS FOR Truss Details — DATE Nov 11, '63

BY C.J.R. CHKD

(Cont. from pg. 1)

9 rivets × 8.12 = 73^K

Size Weld Req'd:

Size × 0.707 × 9" × 4 welds × 12.4^ksi = 73^K

Size = 73/0.707 × 9 × 4 × 12.4

= 0.23

∴ Use 1/4" Weld

Joint U1 Gusset Pl. size

Pl. width = 21" @ Top row rivets in U1-L1

Try 1/2" A-441 Pl's

f = P/A = 587^K/2 ÷ 21 × 1/2 = 27.9^ksi > 27

Try 9/16", f = 24^ksi < 27^ksi

∴ Use 9/16" - A441 Gusset Pl.

Joint U1 Lat. Pl size

25% × 176 = 132^K T

Net Width = say 22" - 3 rivets = 19"

Area = 3/8 × 19 = 7.13 sq in

f = 132/2 ÷ 7.13 = 9.3^ksi

∴ Use 3/8" - A36 Lateral Pl's.

Member U0-U2 (A-36)

Capacity = ~~683^K T~~ 734^K T

Stress = 683^K T

708 ÷ 10.00 = 71^(-) - 1" rivets req'd (H.S.)

Pattern 4444444466888 = 136

Bearing on 1/2 Pl = 20,000;

20,000/2 = 10.00

Member U2-U4 (A441)

Capacity = 1020^K C, 1220^K T

311 + 513 + 67 = 891^K C (Reversal)

437 + 39 + 280 = 196^K T

1087^K

1087 ÷ 10.00 = 109^(-) - 1" rivets req'd (H.S. or rog)

Pattern 4444444466888 = 136

Member L1-U2 (A441)

Capacity = 1218^K C

Stress = 1205^K C

1218 ÷ 15.7 = 78^(-) - 1" rivets req'd (H.S.)

Pattern 5777753 = 82

Member U2-L2 (A441)

Capacity = 546^K T

Stress = 533^K T

546 ÷ 15.7 = 35^(-) - 1" rivets req'd (H.S.)

Pattern 2244444 = 48 @ U2

75% × 546 ÷ 15.7 = 26 req'd @ L2 Use 22424 = 28

Member U2-L3 (A441)

Capacity = 655^K T

215 + 325 + 43 = 583^K T

217 + 24 - 193 = 48^K C

631^K

631 ÷ 15.7 = 40^(+) - 1" rivets req (H.S.)

Pattern 2244442 = 44

631 ÷ 16.6 = 60^(-) - 1" req. rivets req

SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 SHEET NO. 4 OF

COMPUTATIONS FOR Truss Details DATE Nov. '63

BY C.J.R. CHKD

Member U2-L2 (Check $\frac{s^2}{4g}$)

$s^2/4g = \frac{(3.75)^2}{4 \times 3.50} = \frac{14.05}{14.00} =$ say 1.00

$15 - 2 \times 9/8 = 15 - 2.25 = 12.75"$

$15 - (4 \times 9/8) + (2 \times 1.00) =$

$15 - 4.50 + 2.00 = 12.50$

Try $s^2/4g = \frac{(4.00)^2}{4 \times 3.50} = \frac{16}{14.00} = 1.14$

$15 - 4.50 + 2(1.14) = 12.78$

> 12.75 ∴ OK

Use 4" pitch between Row 1 & 2

Member L1-U2 (Develop Cov. Pl.)

Area $= (20.00 - 10.00)\,1/2 = 5.00$ □"

Cap. $= 5.00 \times 19.02 = 95.1^K$ C

Cov. Pl Length = say 12", weld = 5/16"

Cap. $= 12" \times 4$ welds $\times 0.707 \times 5/16 \times 14.7$ psi $=$

$156^K > 95.1^K$ ∴ OK

Member U2-L3 (Develop Web Pl)

Area $= 7.45 \div 2$

Cap $= (7.45 \div 2)\,27 = 100^K$

Cap. $= 25" \times 2$ welds $\times 0.707 \times 1/4 \times 14.7$ psi $=$

$130^K > 100^K$ ∴ OK

Member U2-L2 (Develop Web Pl)

Cap. $= (7.50 \div 2)\,27 = 101^K$

Cap. $= 26.5" \times 2 \times 0.707 \times 1/4 \times 14.7$ psi $=$

$138^K > 101^K$ ∴ OK

Joint U2 - (Develop Splice Mat'l)

Assume 1/2" Splice Pl. (A441)

Area $= (27.50" \times 1/2") - (8 \times 9/8 \times 1/2)$

$= 13.75 - 4.50 = 9.25$ □"

$(9.25 \times 27) \div 10.00 = 25$ 1" H.S. rivets R

Develop 1/16" Fill Pl (A441)

Area $= (27.50 \times 1/16) - (8 \times 9/8 \times 11/16)$

$= 1.72 - 0.56 = 1.16$ □"

$(1.16 \times 27) \div 11.25 = 3$ ℄ rivets Req'd

Member U1-L1 (Develop Cov. Pl.)

Area $= (20.00 - 10.00)(1/2) = 5.00$ □"

Cap. $= 5.00 \times 19.71 = 99^K$

For 1/4" weld:

Length $\times$ 4 welds $\times 0.707 \times 1/4 \times 14.7 = 99^K$

$L = 99 \div 4 \times 0.707 \times 1/4 \times 14.7 = 9'2"$ req'd

Joint L2 - (Gusset Pl. Size)

Try 9/16 A-441 Pls

$f = P/A = \frac{546}{2} \div (19'2 - 4 \times 9/8)\,9/16$

$= 273 \div 8.43 = 32.4^{KSI} > 27^{KSI}$

Try 11/16" A-441 Pls

Area $= 15\,(11/16) = 10.3$ □"

$273 \div 10.3 = 26.5^K < 27^K$ ∴ OK

∴ Use 3/4" A441 Gusset Pl

SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 SHEET NO. 5 OF

COMPUTATIONS FOR Truss Details DATE Nov '63

BY C.J.R. CHKD

Joint U2 - (Transferring Stress to Gusset)

For Member U0-U2

$4 \times 11.25 = 45^K$

2 add holes $= 2 \times \frac{9}{8} \times \frac{9}{16} \times 20 = 25^K$

$8 \times 11.25 = 90^K$

4 add holes $= 4 \times \frac{9}{8} \times \frac{9}{16} = 50^K$

For Member U2-U4

$4 \times 11.25 = 45^K$

2 add holes $= 2 \times \frac{9}{8} \times \frac{9}{16} \times 27 = 34^K$

$8 \times 11.25 = 90$

4 add holes $= 4 \times \frac{9}{8} \times \frac{9}{16} = 68^K$

Joint U2 (Cover PL Splice)

Cover PL Area $= 7.69/2 = 3.85^{\square''}$

Try Splice PL $= 15\frac{5}{8}'' \times \frac{3}{8}'' = 5.85^{\square''}$

$- 4 \times \frac{9}{8} \times \frac{3}{8} = 4.16^{\square''}$

$4.16 \times 27 \div 10.6 = 11^{(-)}$ 1" - Regular Rivets

Lower Lateral Connections

Use Box Section - Sht 24 (A36)

Cap. $= 136^K$ C , 240^K T

Max Stress $= 48^K$ T or C

$(136 + 48) \div 2 = 92^K$

$75\% \times 136^K = 102^K$

$102 \div 8.12 = 13^{(-)}$ Req'd ($\frac{7}{8}$" Regular)

Pattern = 233 = 16 rivets

Joint

Bottom Strut Conn's.

Same section as bottom Laterals

Cap. $= 178^K$ C , 240^K T

Max Stress $= 65.4 \div 2 = 32.7^K$ T or C

$75\% \times 178^K = 134^K$

$134 \div 8.12 = 16^{(+)}$ Req'd ($\frac{7}{8}$" Regular)

Pattern 2323 - 20

Conn. U2-L2 @ L2

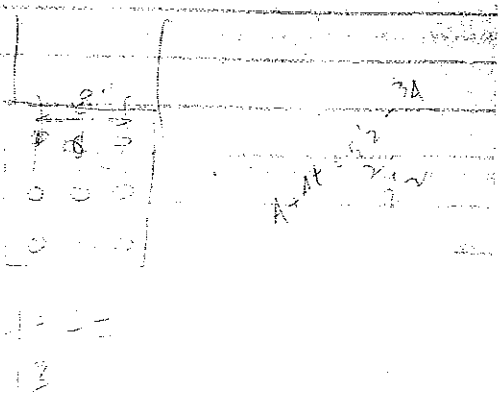
Capacity $= 555^K$ T

Max Stress @ L2 < say 10^K

$\therefore 75\% \times 555^K = 416^K$

$416 \div 10.6 = 39^{(+)}$ 1" rivets req'd

Member U2-L2 has both H.S. and regular rivets in it, but say all since the regular rivets have very little stress.



SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 SHEET NO. 6 OF

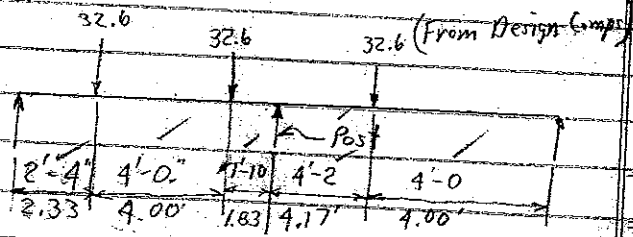
COMPUTATIONS FOR Truss Details DATE Nov 21, '63

BY C.J.R. CHKD

Determine Max. Load on a Post member

Max D.L. = 32.6 Kips (From Design Comps)

Determine L.L. :



Max Ld @ post

$32.6\left(\frac{6.33}{8.16}+\frac{2.33}{8.16}+\frac{4.00}{8.16}\right) = 50.5^{K}$

LL + Imp = 50.5 × 1.3 = say 66 K

DL + LL + Imp = 66 + 32.6 = say 100 K

~~100 ÷ 10.6 = 9(+) 1" Reg rivets req'd~~

Member U0-L1 A-441

Stress = 871 K C

Capacity = 936 K C

1807 = say 900 K Avg.

Furn 100 e U0 ← 900 ÷ 10.6 = 85-1" Reg Rivets Req'd

Furn 104 e L1 900 ÷ 15.7 = 57(+)-1" H.S. Rivets "

Develop Cover Pl

A = (20-10) 1/2 = 5.00 □"

Cap. = 5.00 × 18.68 = 93.3 K

93.3 = l × 4 welds × 0.707 × 5/16 × 14.7 psi

$l_{req'd}$ = 93.3 ÷ 4 × 0.707 × 5/16 × 14.7

= 7.2" say 7 1/2"

Member L1-L3

Capacity = 702 K C, 297 K T

148 + 333 + 43 = 524 K T } Reversal

345 + 31 - 133 = 243 K C }

767 K

767 K ÷ 15.7 = 49 1" H.S. rivets req'd @ L1

Pattern 4@4@6@8 = 76 furnished

Joint L1

Spl. Mat'l Furnished :

2 gussets : say 28" × 5/8 = 35.0 □"

2 Spl Pls : " 28 × 5/8 = 35.0 □"

70.0 □"

- 16 holes × 9/8 × 10/8 = 22.50

Net A = 47.50 □" > 39.82 for L1-L3 ∴ say OK

Develop Spl Pl's

5/8 × 27 1/2 - 9/8 × 8 × 5/8 = 17.2 - 5.6 = 11.6

(11.6 × 27) ÷ 10.6 = 29(+) 1" reg rivets req'd

Develop 1/4" Fill Pl

1/4 × 27 1/2 - 9/8 × 8 × 1/4 = 6.88 - 2.25 = 4.63 □"

(4.63 × 27) ÷ 10.6 = 12(-) req'd.

Joint U2 - L3 (Cover Pl Splice)

Top Cov. Pl Area = 3.75 □"

Try Splice Pl 3/8" × 20" - 5 × 9/8 × 3/8

= 7.50 □" - 2.11 = 5.39 □" ∴ OK

5.39 × 20 ÷ 10.6 = 10(+) 1" reg riv.

Bottom

Cov Pl Area = 3.75 □"

Try Splice Pl 3/8 × 15 1/2" - 4 × 9/8 × 3/8

= 5.82 - 1.69 = 4.13 □" > 3.75 ∴ OK

4.13 × 20 ÷ 10.6 = 8(+) 1" reg rivets req'd

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO. 9 OF

COMPUTATIONS FOR Truss Details DATE Dec 4, 1963

BY CTR CHKD

Member L3-U4 (A441)

Stress = 594^K T

Capacity = 618^K T, 482^K C

1212 ÷ 2 = 606^K T avg.

606 ÷ 15.7 = 39$^{(-)}$ 1" HS rivets ✓

606 ÷ 10.6 = 57$^{(+)}$ 1" reg. "

Pattern 4345531 - 60

Member L3-L5 (A441)

Capacity = 1180^K T, 986^K C

78 + 572 + 74 = 724^K T
490 + 44 - 70 = 464^K C
1188^K } Reversal

1188 ÷ 10.00 = 119$^{(-)}$ HS. or Reg rivets

Develop Horiz. Diaphragm

Area ~ 11.25$^{D^u}$

Cap = 11.25 × 20.43 = 230^K

Rivets Req'd = (11.25 × 27) ÷ 10.0 = 30$^{(+)}$ OK

Weld length req'd:

= (11.25 × 20.43) ÷ ¼ × 0.707 × 14.7 × 4 welds

= 280 ÷ 10.4 = 22.1" req'd; 29.5" furn.

say OK

SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 SHEET NO. 10 OF

COMPUTATIONS FOR Truss Details DATE Dec 10, 1963

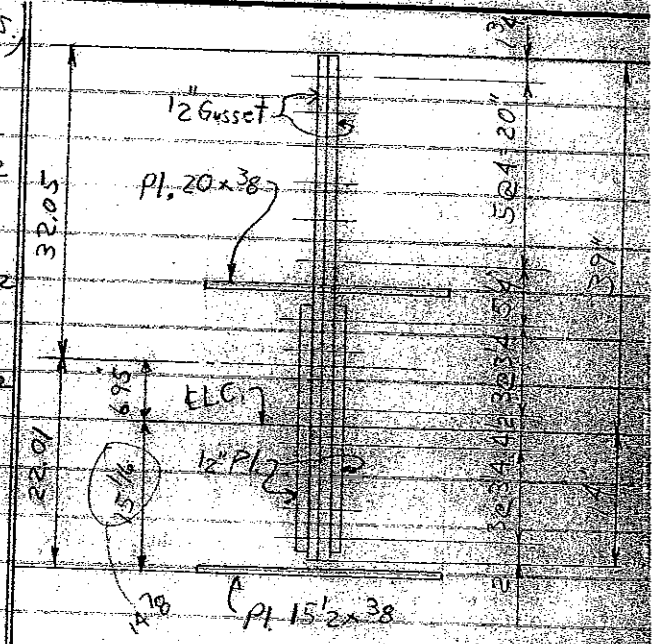
BY C.J.R. CHKD

Splice @ L3 Mtl. A441 (A.S.)

Say stress across Jt L3 =
Stress in U2-U4 = say 1090^k (see sheet 2)
↑ change

Holes out = $(\frac{9}{8} \times 2)(\overline{18.95}^2 + \overline{15.70}^2 + \overline{12.45}^2 + \overline{9.20}^2 + \overline{4.70}^2 + \overline{1.45}^2 + \overline{1.80}^2 + \overline{5.05}^2) + (\frac{9}{8} \times 1)(\overline{10.30}^2 + \overline{14.30}^2 + \overline{18.30}^2 + \overline{22.30}^2 + \overline{26.30}^2 + \overline{30.30}^2)$

$= 2030 + 3100 = 5130$



		A_{gr}	$\bar{y}$	$A\bar{y}$	A(net)	
2 Gusset Pls	53×½	53.00 in²	12.5	663	37.25	28×⅞×½ = 15.75 in²
2 Spl. Pls	27½×½	27.50	0	0	18.50	16×⅞×½ = 9.00 in²
1 Top Spl. Pl	20×⅜	7.50	14.88	111.5	5.39	5×⅞×⅜ = 2.11
1 Bott Spl. Pl	20*×⅜	7.50	−14.88	−111.5	5.39	5×⅞×⅜ = 2.11
		95.50 in²	12.50	663	66.53 in²	

*Assumed Eff. Pl width (Pl. is actually 15½" wide)

I:	A	d	Ad^2	I_o
Gussets	53.00	5.55	1632	12,400
Spl. Pls	27.50	6.95	1830	1738
do (net)	5.39	7.93	338	~~
do (net)	5.39	21.83	2580	~~
			5880	14,138
				5880
				20,018
		holes out		−5130
		I_{net}		14,888

S_m (top) = 14888 ÷ 32.05 = 464
S_m (bott) = 14888 ÷ 22.01 = 675

Stresses

1090^k across joint (see above)

At bottom
$f = \frac{1090}{66.53} + \frac{1090 \times 6.95}{675}$

$= 16.4 + 11.2 = 27.6^{ksi\ T} > 27$

∴ Use ⅝" Gussets

Conn. Spl. Mat'l	Req'd	Furn.
Pl 27.50×½ = 9.25×27÷10 =	25	24
Pl 20×⅜ : 5.62×27÷8.1 =	19	20
Pl 15⅛×⅜ : 4.17×27÷8.1 =	14	16

say 24 is OK since 10^{ksi} is conservative

SVERDRUP & PARCEL

JOB Minnesota Bridge #9340 SHEET NO. 11 OF

COMPUTATIONS FOR Truss Details DATE Dec 11, 1963

BY C.J.R. CHKD

Member U4-U6 (A441)

Capacity = 1063^{KT}, $934^{K}C$

$352^{T} + 526^{T} + 47^{T} = 925^{KT}$ } Reversal
$443 + 58 - 317 = 184^{K}C$ }
1109^{K}

$1109 \div 10.00 =$ 111 H.S. or Reg rivets @ U4 req'd

$1109 \div 15.7 =$ $71^{(-)}$ H.S. rivets req'd @ U6

Member U4-L5 (A441)

Capacity = 1008^{K} C

Stress = 791^{K} C

$1008 \div 15.7 =$ $64^{(4)}$ 1" H.S. rivets req'd

$1008 \div 10.6 =$ 95 1" req " "

Member L5-L7 (A441)

Capacity = 1588^{K} C

Stress = 1578^{K} C

$1588 \div 15.7 =$ 101 1" H.S. rivets req'd

Member L5-U6 (T-1)

Capacity = 1372^{K} T

Stress = 1259^{K} T

$2631 \div 2 = 1316^{K}$ T (avg)

$1316 \div 15.7 =$ $84^{(-)}$ 1" H.S. rivets req'd.

Member U5-L5 (A441)

Capacity = 609^{K} C

Stress = 586^{K} C

$1195 \div 2 = 598^{K}$ C avg

$75\% \times 609 = 456^{K}$ C

$598 \div 15.7 =$ $38^{(4)}$ 1" H.S. rivets req'd @ Jt. L5

$456 \div 15.7 =$ 29 " " Jt. U5

Joint L5

Develop 12" I.S. Spl. Pl

$\frac{2.7 \times 12 \times 27^{ksi}}{15.7} = 24^{(-)}$ 1" H.S. rivets req

Develop 12" x 27/8" Fill Pl

Same as Spl. Pl = $24^{(-)}$ 1" H.S. riv

Member L5-U6 (Develop Web Pl

Weld length req'd =

$\frac{8.4^{kips} \times 15^{ksi}}{.4 \times 0.707 \times 14.7 \times 4 \text{ welds}} = 37.4"$ (too long

Use 3/8" weld = $\frac{37.4 \times 1/4}{3/8} = 24.9"$ (OK)

Member U6-L7 (A441)

Capacity = 1650^{K} C

Stress = 1618^{K} C

$1650 \div 15.7 =$ 105 1" H.S. rivets req'd

Pattern @ U6

Member U6-U8 (T-1)

Capacity = 2300^{K} T

Stress = 2312^{K} T

$2300 \div 15.7 =$ 153 1" H.S. Rivets req'd

Pattern

$4 \times 15.7 = 62.8^{K}$

$2 \times 7/8 \times 7/8 \times 45 = 88.6$ too high

$8 \times 15.7 = 125.6^{K}$

∴ Pattern shall begin : 4@8

SVERDRUP & PARCEL

JOB Minnesota Bridge #9340 SHEET NO. 11 OF

COMPUTATIONS FOR Truss Details DATE Dec 11, 1963

BY C.J.R. CHKD.

Member U4-U6 (A441)

Capacity = 1063^{KT}, $934^{K}C$

$352^{T} + 526^{T} + 47^{T} = 925^{KT}$ } Reversal

$443 + 58 - 317 = 184^{K}C$ }

1109^{K}

$1109 \div 10.00 = 111$ H.S. or Rec. rivets @ U4 req'd

$1109 \div 15.7 = 71^{(-)}$ H.S. rivets req'd @ U6

Member U4-L5 (A441)

Capacity = 1008^{K} C

Stress = 991^{K} C

$1008 \div 15.7 = 64^{(4)}$ 1" H.S. rivets req'd

$1008 \div 10.6 = 95$ 1" rec. " "

Member L5-L7 (A441)

Capacity = 1588^{K} C

Stress = 1578^{K} C

$1588 \div 15.7 = 101$ 1" H.S. rivets req'd

Member L5-U6 (T-1)

Capacity = 1372^{K} T

Stress = 1259^{K} T

$2631 \div 2 = 1316^{K}$ T (avg)

$1316 \div 15.7 = 84^{(-)}$ 1" H.S. rivets req'd.

Member U5-L5 (A441)

Capacity = 609^{K} C

Stress = 586^{K} C

$1195 \div 2 = 598^{K}$ C (avg)

$75\% \times 609 = 456^{K}$ C

$598 \div 15.7 = 38^{(4)}$ 1" H.S. rivets req'd @ Jt. L5

$456 \div 15.7 = 29$ " " Jt. U5

Joint L5

Develop 12" I.S. Spl. PL

$\frac{27 \frac{1}{2} \times \frac{1}{2} \times 27^{KSI}}{15.7} = 24^{(-)}$ 1" H.S. rivets req'd

Develop 12" x 27½" Fill PL

Same as Spl. PL = $24^{(-)}$ 1" H.S. rivets

Member L5-U6 (Develop Web PL)

Weld length req'd =

$\frac{8.64^{KIPS} \times 45^{KSI}}{\frac{1}{4} \times 0.707 \times 14.7 \times 4 \text{ welds}} = 37.4$" (too long)

Use ⅜" weld = $\frac{37.4 \times \frac{1}{4}}{\frac{3}{8}} = 24.9$" (OK)

Member U6-L7 (A441)

Capacity = 1650^{K} C

Stress = 1618^{K} C

$1650 \div 15.7 = 105$ 1" H.S. rivets req'd

Pattern @ U6

Member U6-U8 (T-1)

Capacity = 2300^{K} T

Stress = 2312^{K} T

$2300 \div 15.7 = 153$ 1" H.S. Rivets req'd

Pattern

$4 \times 15.7 = 62.8^{K}$

$2 \times \frac{7}{8} \times \frac{7}{8} \times 45 = 88.6^{K}$ too high

$8 \times 15.7 = 125.6^{K}$

∴ Pattern shall begin : 4468

SVERDRUP & PARCEL

JOB Minnesota Bridge # 9340 SHEET NO. 12 OF

COMPUTATIONS FOR Truss Details DATE 12-13-63

BY C.J.R. CHKD

Splice @ U4 + U24 (Mtl. A36)

Stress across joint = Stress in L3-L5 or L23-L25

Design Joint For 693[k] C, 630[k] T

Assume "c.g." and "I" of this joint to be same as @ Jt U2

With no holes out: (Comp)

S.m. (top) = 22,023 ÷ 22.5 = 980

Stress @ top:

= f

With holes out (Tension)

S.m. (top) = 16560 ÷ 22.5 = 735

Stress @ top

$$f = \frac{464}{67.39} + \frac{464 \times 7.62}{735}$$

$$= 6.89 + 4.81 = 11.70^{ksi}\ T$$

Figure Splice ℄'s with holes out because sag stress on splice ℄'s = 13[ksi] - (conservative - see comps. above)

13[ksi] × 13.75[in²] = 179[kips] to develop

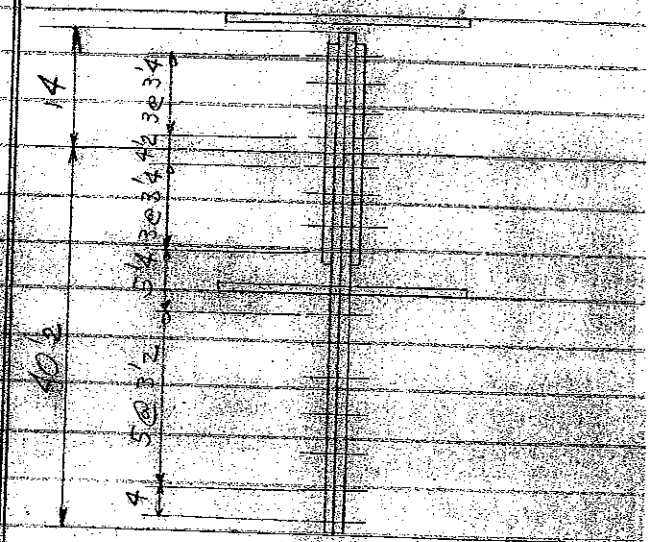
179 ÷ 10[kips]/rivet = 18 req'd < 24 furnished

∴ sag OK

For lateral ℄ 20 × 3/8 = 7.50[in²] × 13[ksi] = 98[k]

98 ÷ 8.1 = 12 req'd < 20 furnished

∴ sag ok



VOID

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO. 13 OF

COMPUTATIONS FOR Truss Details DATE Dec. 16, 1963

BY C.J.R. CHKD

Splice @ L5 Mtl - A441 (1S)

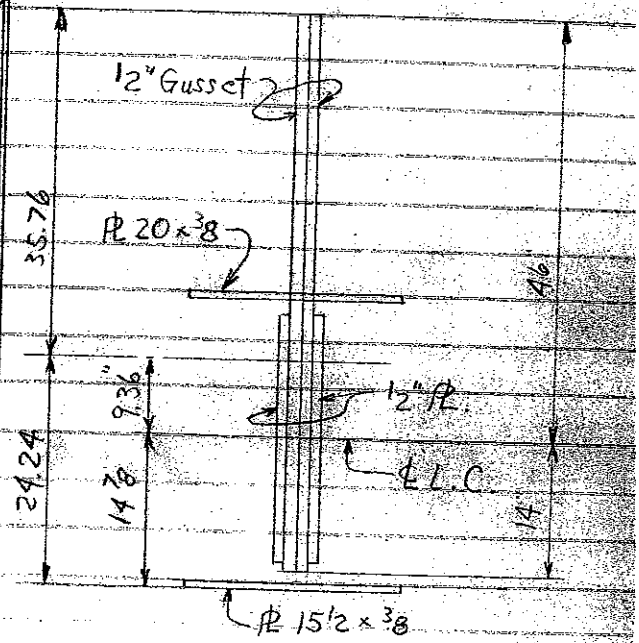
Say stress across jt = stress in member U4-U6.

Member U4-U6: 925^K T, 184^K C

45.92
36.12
9.80

76 | 9.80 | 16.6

(76.6 ÷ 76) × 925 = 935^K C across Jt L5



	Agr	y	Ay
2 Gusset Pls 60×1/2	60.00	16.00	960
2 Spl. Pls 27 1/2×1/2	27.50	0	0
1 Top Spl Pl 20×3/8	7.50	14.69	110
1 Bott Spl Pl 20*×3/8	7.50	-14.69	-110
	102.50	16.00	960

* Assumed effective Pl width (Pl is actually 15'2" wide)

I:	A	d	Ad^2	I_o
Gussets	60.00	6.64	2640	18,000
Spl Pls	27.50	9.36	2420	1738
do	5.39	5.33	153	~~
do	5.39	24.05	3116	~~
			8329	19,738
				8329
		I_{gr}		28,067

S_m (top) = 28,067 ÷ 35.76 = 786

S_m (bott) = 28,067 ÷ 24.24 = 1160

Stresses

935^K C across Joint

At bottom

$f = \frac{935}{102.50} + \frac{935 \times 9.36}{1160}$

= 9.11 + 7.53 = 16.6 ^{Ksi} < 27^{Ksi}

Use 3/8" I.S. Spl Pl's Stress = 12 ^{Ksi} (Satisfactory)

Conn. Spl. Mtl		Reqd.	Fur
Pl 27.50×3/8	= 10.3 × 27 ÷ 15.7 =	18(-)	24
Pl 20×3/8	= 7.50 × 27 ÷ 15.7 =	13(-)	15
Pl 15 1/2×3/8	= 5.81 × 27 ÷ 15.7 =	10	12

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO. 14 OF

COMPUTATIONS FOR Truss Details DATE Dec. 18, 1963

BY C.J.R. CHKD.

Splice @ U6 Mtl. (Q.T.)

Say stress across Mt. = horiz component of stress in L5-L7

Member L5-L7 = 1588^K C

52.041
39.796
12.245

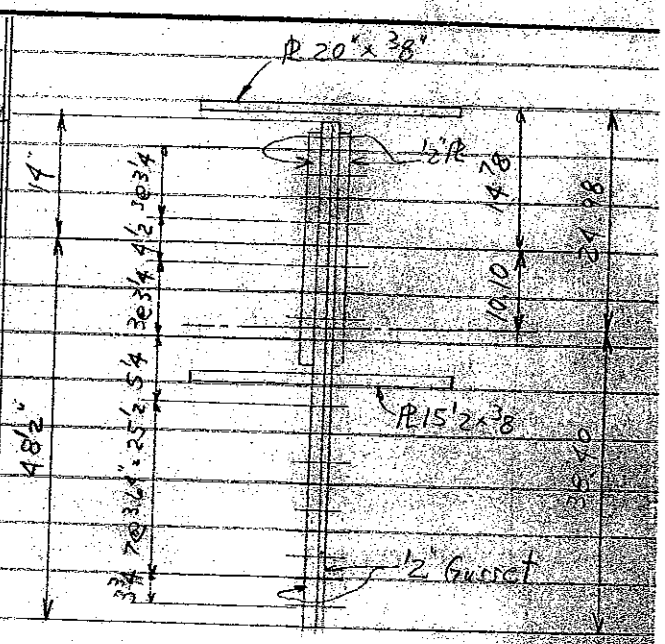
76
12.24
77.1

116.0

77.1 × 1588 = 1560^K T across Mt. U6

Holes out = $(\frac{9}{8}\times 2)(22.10^2 + 18.85^2 + 15.60^2 + 12.35^2 + 7.85^2 + 4.60^2 + 1.35^2 + 1.90^2) + (\frac{9}{8}\times 1)(7.15^2 + 10.79^2 + 14.93^2 + 18.07^2 + 21.71^2 + 25.35^2 + 28.99^2 + 32.63^2 + 36.63^2)$

= 2990 + 5700 = 8690



	Aor	y	Ay
2 Gusset Pls 62" × 1/2"	62.00	17.00	1054
2 Spl. Pls 27 1/2 × 1/2"	27.50	0	0
1 Top Spl PL 20" × 3/8	7.50	-14.69	-110
1 Bott Spl PL 20" × 3/8	7.50	14.69	110
	104.50	17.00	1054

* Assumed Eff. Width (PL is 15'2" wide)

A (net)	
42.90	34 × 9/8 × 1/2 = 19.10 ea
18.50	16 × 3/8 × 1/2 = 9.00
5.39	5 × 9/8 × 3/8 = 2.11
5.39	5 × 9/8 × 3/8 = 2.11
72.18	

I	A	d	Ad^2	I_o
Gussets	62.00	6.90	2950	19,850
Spl Pls	27.50	10.10	2810	1738
do (net)	5.39	24.79	3310	~
do (net)	5.39	4.59	113	~
			9183	21,588
				9183
				30,771
Holes out				- 8690
				22,081

Sm (top) = 22,081 ÷ 24.98 = 884

Sm (butt) = 22,081 ÷ 38.40 = 575

Stresses:

At top

$f = \frac{1560}{72.18} + \frac{1560 \times 10.10}{884}$

= 21.6 + 17.8 = 39.4 < 45 ksi T too hi

∴ Use 5/8" Gusset Pls

Conn. Spl. Mat'l		Req'd	Furn
PL 27 1/2 × 1/2	= 9.25 × 45 ÷ 15.7	26 (+)	32
PL 20 × 3/8	= 5.39 × 45 ÷ 15.7	15 (+)	20
PL 15 1/2 × 3/8	= 4.13 × 45 ÷ 15.7	12 (-)	16

Revise Drawing

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO. 15 OF

COMPUTATIONS FOR Truss Details DATE Dec 30, 1963

BY C.J.R. CHKD

Member U7-L7 (A441)

See U1-L1 (Sht. 1)

Member L7-U8 (T-1)

Stress = 1619^{K} T

Capacity = 1700^{K} T

3319 ÷ 2 = 1660^{K} T avg.

1660 ÷ 15.7 = 106 - 1" H.S. rivets req'd

Member L7-L8 (T-1)

Stress = 3266^{K} C

Capacity = 3300^{K} C

3300 ÷ 15.7 = 210 - 1" H.S. rivets req'd

Member U8-U10 (T-1)

Stress = 2044^{K} T

Capacity = 2036^{K} T

2036 ÷ 15.7 = 130$^{(-)}$ 1" H.S. rivets req'd.

Member U8-L9 (T-1)

Stress = 2028^{K} T

Capacity = 2129^{K} T

4157 ÷ 2 = 2079^{K} T avg.

2079 ÷ 15.7 = 133$^{(-)}$ 1" H.S. rivets req'd

Member U8-L8 (T-1)

Stress = 3252^{K} C

Capacity = 3380^{K} C

6632 ÷ 2 = 3316^{K} C avg.

3316 ÷ 15.7 = 211$^{(+)}$ 1" H.S. rivets req'd

Member L9-U10 (T-1)

Stress = 2228^{K} C

Capacity = 2255^{K} C

4483 ÷ 2 = 2242^{K} C avg.

2242 ÷ 15.7 = 143 - 1" H.S. rivets req'd

Member L9-L11 (A-441)

Stress = 850^{K} C

Capacity = 1020^{K} C

1870 ÷ 2 = 935^{K} C avg

935 ÷ 15.7 = 60$^{(-)}$ 1" H.S. Rivets req'd

Horiz. Web PL

Weld Req'd - Try $\frac{3}{8}$" weld

$\frac{20.54 \times 11.25}{\frac{3}{8} \times 0.707 \times 14.7 \times 4}$ = 14.8" Req'd, 15" Furn. (say OK)

Joint L9

By inspection, use same splice mat'l as @ J. L7

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO. 16 OF

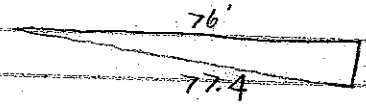
COMPUTATIONS FOR Truss Details DATE Dec 31, 1963

BY C.J.R. CHKD

Splice @ L7 Mtl. (Q.T.)

Say stress across Mt. = stress in member U6-U8

Member U6-U8 = 2312^K T



$\frac{77.4}{76} \times 2312$ = say 2350^K C across L7

	A_{gv}	y	A_y
2 Gusset Pl's 68" x ½"	68.00	20.00	1360
2 Spl. Pl's 27½" x ½"	27.50	0	0
1 Top Spl. Pl 20" x ⅜"	7.50	14.88	118
1 Bott Spl. Pl 20"* x ⅜"	7.50	-14.88	-118
	110.50	20.00	1360

*Assumed Effective Pl width (Pl is actually 15½" wide)

A_y/A = 1360/110.5 = 12.30"

I:	A	d	Ad^2	I_o
Gussets	68.00	7.70	4030	26,180
Spl Pls	27.50	12.30	4160	1738
d_o	5.39	2.58	36	~
d_o	5.39	27.18	3970	~
			12,196	27,918
				12,196
				40,114

$S_{m\ top}$ = 40,114 ÷ 41.70 = 963

$S_{m\ bott.}$ = 40,114 ÷ 27.36 = 1470

Stresses:

2350^K C across Joint

At bottom

$f = \frac{2350}{110.50} + \frac{2350 \times 12.30}{1470}$

= 21.2 + 19.7 = 40.9 KSI < 45 too low

∴ Use 5⅝" Gussets

Stress = 37.9 KSI (scratch paper) say

Horizontal Web Pl in L5-L

See Calculations for L3-L5. (Sht.

Use ⅜" Weld

$\frac{20.37 \times 11.88}{3/8 \times 0.707 \times 14.7 \times 4\ welds}$ = 15.6" req'd

18" Furn. OK

For Member L7-L8:

$\frac{15.97 \times 30.90}{5/16 \times 0.707 \times 14.7 \times 4\ welds}$ = 38" req'd

35" Furn.

Use ⅜" weld — 32" req'd

35" Furn. OK

Conn. Splice Mat'l.

	Req'd	Fur.
Pl 27½" x ½" : 13.75^{in} x 45^{KSI} ÷ 15.7 =	40^K	40
Pl 20" x ⅜" : 7.50 x 45 ÷ 15.0 =	22$^{(1)}$	25
Pl 15½" x ⅜" : 5.81 x 45 ÷ 15.0 =	17^K	20

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO 17 OF

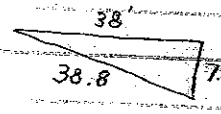
COMPUTATIONS FOR Truss Details DATE Jan 3, 1964

BY C.J.R. CHKD

Splice @ U8 (Mtl. - Q.T.)

Say stress across ℄ = horiz component of stress in L7-L8 or L8-L9

Member L7-L8 = Say 3270^k



$\frac{38}{38.8} \times 3270 = 3200^k$ T across ℄ U8

Holes out = $(\frac{9}{8} \times 2.75)(\overline{29.97}^2 + \overline{26.22}^2 + \overline{22.97}^2 + \overline{19.72}^2 + \overline{15.22}^2 + \overline{11.97}^2 + \overline{8.72}^2 + \overline{5.47}^2)$

$+(\frac{9}{8} \times 1.25)(\overline{0.22}^2 + \overline{3.28}^2 + \overline{6.78}^2 + \overline{10.28}^2 + \overline{13.78}^2 + \overline{17.28}^2 + \overline{20.78}^2 + \overline{24.28}^2 + \overline{27.78}^2 + \overline{31.28}^2 + \overline{34.78}^2 + \overline{38.28}^2 + \overline{41.78}^2 + \overline{45.28}^2 + \overline{48.78}^2)$

$= 9130 + 18,500 = 27,630$

	Agr.	y	Ay	A(net)
2 gusset ℄'s 82×⅝	102.50	27.00	2770	70.20
2 Spl. ℄'s 27½×¾	41.25	0	0	27.75
1 Top Spl ℄ 20×⅜	2.50	-14.69	-110	5.39
1 Bott Spl ℄ 20×⅜	2.50	14.69	110	5.39
	158.75	27.00	2770	108.73

$23 \times \frac{9}{8} \times \frac{10}{8} = 32.3^{**}$

$8 \times \frac{9}{8} \times \frac{3}{2} = 13.50$

$5 \times \frac{9}{8} \times \frac{3}{8} = 2.11$

$5 \times \frac{9}{8} \times \frac{3}{8} = 2.11$

* Assumed effective A width (℄ is all 15'2" wide)

I:	A	d	Ad^2	I_o
Gussets	102.50	9.53	9300	57,500
Spl ℄'s	41.25	17.47	12590	2600
do (net)	5.39	32.16	5550	~~~
do (net)	5.39	2.78	42	~~~
			27,482	60,100
				27,482
				87,582
		Holes out		- 27,630
				59,952

S_m (top) = 60,000 ÷ 32.35 = 1860

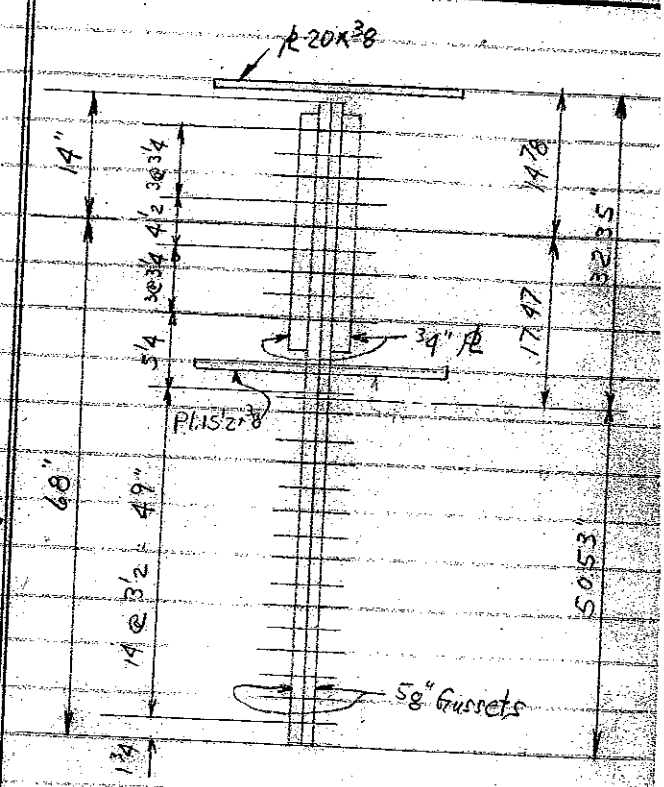
S_m (bott) = 60,000 ÷ 50.53 = 1188

Stresses:

At top

$f = \frac{3200}{108.73} + \frac{3200 \times 17.47}{1860}$

$= 29.5 + 30 = 59.5^{ksi}$ too high



SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 SHEET NO. 18 OF

COMPUTATIONS FOR Truss Details DATE Jan 3, 1964

BY C.J.R. CHKD

Splice @ U8 (continued)

Try:

	A_{gr}	y	Ay	$A_{(net)}$
2 Gusset Pl's 82 × 5/8	102.50	27.00	2770	70.20
2 Spl. Pl's 27 1/2 × 3/4	41.25	0	~	27.75
2 Spl Pl's 28 × 3/4	42.00	0	~	28.50
1 Top Spl. Pl 20 × 3/8	7.50	-14.69	-110	5.39
1 Bott Spl. Pl 20 × 3/8	7.50	14.69	110	5.39
	200.75	27.00	2770	137.23

$2770 \div 200.75 = 13.80''$

I:

	A	d	Ad^2	I_o
Gussets	102.50	13.20	17,880	57,500
I.S. Spl. Pls	41.25	13.80	7850	2600
o.s. Spl Pls	42.00	13.80	8000	2740
d_o (net)	5.39	28.49	4370	~
d_o (net)	5.39	0.89	~	~
			38,100	62,840
				38,100
				100,940
Holes out: 9700 ÷ 22500 (approx)				- 32,200
				68,740

S_m (top) = 68,740 ÷ 28.7 = 2390

Stress @ top

$$\frac{3200}{137.2} + \frac{3200 \times 13.8}{2390}$$

$= 23.3 + 18.5 = 41.8$ ksi

SVERDRUP & PARCEL

JOB Minnesota Bridge No 9340 SHEET NO. 19 OF

COMPUTATIONS FOR Truss Details DATE Jan 3, 1963

BY C.J.R. CHKD

Splice @ U8 (continued)

Try:

	Agr	y	Ay	A(net)
2 Gusset Pl's 82 × ¾	123.00	27.00	3320	84.20
2 Spl. Pl's 27½ × ¾	41.25	0	~	27.75
2 Spl. Pl's 28 × ¾	42.00	0	~	28.50
1 Top Spl Pl 20 × ⅜	7.50	-14.69	-110	5.39
1 Bott Spl. Pl 20 × ⅜	7.50	14.69	110	5.39
	221.25	27.00	3320	151.23

$23 \times \frac{9}{8} \times \frac{3}{2} = 38.8$

3320 ÷ 221.25 = 15.00

I:	A	d	Ad²	I_o
Gussets	123.00	12.00	17,720	73,500
1.5 Spl Pls	41.25	15.00	9280	2600
2.0 Spl Pls.	42.00	15.00	9450	2740
do bolt	7.50	29.69	6610	~
do (net)	7.50	0.31	~	~
			43,060	78,840
				43,060
				121,900
Holes out = 12,700 + 24,400 (approx.)				37,100
				84,800

S.m. (top) = 84,800 ÷ 29.9 = 2840

Stress @ top

$$= \frac{3200}{151.23} + \frac{3200 \times 15.00}{2840}$$

$$= 21.2 + 16.9 = \underline{38.1^{ksi}} < 45^{ksi}$$ say OK

Connect Spl. Mat'l

	Req'd	Furn
Pl 28 × ¾ = 14.25 × 45 ÷ 15.7	41 (-)	48
Pl 27½ × ¾ = 13.9 × 45 ÷ 15.7	40 (-)	48
Pl 20 × ⅜ = 5.39 × 45 ÷ 15.7	15 (+)	20
Pl 15½ × ⅜ = 4.13 × 45 ÷ 15.7	12 (-)	16

SVERDRUP & PARCEL

JOB 2083 Minnesota Bridge No 9340 SHEET NO. 20 OF

COMPUTATIONS FOR Truss Details DATE Jan 9, 1964

BY C.J.R. CHKD

Member U10-U12 (A441)

Stress = 900^k C

Capacity = 1020^k C

1920 ÷ 2 = 960^k C avg.

960 ÷ 15.0 = 64-1" H.S. rivets req'd

Member U10-L11 (T-1)

Stress = 1930^k T

Capacity = 1970^k T

3900 ÷ 2 = 1950^k T avg.

1950 ÷ 15.7 = 124$^+$-1" H.S. rivets req'd.

Joint U10

See Jt U6 Comps.

By inspection, Use (2-½" Gussets
(A.S.) 2-½" Splices

Connect. Splice mat'l	Req'd	Furn.
Pl 27½ × ½ = 9.25 × 27 ÷ 15.0 =	17(-)	22
Pl 20 × ⅜ = 5.39 × 27 ÷ 15.7 =	9$^+$	10
Pl 15½ × ⅜ = 4.13 × 27 ÷ 15.7 =	7(+)	8

¼" Fill Pl = 4.63 × 27 ÷ 15.0 = 8(+)

$f = \frac{850}{72.18} + \frac{850 \times 10.1}{884}$

= 11.8 + 9.71 = 21.5^{ksi} < 27 say OK

Member L11-U12 (A441)

Stress = 1683^k C

Capacity = 1745^k C

3428 ÷ 2 = 1714^k C avg.

1714 ÷ 15.7 = 109(+) 1" H.S. Rivets Req'd

Member L11-L13 (T-1)

Stress = 1976^k T

Capacity = 2036^k T

4012 ÷ 2 = 2006^k T avg.

2006 ÷ 15.7 = 128 1" H.S. rivets req'd

Member U11-L11 (A-441)

Stress 536^k C

Capacity 584^k C

1120 ÷ 2 = 560^k C avg

75% × 584 = 438^k C

560 ÷ 15.7 = 36(-) 1" H.S. Riv. Req'd @ L11

438 ÷ 15.7 = 28(-) " " " " @ U11

Joint L11

By Inspection use some Jt mat'l as in Trial #1 @ Jt U6.

2 Gussets - ½"
2 Spl. Pl's - ½"
Top Spl Pl - ⅜"
Bot " " - ⅜"

A net = 72.18
Mat'l = A441
Stress across Jt = say 965^k

$\frac{965}{72.18} + \frac{965 \times 10.10}{884} = 13.4 + 11.0 = 24.4 < 27$

say OK

SVERDRUP & PARCEL

JOB 2083 Minnesota Bridge No. 9340 SHEET NO. 22 OF

COMPUTATIONS FOR Truss Details DATE Jan 24, 1964

BY C.J.R. CHKD

Member U12-U14 (T-1)

Stress: 2756 k C

Capacity = 2860 k C

5616 ÷ 2 = 2808 k C avg.

2808 ÷ 15.7 = 179-1" H.S. rivets reqd

Member U12-L13 (T-1)

Stress = 1233 k T

Capacity = 1372 k T

2605 ÷ 2 = 1303 k T avg.

1303 ÷ 15.7 = 83-1" H.S. rivets reqd.

Joint U12

See Jt L5 Comps

By inspection, try (Q.T.) { 2-½" Gussets; 2-½" I.S. Spl. Pls; ⅜" Cov Pl Spl. T & B.

$f = \frac{1976}{102.50} + \frac{1976 \times 9.36}{1160}$

= 19.3 + 15.9 = 35.2 < 45 ksi say O.K.

Conn. Spl. Mat'l	Reqd	Furn.
Pl 27½ × ½ = 13.75 × 45 ÷ 15.7 =	40 (-)	40
Pl 20 × ⅜ = 7.50 × 45 ÷ 15 =	22 (4)	35
Pl 15½ × ⅜ = 5.81 × 45 ÷ 15 =	17 (-)	20
Fill Pl 27½ × ⅜ = 12.3 × 27 ÷ 15.7 =	30 (-)	32

Member L13-U14 (A-36)

Capacity = 584 k C, 700 k T

205 + 285 + 31 = 521 k C } Reversal

213 + 24 − 185 = 52 k T }

573 k

573 ÷ 15.7 = 37 (-) 1" H.S. rivets reqd

Member L13-L15 (T-1)

Stress = 2958 k T

Capacity = 2961 k T

2961 ÷ 15.7 = 189 (-) 1" H.S. rivets reqd.

Try 4-6 pattern

4 × 15.7 = 62.8 k

2 × 9/8 × 19/16 × 45 = 121 k > 62.8 k

8 × 15.7 = 125.6 k

Try 4-4-6-8 Pattern

14 × 15.7 = 220 k

4 × 9/8 × 19/16 × 45 = 242 k > 220 k

∴ Use 4-4-6-6-8 pattern

Joint L13 (see sheet 23)

SVERDRUP & PARCEL

JOB Minnesota Bridge No. 9340 SHEET NO. 23 OF

COMPUTATIONS FOR Truss Details DATE Jan 27, 1964

BY C.J.R. CHKD

Splice @ L13 (Mtl. - T-1)

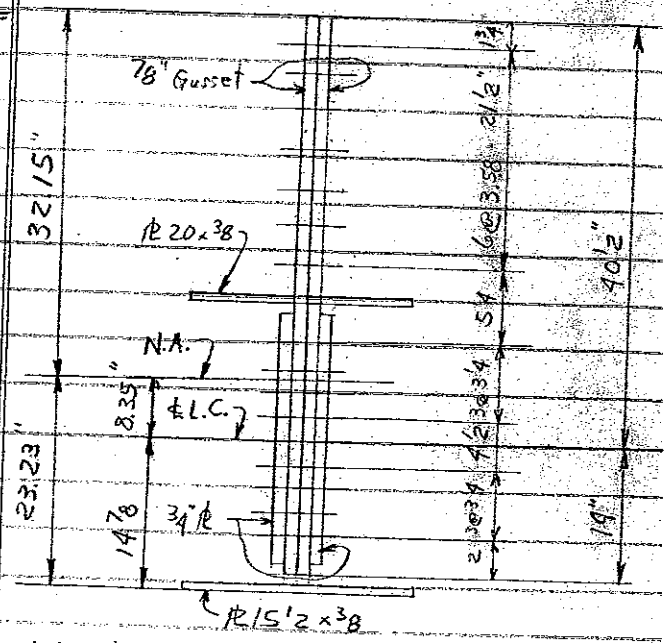
Say Stress across Mt. = stress in Member U12-U14

U12-U14 = 2756^k C

∴ Stress across L13 = 2756^k T

Holes out = $(\frac{9}{8} \times 3\frac{1}{4})(\overline{20.35}^2 + \overline{17.10}^2 + \overline{13.85}^2 + \overline{10.60}^2 + \overline{6.10}^2 + \overline{2.85}^2 + \overline{0.40}^2 + \overline{3.65}^2) + (\frac{9}{8} \times 1\frac{3}{4})(\overline{8.90}^2 + \overline{12.48}^2 + \overline{16.06}^2 + \overline{19.64}^2 + \overline{23.22}^2 + \overline{26.80}^2 + \overline{30.38}^2)$

= 3900 + 6040 = 9940



Trial #1

	Agr	y	Ay
26 Gusset Pl's 54'2 x 7/8	95.40 in²	13.25	1265
2 Spl Pl's 27'2 x 3/4	41.25	0	0
1 Top Spl Pl 20* x 3/8	7.50	14.69	110
1 Bott Spl Pl 20 x 3/8	7.50	-14.69	-110
	151.65 in²	13.25	1265

* Assumed Effective Pl width (Pl is actually abt 15'2" wide)

	A(net)	
	65.90 in²	30 x 9/8 x 7/8 = 29.50
	27.75 in²	16 x 9/8 x 3/4 = 13.50
	5.39	5 x 9/8 x 3/8 = 2.11
	5.39	5 x 9/8 x 3/8 = 2.11
	104.43	

I:	A	d	Ad²	I_o
Gussets	95.40	4.90	2290	23,600
Spl Pl's	41.25	8.35	2880	2610
do (net)	5.39	6.34	216	~~
do (net)	5.39	23.04	2850	~~
			8236	26,210
				8236
				34,446
Holes out:				- 9940
I (net):				24,506

S_m (top) = 24,500 ÷ 32.15 = 764

S_m (bott) = 24,506 ÷ 23.23 = 1055

Stresses

2756^k T across Mt. (see above)

At bottom

$f = \frac{2756}{104.4} + \frac{2756 \times 8.35}{1055}$

= 26.4^k + 21.8^k = 48.2^{ksi} > 45^{ksi} (too high)

(See Page 24 for Trial # 2)

SVERDRUP & PARCEL

JOB 2083 Minnesota Bridge No. 9340 SHEET NO. 24 OF

COMPUTATIONS FOR Truss Details DATE Jan 27, 1964

BY C.J.R. CHKD

Splice @ L13 (cont.)

Trial #2

	Agr	ȳ	Ay	Anet	
2 Gussets PL's 54 1/2 x 3/4	81.60 in²	13.25	1081	56.30 in²	30 x 9/8 x 3/4 = 25.3
2 I.S. Spl. PL's 27 1/2 x 3/4	41.25	0	0	27.75	16 x 9/8 x 3/4 = 13.50
2 O.S. Spl. PL's 28 x 3/4	42.00	0	0	28.25	do do
1 Top Spl PL 20* x 3/8	7.50	14.69	110	5.39	5 x 9/8 x 3/8 = 2.11
1 Bott Spl PL 20 x 3/8	7.50	-14.69	-110	5.39	5 x 9/8 x 3/8 = 2.11
	179.85		1081	123.08	

ȳ = 6.05

I	A	d	Ad²	I_o
Gussets	81.60	7.20	4230	20,300
I.S. Spl.	41.25	6.05	1510	2610
O.S. Spl	4200	6.05	1540	2740
Top Spl	5.39	8.64	403	~~
Bott Spl	5.39	20.74	2320	~~
			10,003	25,650
Holes out:				10,003
Say 3900 x 4.50/3.25 = 5400				35,653
+ 6090 x 3/4 / 7/8 = 5170				- 10,570
10570				25,083

Sm(bott) = 25,083 ÷ 20.93 = 1200

$$f_{(bott)} = \frac{2756}{123.08} + \frac{2756 \times 6.05}{1200}$$

= 22.4 + 13.9 = 36.3 ksi < 45 ksi

Say OK

Connect Spl. mat'l	Req'd	Furn
PL 28 x 3/4 = 14.12 x 45 ÷ 15.7 =	40+	40
PL 27 1/2 x 3/4 = 13.80 x 45 ÷ 15.7 =	40(-)	40
PL 15 1/2 x 3/8 = 4.17 x 45 ÷ 15.7 =	12(-)	16
PL 20 x 3/8 = 5.39 x 45 ÷ 15.7 =	15(4)	20
Fill PL 27 1/2 x 7/16 = 8.08 x 45 ÷ 15.7 =	23(41)	24

SVERDRUP & PARCEL

JOB 2083 Minnesota Bridge No. 9340 SHEET NO. 25 OF

COMPUTATIONS FOR Truss Details DATE Jan 29, 1964

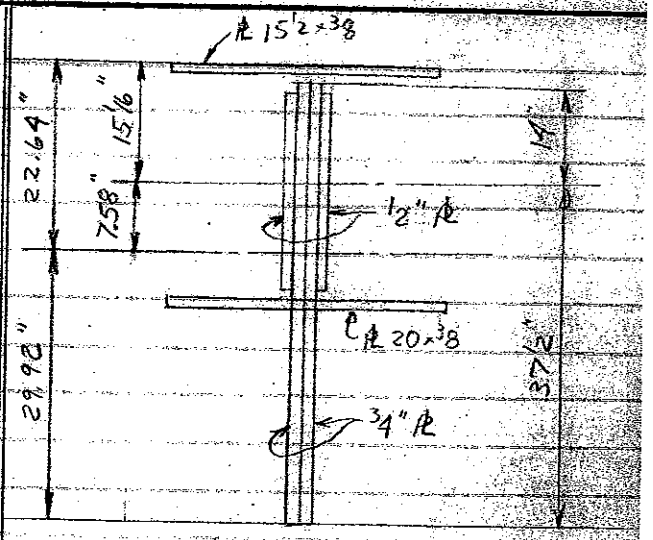
BY C.J.R. CHKD

Splice @ U14 (M11 - T-1)

Say stress across Jt = stress in Member L13-L15.

L13-L15 · 2958^K T

∴ Stress across Jt U14 = 2958^K C



Try:	A gr	y	Ay
2 Gusset Pl's 51½ × ¾	77.20	11.75	907
2 Spl Pl's 27½ × ½	27.50	0	0
1 Top Spl Pl 20* × ⅜	7.50	-14.88	-111.7
1 Bott Spl Pl 20 × ⅜	7.50	14.88	111.7
	119.70	11.75	907

* Assumed Effective Pl Width (Pl is actually abt 15½" wide)

I:	A	d	Ad²	I_o
Gussets	77.20	4.17	1340	17,080
Spl Pl's	27.50	7.58	1580	1738
do	7.50	22.46	3800	~~~
do	7.50	7.30	399	~~~
			7119	18,818
				7119
		I_{gr} =		25,937

S_m (Top) = 25,937 ÷ 22.64 = 1147

Stress:

$$f = \frac{2958}{119.7} + \frac{2958 \times 7.58}{1147}$$

= 24.8 + 19.6 = 44.4 Too high

∴ Use 5⅝" I.S. Spl. Pl's

Develop Horiz. Web Pl

Try ½" weld

$$l = \frac{15.25 \times 31.08}{12 \times 0.707 \times 14.7 \times 4} = 22.8 \text{ reqd}$$

24" Furn OK

Conn. Spl. Mat'l

	Reqd	Furn
Pl 27½ × ⅝ = 17.20 × 45 ÷ 15.7 =	49(+)	48

Say OK since unit stress in conn. mat'l is less than 45 ksi and Horiz. web Pl cannot be cutback one more rivet line and still use a ½" weld. There is not enough clearance to cut the Spl. Pl around the horiz web Pl.

Pl 15½ × ⅜ · 5.81 × 45 ÷ 15.0 =	17(-)	20
Pl 20 × ⅜ · 7.50 × 45 ÷ 15 =	22(+)	25