



**FORM DQP 2.01-1
LEVEL 1 CHECK PRINT SIGN-OFF SHEET**

Client Name: Ohio Department of Transportation
 Job Title: Cleveland Innerbelt Design-Build Contract
 Job Number: CUY-90-14.90
 Document Title: KNEE BRACE WELDS - RFI check

Check Level (Mark One): 1A 100% Document Check
 1B 100% Input Check

Enter description below:

	Print Name	Signature	Date
<input checked="" type="checkbox"/> Originator	<u>SARAH LARSON</u>	<u>Sarah Larson</u>	<u>9-8-11</u>
<input checked="" type="checkbox"/> Checker	<u>Jim Truesdell</u>	<u>Jim Truesdell</u>	<u>9-8-11</u>
<input checked="" type="checkbox"/> Backchecker	<u>SARAH LARSON</u>	<u>Sarah Larson</u>	<u>9-8-11</u>
<input checked="" type="checkbox"/> Updater	<u>SARAH LARSON</u>	<u>Sarah Larson</u>	<u>9-8-11</u>
<input checked="" type="checkbox"/> Validator	<u>Jim Truesdell</u>	<u>Jim Truesdell</u>	<u>9-8-11</u>

Insert an "X" in the box to indicate a required QC activity.

	The HNTB Companies		Made	SJL	Date	9/8/2011	Job No.:	49633
			Checked	JBT	Date	9/8/2011		
	For		Backch'kd	SJL	Date	9/8/2011	Sheet No.	
Cleveland Innerbelt Diaphragm Design								

N:\49633\Bridges\Design\Final Design\Unit 2\Excel\Diaphragms\Final Forces\Lateral Bracing Revision\RFI calcs\Knee Brace Welds.xlsx|Type A

type A

Minimum Moment

Flange Stress (ksi): -18.3
 Web Stress (ksi): 27
 Shear (kip): 307
 Length of Web (in): 36.50
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 16.88
 Unit stress along flange (kip/in): -16.01
 Shear along web (kip/in): 8.41

Minimum weld required web (in): 0.397 = 7/16"
 Minimum weld required flange (in): 0.34 = 6/16"

Maximum Moment

Flange Stress (ksi): 19.3
 Web Stress (ksi): -35.4
 Shear (kip): 290
 Length of Web (in): 36.50
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -22.13
 Unit stress along flange (kip/in): 16.89
 Shear along web (kip/in): 7.95

Minimum weld required web (in): 0.495 = 8/16"
 Minimum weld required flange (in): 0.36 = 6/16"

Minimum Moment

Flange Stress (ksi): -20.8
 Web Stress (ksi): 32.4
 Shear (kip): 206
 Length of Web (in): 36.50
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 20.25
 Unit stress along flange (kip/in): -18.20
 Shear along web (kip/in): 5.64

Minimum weld required web (in): 0.442 = 8/16"
 Minimum weld required flange (in): 0.38 = 7/16"

Maximum Moment

Flange Stress (ksi): 22
 Web Stress (ksi): -42.8
 Shear (kip): 187
 Length of Web (in): 36.50
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -26.75
 Unit stress along flange (kip/in): 19.25
 Shear along web (kip/in): 5.12

Minimum weld required web (in): 0.573 = 10/16"
 Minimum weld required flange (in): 0.41 = 7/16"

Minimum weld required web (in): = 10/16"
 Minimum weld required flange (in): = 7/16"



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Type B

Minimum Moment

Maximum Moment

Flange Stress (ksi): -15.8
 Web Stress (ksi): 20.5
 Shear (kip): 591
 Length of Web (in): 44.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Flange Stress (ksi): -27.2
 Web Stress (ksi): 38.8
 Shear (kip): 468
 Length of Web (in): 44.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 ϕ_e2 : 0.80

Fex (ksi): 70
 ϕ_e2 : 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 12.81
 Unit stress along flange (kip/in): -13.83
 Shear along web (kip/in): 13.43

Rr (ksi): 33.60
 Unit stress along web (k/in): 24.25
 Unit stress along flange (kip/in): -23.80
 Shear along web (kip/in): 10.64

Minimum weld required web (in): 0.391 = 7/16"
 Minimum weld required flange (in): 0.29 = 5/16"

Minimum weld required web (in): 0.557 = 9/16"
 Minimum weld required flange (in): 0.50 = 9/16"

Minimum Moment

Maximum Moment

Flange Stress (ksi): 8.6
 Web Stress (ksi): -12.7
 Shear (kip): 313
 Length of Web (in): 44.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Flange Stress (ksi): 21.1
 Web Stress (ksi): 29.2
 Shear (kip): 328
 Length of Web (in): 44.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Minimum weld required web (in): = 9/16"
 Minimum weld required flange (in): = 9/16"

Fex (ksi): 70
 ϕ_e2 : 0.80

Fex (ksi): 70
 ϕ_e2 : 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -7.94
 Unit stress along flange (kip/in): 7.53
 Shear along web (kip/in): 7.11

Rr (ksi): 33.60
 Unit stress along web (k/in): 18.25
 Unit stress along flange (kip/in): 18.46
 Shear along web (kip/in): 7.45

Minimum weld required web (in): 0.224 = 4/16"
 Minimum weld required flange (in): 0.16 = 3/16"

Minimum weld required web (in): 0.415 = 7/16"
 Minimum weld required flange (in): 0.39 = 7/16"



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For Cleveland Innerbelt Diaphragm Design

N:\49633\Bridges\Design\Final Design\Unit 2\Excel\Diaphragms\final forces\LateralBracingRevision\RF1 calcs\{KneeBraceWelds.xlsx}Type C

Type C

Minimum Moment

Flange Stress (ksi): -15.1
 Web Stress (ksi): 23.1
 Shear (kip): 291
 Length of Web (in): 31.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 14.44
 Unit stress along flange (kip/in): -13.21
 Shear along web (kip/in): 9.39

Minimum weld required web (in): 0.362 = 6/16"
 Minimum weld required flange (in): 0.28 = 5/16"

Maximum Moment

Flange Stress (ksi): 18.2
 Web Stress (ksi): -32.9
 Shear (kip): 333
 Length of Web (in): 31.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -20.56
 Unit stress along flange (kip/in): 15.93
 Shear along web (kip/in): 10.74

Minimum weld required web (in): 0.488 = 8/16"
 Minimum weld required flange (in): 0.34 = 6/16"

Minimum Moment

Flange Stress (ksi): -20.6
 Web Stress (ksi): 32.6
 Shear (kip): 273
 Length of Web (in): 31.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 20.38
 Unit stress along flange (kip/in): -18.03
 Shear along web (kip/in): 8.81

Minimum weld required web (in): 0.467 = 8/16"
 Minimum weld required flange (in): 0.38 = 7/16"

Maximum Moment

Flange Stress (ksi): 24.6
 Web Stress (ksi): -44.8
 Shear (kip): 332
 Length of Web (in): 31.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -28.00
 Unit stress along flange (kip/in): 21.53
 Shear along web (kip/in): 10.71

Minimum weld required web (in): 0.631 = 11/16"
 Minimum weld required flange (in): 0.45 = 8/16"

Minimum weld required web (in): = 11/16"
 Minimum weld required flange (in): = 8/16"



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Type D

Minimum Moment

Flange Stress (ksi): -14.7
 Web Stress (ksi): 23.1
 Shear (kip): 542
 Length of Web (in): 32.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 14.44
 Unit stress along flange (kip/in): -12.86
 Shear along web (kip/in): 16.94

Minimum weld required web (in): 0.468 = 8/16"
 Minimum weld required flange (in): 0.27 = 5/16"

Maximum Moment

Flange Stress (ksi): 13
 Web Stress (ksi): -20
 Shear (kip): 475
 Length of Web (in): 32.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -12.50
 Unit stress along flange (kip/in): 11.38
 Shear along web (kip/in): 14.84

Minimum weld required web (in): 0.408 = 7/16"
 Minimum weld required flange (in): 0.24 = 4/16"

Minimum Moment

Flange Stress (ksi): 10.3
 Web Stress (ksi): -15.7
 Shear (kip): 381
 Length of Web (in): 32.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -9.81
 Unit stress along flange (kip/in): 9.01
 Shear along web (kip/in): 11.91

Minimum weld required web (in): 0.325 = 6/16"
 Minimum weld required flange (in): 0.19 = 4/16"

Maximum Moment

Flange Stress (ksi): -11.3
 Web Stress (ksi): 17.5
 Shear (kip): 420
 Length of Web (in): 32.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 10.94
 Unit stress along flange (kip/in): -9.89
 Shear along web (kip/in): 13.13

Minimum weld required web (in): 0.360 = 6/16"
 Minimum weld required flange (in): 0.21 = 4/16"

Minimum weld required web (in): = 8/16"
 Minimum weld required flange (in): = 5/16"



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Type D

Minimum Moment

Flange Stress (ksi): -24.6
 Web Stress (ksi): 40
 Shear (kip): 586
 Length of Web (in): 32.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 25.00
 Unit stress along flange (kip/in): -21.53
 Shear along web (kip/in): 18.31

Minimum weld required web (in): 0.652 = 11/16"
 Minimum weld required flange (in): 0.45 = 8/16"

Maximum Moment

Flange Stress (ksi): -28.9
 Web Stress (ksi): 39.5
 Shear (kip): 478
 Length of Web (in): 44.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): 24.69
 Unit stress along flange (kip/in): -25.29
 Shear along web (kip/in): 10.86

Minimum weld required web (in): 0.568 = 10/16"
 Minimum weld required flange (in): 0.53 = 9/16"

Minimum Moment

Flange Stress (ksi): 17.8
 Web Stress (ksi): -28.2
 Shear (kip): 414
 Length of Web (in): 32.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

Rr (ksi): 33.60
 Unit stress along web (k/in): -17.63
 Unit stress along flange (kip/in): 15.58
 Shear along web (kip/in): 12.94

Minimum weld required web (in): 0.460 = 8/16"
 Minimum weld required flange (in): 0.33 = 6/16"

Maximum Moment

Flange Stress (ksi): 22.5
 Web Stress (ksi): -30.3
 Shear (kip): 326
 Length of Web (in): 44.00
 Thickness of Web (in): 0.625
 Thickness of Flange (in): 0.875

Fex (ksi): 70
 $\phi e2$: 0.80

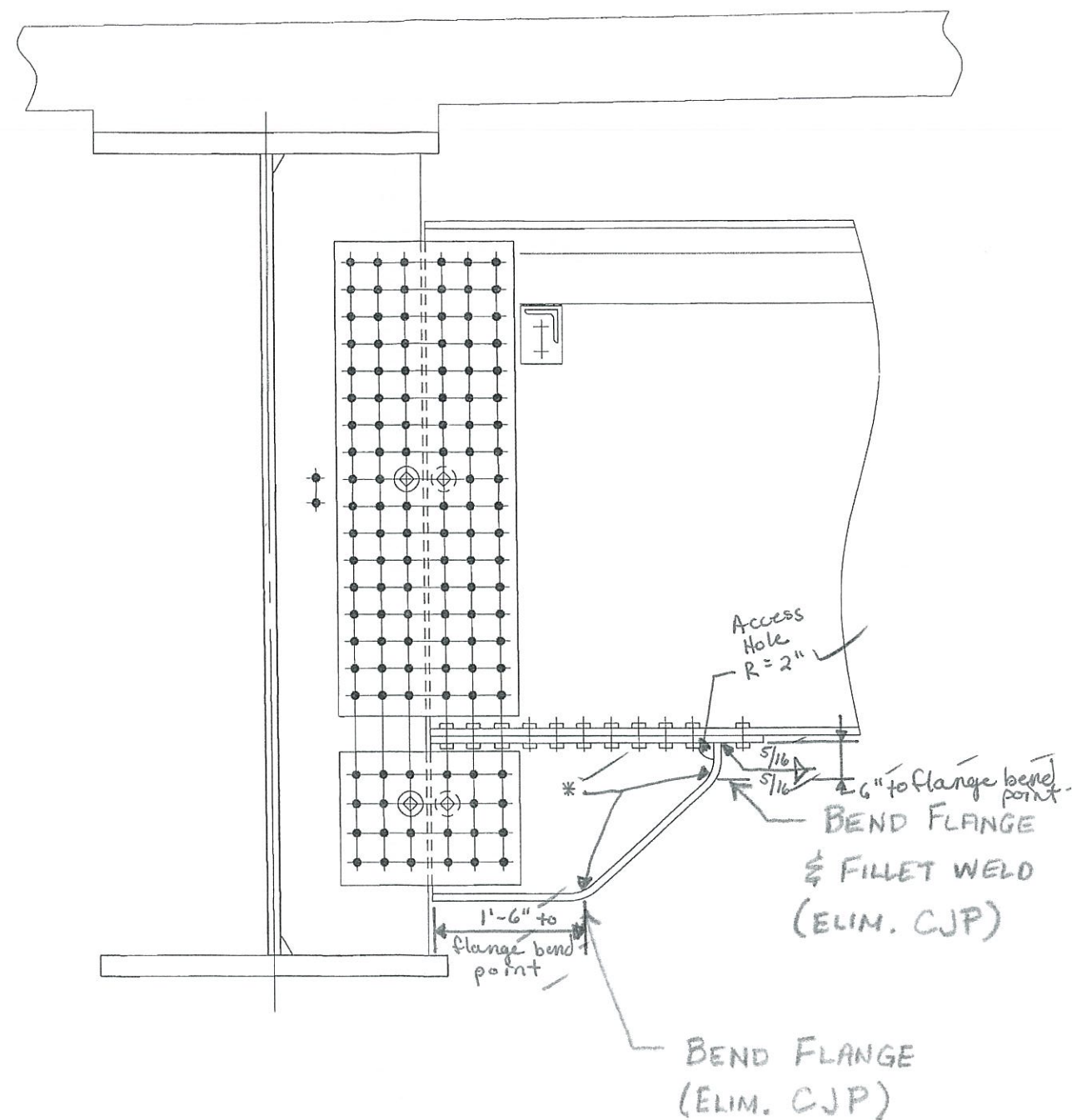
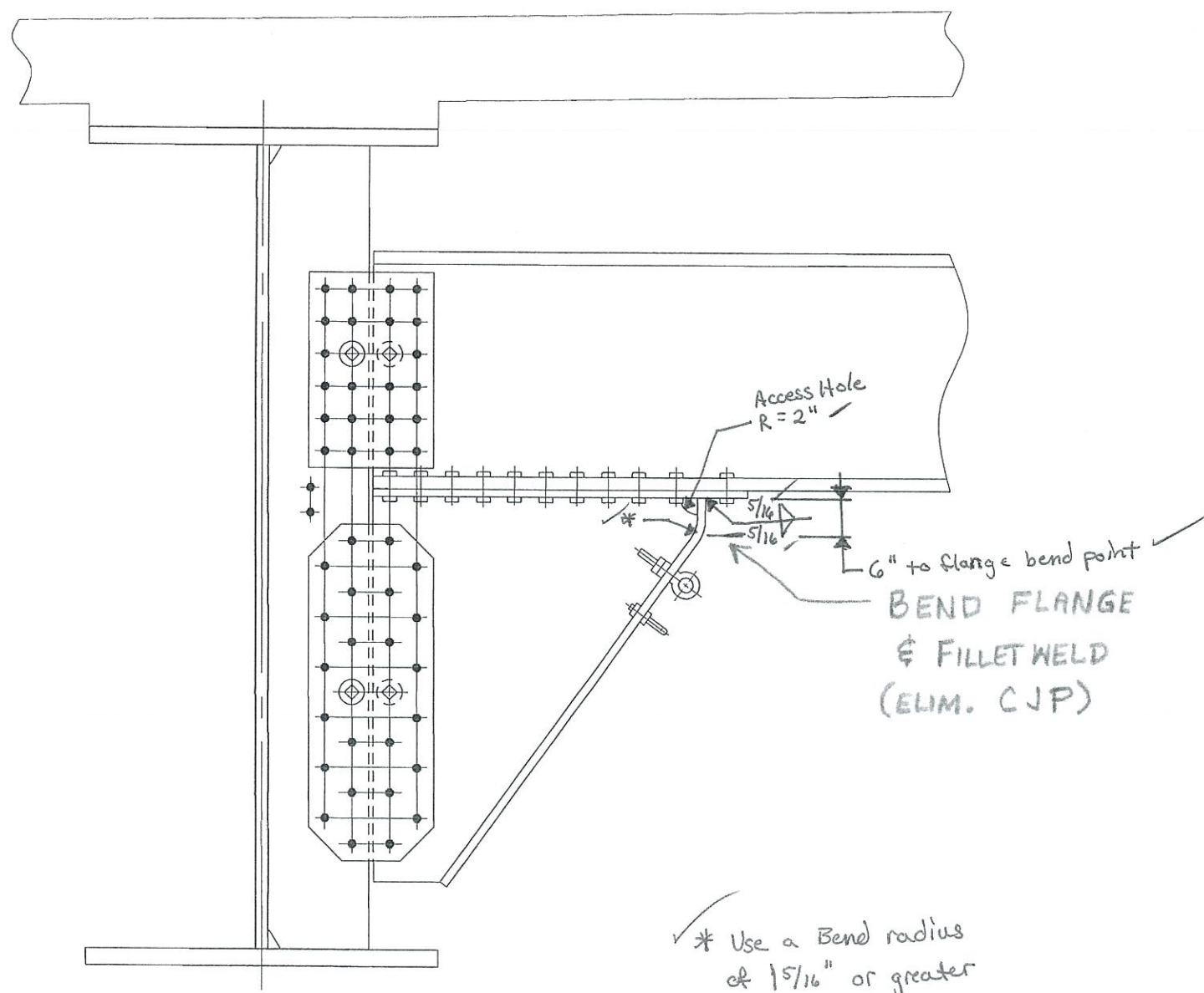
Rr (ksi): 33.60
 Unit stress along web (k/in): -18.94
 Unit stress along flange (kip/in): 19.69
 Shear along web (kip/in): 7.41

Minimum weld required web (in): 0.428 = 7/16"
 Minimum weld required flange (in): 0.41 = 7/16"

Minimum weld required web (in): = 11/16"
 Minimum weld required flange (in): = 9/16"

FLOORBEAM TYPES A, B, C

FLOORBEAM TYPES D, E, F



TYPICAL FLOORBEAM/KNEEBRACE DETAIL
(REF. CONTRACT DWGS. 34-38)