Company Name	SANGAM UNIVERSITY	Project Title	PROJECT3
Group/Team Name	OSDAG	Subtitle	
Designer	ENGINEER	Job Number	3
Date	05 /06 /2016	Method	Limit State Design (No Earthquake Load)

Design Conclusion	
Cleat Angle	**Pass**
Cleat Angle	
Connection Properties	
Connection	
Connection Title	Double Angle Web Cleat
Connection Type	Shear Connection
Connection Category	
Connectivity	Beam-Beam
Beam Connection	Bolted
Column Connection	Bolted
Loading (Factored Load)	
Shear Force (kN)	100.0
Components	
Column Section	ISMB 450
Material	Fe 410
Beam Section	ISMB 300
Material	Fe 410
Hole	STD
Cleat Section	ISA 100X100X10
Thickness (mm)	10
Cleat Leg Size B (mm)	100
Cleat Leg Size A (mm)	100
Hole	STD
Bolts on Beam	
Type	Black Bolt
Grade	4.8
Diameter (mm)	20
Bolt Numbers	4
Columns (Vertical Lines)	1
Bolts Per Column	4
Gauge (mm)	0
Pitch (mm)	50
End Distance (mm)	37
Edge Distance (mm)	37
Bolts on Column	
Type	Black Bolt
Grade	4.8
Diameter (mm)	20
Bolt Numbers	6
Columns (Vertical Lines)	1
Bolts Per Column	3
Gauge (mm)	0

Pitch (mm)	50
End Distance (mm)	62
Edge Distance (mm)	37
Assembly	
Column-Beam Clearance (mm)	20

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Design Check: Secondary Beam Connectivity			
Check	**Required**	**Provided**	**Remark**
Bolt shear capacity (kN)		V_{dsb} = ((2*400*0.6126*20*20)/(√3*1.25*1000) = 90.529 [cl. 10.3.3]	
Bolt bearing capacity (kN)		V_{dpb} = (2.5*0.508*20*7.7*400)/(1.25*1000) = 62.586 [cl. 10.3.4]	
Bearing capacity of beam web (kN)		V_{dpb} = (2.5*0.508*20*7.7*410)/(1.25*1000) = 64.15 [cl. 10.3.4]	
Bearing capacity of cleat (kN)		V_{dpb} = (2.5*0.508*20*10*410)/(1.25*1000) = 83.312 [cl. 10.3.4]	
Bearing capacity (kN)		Min (62.586, 64.15, 83.312) = 62.586	
Bolt capacity (kN)		Min (90.529, 62.586) = 62.586	
Critical bolt shear (kN)	≤ 62.586	22.66	**Pass**
No. of bolts		4	
No.of column(s)	≤ 2	1	
No. of bolts per column		4	
Bolt pitch (mm)	≥ 2.5* 20 = 50, ≤ Min(32*7.7, 300) = 247 [cl. 10.2.2]	50	**Pass**
Bolt gauge (mm)	≥ ;2.5*20 = 50, ≤ Min(32*7.7, 300) = 247 [cl. 10.2.2]	0	
End distance (mm)	≥ 1.7*22.0 = 37.4, ≤ 12*7.7 = 92.4 [cl. 10.2.4]	37	**Pass**
Edge distance (mm)	≥ 1.7*22.0 = 37.4, ≤ 12*7.7 = 92.4 [cl. 10.2.4]	37	**Pass**
Block shear capacity (kN)	≥ 100.0	V_{db} = 271.568 [cl. 6.4.1]	**Pass**
Cleat height (mm)	≥ 0.6*300.0=180.0, ≤ 300.0-13.1-14.0-17.4-15.0- 5=235.5 [cl. 10.2.4, Insdag Detailing Manual, 2002]	224	**Pass**
Cleat moment capacity (kNm)	$(2*90.529*50^2)/(50*1000)$ = 3.15	M_d = (1.2*250*Z)/(1000*1.1) = 150.528 [cl. 8.2.1.2]	**Pass**

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Design Check: Primary Beam Connectivity			
Check	**Required**	**Provided**	**Remark**
Bolt shear capacity (kN)		V_{dsb} = ((400*0.6126*20*20)/(√3*1.25*1000) = 45.264 [cl. 10.3.3]	
Bolt bearing capacity (kN)		V_{dpb} = (2.5*0.508*20*9.4*400)/(1.25*1000) = 76.403 [cl. 10.3.4]	
Bearing capacity of beam web (kN)		V_{dpb} = (2.5*0.508*20*9.4*410)/(1.25*1000) = 78.313 [cl. 10.3.4]	
Bearing capacity of cleat (kN)		V_{dpb} = (2.5*0.508*20*10*410)/(1.25*1000) = 83.312 [cl. 10.3.4]	
Bearing capacity (kN)		Min (76.403, 78.313, 83.312) = 83.312	
Bolt capacity (kN)		Min (45.264, 83.312) = 45.264	
Critical bolt shear (kN)	≤ 45.264	37.35	**Pass**
No. of bolts		6	
No.of column(s) per angle	≤ 2	1	
No. of bolts per column per angle		3	
Bolt pitch (mm)	≥ 2.5* 20 = 50, ≤ Min(32*9.4, 300) = 300 [cl. 10.2.2]	50	**Pass**
Bolt gauge (mm)	≥ 2.5*20 = 50, ≤ Min(32*9.4, 300) = 300 [cl. 10.2.2]	0	
End distance (mm)	≥ 1.7*22.0 = 37.4, ≤ 12*9.4 = 112.8 [cl. 10.2.4]	62	**Pass**
Edge distance (mm)	≥1.7*22.0 = 37.4, ≤12*9.4 = 112.8 [cl. 10.2.4]	37	**Pass**
Block shear capacity (kN)	≥100.0	V_{db} = 266.455 [cl. 6.4.1]	**Pass**
Cleat height (mm)	≥ 0.6*300.0=180.0, ≤ 300.0-13.1-14.0-17.4-15.0- 5=235.5 [cl. 10.2.4, Insdag Detailing Manual, 2002]	224	**Pass**
Cleat moment capacity (kNm)	$(2*45.264*50^2)/(50*1000)$ = 3.342	M_d = (1.2*250*Z)/(1000*1.1) = 150.528 [cl. 8.2.1.2]	**Pass**

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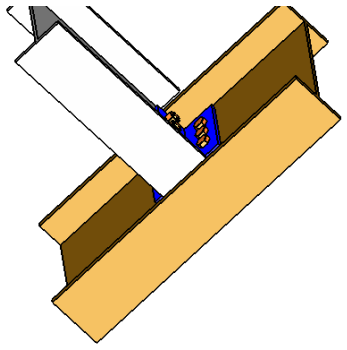
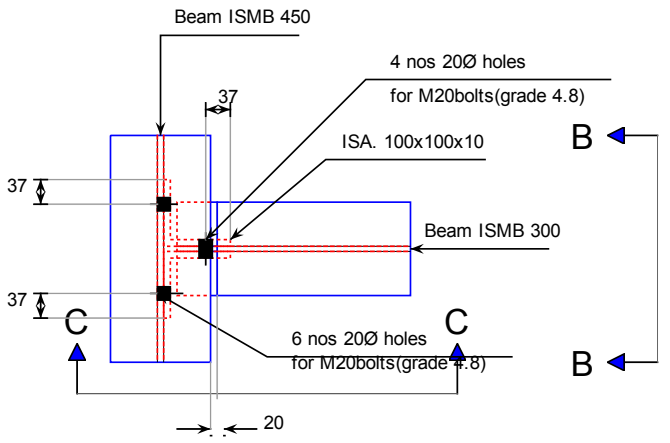
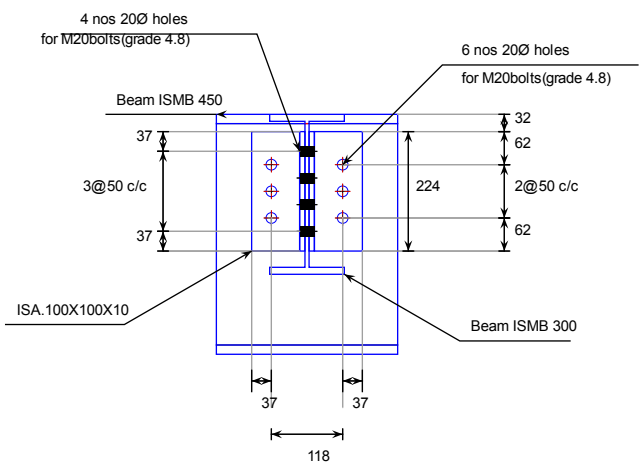
Views

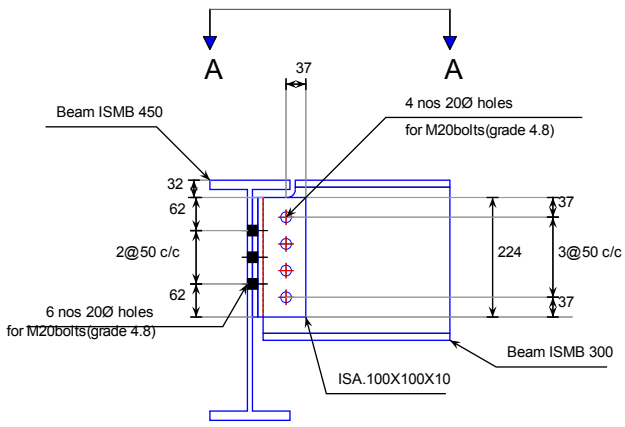




Top view (Sec A-A) (All distances are in "mm")



Side View (Sec B-B) (All distances are in "mm")



Front view (Sec C-C) (All distances are in "mm")

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Additional Comments	