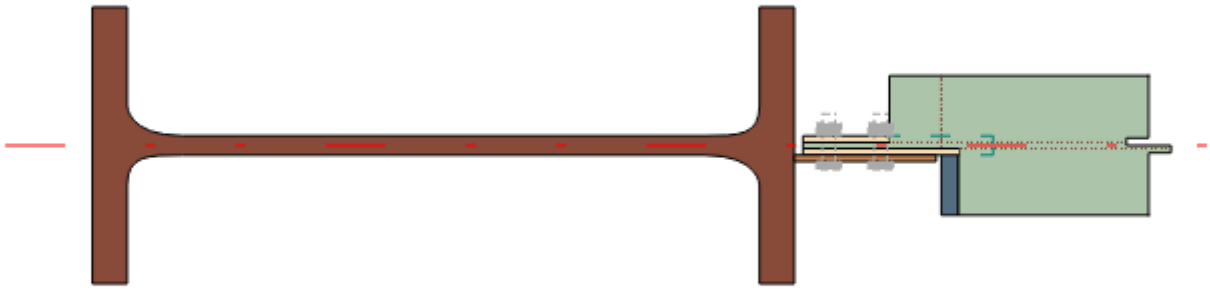
Family:	Beam-Column flange (BCF)
Type:	Single plate

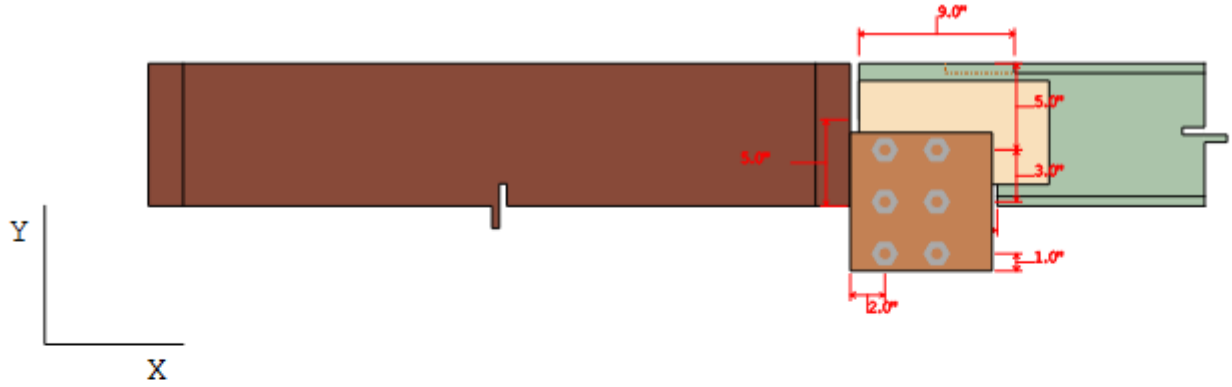
General information

Connector

Top View



Lateral View



Members

Beam

General

Beam section	:	W8X40
Beam material	:	A992
sb: Beam setback	:	0.5
Horizontal angle (deg)	:	0.0°
Vertical angle (deg)	:	0.0°
Horizontal eccentricity	:	0.0 in

Coped

dct: Top cope depth	:	4.0 in
ct: Top cope length	:	1.0 in
dcb: Bottom Cope depth	:	5.0 in
cb: Bottom cope length	:	8.0 in

Column

General

Support section	:	W40X362
Support material	:	A992
Is column end	:	Yes

Single plate

Connector

Section	:	PL 3/8x8 3/16x8.0
b: Width	:	8.210 in
L: Length	:	8.000 in
to: Plate thickness	:	0.375 in
Material	:	A36
Plate position on beam	:	Top
dtop: Distance to beam top	:	4.000 in
Bolts	:	3/4" A325N
nr: Rows of Bolts	:	3
nc: Bolt columns	:	2
s: Pitch - longitudinal center-to-center spacing	:	3.000
Lev: Vertical edge distance	:	1.000
Leh: Horizontal edge distance	:	3.210
a: Distance between weld and bolts	:	2.000
Hole type on plate	:	Short-Slot
Slot direction on plate	:	Horizontal
Hole type on beam	:	Standard
Welding electrode to support	:	E70XX
D: Weld size to support	:	4.0
Wo: Obtuse side weld size (AWS) (1/16 in)	:	4.0
Wa: Acute side weld size (AWS) (1/16 in)	:	4.0
Wo: Obtuse side weld size (AISC) (1/16 in)	:	4.0
Wa: Acute side weld size (AISC) (1/16 in)	:	4.0

Demands

	Beam		Column			
Description	**Ru**	**Pu**	**Pu**	**Mu22**	**Mu33**	**Load Type**
	[kip]	[kip]	[kip]	[kip*ft]	[kip*ft]	
DL	50.0	0.00	0.00	0.0	0.0	Design

Geometric Considerations

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Shear Plate						
Number of bolts		6	2	12	✓	p 10-88
Min. nrow=2, Max. nrow=12						
Distance from the bolt line to the weld line	[in]	2.0	-	3.5	✓	p 10-88
Max. a = 3.5 [in]						
Length	[in]	8.0	3.17	5.5	✓	p 10-89
L_{min} = T/2 = 6.3420000000000005[in]/2 = 3.17[in]						
Vertical edge distance	[in]	1.0	1.0	-	✓	Tables J3.4 , J3.5
L_{emin} = e_{dmin}+C_2 = 1.0[in]+0[in] = 1.0[in]						
Horizontal edge distance	[in]	3.21	1.5	-	✓	Sec. J3.3
L_{emin} = 2*d = 2*0.75 = 1.5 [in]						
Vertical center-to-center spacing (pitch)	[in]	3.0	2.0	8.64	✓	Sec. J3.3
S_{min} = 2 2/3*d = 2 2/3*0.75 = 2.0						
is Corrosion Considered → False						
S_{max} = min(24*tp, 12[in]) = min(24*0.36, 12) = 8.64[in]						Sec. J3.5

Dimensions	Unit	Value	Min.	Max.	Sta.	References
Beam						
Vertical edge distance	[in]	3.21	1.0	-	✓	Tables J3
$L_{emin} = e_{dmin}+C_2$ = 1.0+0[in] = 1.0[in]						
Horizontal edge distance	[in]	3.21	1.5	-	✓	p. 10-88
$L_{emin} = 2*d$ = 2*0.75[in] = 1.5						
Support						
Weld size	[in]	4.0	4.0	-	✓	p. 10-87
$W_{min} = (5/8)*t_p$ = (5/8)*0.375[in] = 0.234[in]						
Weld length	[in]	8.0	1.0	-	✓	Sec J2.2b
$L_{min} = 4.0*w$ = 4.0*0.25 = 1.0[in]						

Design Check

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Shear plate						
Bolts shear	[Kip]	80.192	50.0	DL	0.62	Table(7-1..14)
e=1.0; Max. tp=None						Table 10-9
$\phi R_n = \phi * F_{nv} * A_b$ $= 0.75 * 54[ksi] * 0.442[in^2]$ $= 17.9[kip]$						Eq. J3-1
$\phi R_n = C * \phi R_n * \text{Bolt Factor}$ $= 4.48 * 17.9[kip] * 1$ $= 80.192[in]$						Table *
Bolts bearing under shear load	[Kip]	105.06	50.0	DL	0.48	Table
e = 1.0[in], Max. tp = None						Table 10-9
$L_{c\text{-}end} = \text{Max}(0.0, L_e - d_h/2)$ $= \text{Max}(0.0, 1.000[in] - 0.812[in]/2)$ $= 0.594$						Sec. J3-10*
$L_{c\text{-}spa} = \text{Max}(0.0, s - d_h)$ $= \text{Max}(0.0, 3.0[in] - 0.812[in])$ $= 2.188[in]$						Sec. J3-10
$\phi R_n = \phi * (C/(n_c * n)) * \min(k_1 * l_c, k_2 * d) + \min(k_1 * L_{c\text{-}spa}, k_2 * d) * (n-1)) * t_p * F_u * n_u$ $= 0.75 * (4.48/(2*3)) * (\min(1.2 * 0.594, 2.4 * 0.75) + \min(1.2 * 2.188, 2.4 * 0.75) * (3-1)) * 0.375 * 58 * 2$ $= 105.06[kip]$						
Shear yielding	[Kip]	64.8	50.0	DL	0.77	Eq. J4-3
$A_g = L_p * t_p$ $= 8.0[in] * 0.375[in]$ $= 3.0$						
$\phi R_n = \phi * 0.60 * F_y * A_g$ $= 1.0[in] * 0.60 * 36[ksi] * 3.0[in^2]$ $= 64.8$						Eq. J4-3
Shear rupture	[Kip]	52.62	50.0	DL	0.95	Eq. J4-4
$L_h = d_h + 1/16[in]$ $= 0.812[in] + 1/16[in]$ $= 0.875[in]$						
$L_e = L - n * L_h$ $= 8.0[in] - 3 * 0.875[in]$ $= 5.375[in]$						
$A_{nv} = L_e * t_p$ $= 5.375[in] * 0.375[in]$ $= 2.016[in^2]$						

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Shear plate						
$\phi R_n = \phi*0.60*F_u*A_{nv}$ $= 0.75*0.60*[ksi]58*2.016$ $= 52.62[kip]$						Eq J4-4
Block shear	[Kip]	117.824	50.0	DL	0.42	...
$dh_h = d_{h\_h}+1/16[in]$ $= 1.0[in]+1/16[in]$ $= 1.063[in]$						
$dh_v = d_{h\_v}+1/16[in]$ $= 0.812[in]+1/16[in]$ $= 0.875[in]$						...
$A_{nt} = (L_{eh}+(nc-1)*spa-(n_c-0.5)*dh_h)*t_p$ $= (3.21[in]+(2-1)*3.0[in]-(2-0.5)*1.063[in])*0.375[in]$ $= 1.731[in^2]$						...
$A_{gv} = (L_{ev}+(n-1)*s)*\ t_p$ $= (1.0+(3-1)*3.0)*0.375$ $= 2.625[in^2]$						...
$A_{nv} = (L_{ev}+(n-1)*(s-dh_v)-dh_v/2)*t_p$ $= (1.0+(3-1)*(3.0-0.875)-0.875/2)*0.375$ $= 1.805[in^2]$						...
is Stress Uniform → True						
$U_{bs} = 1$						
$\phi R_n = \phi*\min(0.6*F_u*A_{nv}+U_{bs}*F_u*A_{nt},\ 0.6*F_y*A_{gv}+U_{bs}*F_u*A_{nt})$ $= 0.75*\min(0.60*58*1.805+1*58*1.731,\ 0.60*36*2.625+1*58*1.731)$ $= 117.824[kip]$						
Plate (support side)						
Weld capacity	[Kip]	107.52	50.0	DL	0.47	Table 8-4...8-11
$\phi R_n = \phi*C*C_1*D*L$ $= 0.75*4.48[kip/in]*4.0*1.0*8.0[in]$ $= 107.52[in]$						
Beam						
Bolt bearing under shear load e=3.21[in], Max. tp=None	[Kip]	141.523	50.0	DL	0.35	Table
$L_{c\text{-}end} = \text{Max}(0.0,\ L_e-d_h/2)$ $= \text{Max}(0.0,\ 5.0-0.812/2)$ $= 4.594[in]$						
$L_{c\text{-}spa} = \text{Max}(0.0,\ s - d_h)$ $= \text{Max}(0.0,\ 3.0 - 0.812)$ $= 2.188[in]$						
$\phi R_n = \phi*(C/(n_c*n))*(\min(k_1*l_c,\ k_2*d)+\min(k_1*L_{c\text{-}spa},\ K_2*d)*(n-1))*t_p*F_u*n_c$ $= 0.75*(4.48/(2*3))*(\min(1.2*4.594,\ 2.4*0.75)+\min(1.2*2.188,\ 2.4*0.75)$ $*(3-1))*0.36*65*2$ $= 141.523[kip]$						

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Shear yielding	[Kip]	89.1	50.0	DL	0.56	***

$A_g = L_p * t_p$
$= 8.25[in] * 0.36[in]$
$= 2.97[in^2]$

$\phi R_n = \phi * 0.60 * F_y * A_g$
$= 1.0 * 0.60 * 50[lb/in^2] * 2.97[in^2]$
$= 89.1[kip]$

Support

Welds rupture	[Kip]	---	---	DL	---	

$R_n = 0.60 * F_u * t_p$
$= 0.60 * 65[lib/in^2] * 2.01[in]$
$= 1[in]$

$D_{min} = P/(\phi * C * C_1 * L)$
$= 50.0/(0.75 * 4.48 * 1.0 * 8.0)$
$= 1.86$

Has Welds on both sides → False

$R_u = 0.6 * F_{exx} * (2)^{1/2}/2 * D_{min}/16[in]$ p. 9-5
$= 0.6 * 70 * (2)^{1/2}/2 * 1.86/16[in]$
$= 3.452[in]$