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Company Name	**El Mystico & Janet**	**Project Title**	**Twenty-five story blocks**
Group/Team Name	**Design by Hypnosis**	**Subtitle**	**Something completely different**
Designer	**El Mystico**	**Job Number**	**1.2.1.2.1.1**
Date	**21 /06 /2018**	**Client**	**Mr. Clement Onan**

Design Conclusion	
Extended End Plate	**Pass**
Extended End Plate	
Connection Properties	
Connection	
Connection Title	Extended End Plate
Connection Type	Moment Connection
Connection Category	
Connectivity	Extended both ways
Beam Connection	Bolted and Welded
Loading (Factored Load)	
Bending Moment (kNm)	100.0
Shear Force (kN)	40.0
Axial Force (kN)	0.0
Components	
Beam Section	NPB 350x170x50.2
Material	Fe 410.0
Plate Section	563.6 X 195.0 X 20.0
Thickness (mm)	20.0
Width (mm)	195.0
Depth (mm)	563.6
Hole	Over-sized
Weld	
Type	Double Fillet
Weld at Flange (mm)	8
Weld at Web (mm)	6
Bolts	
Type	Bearing Bolt
Grade	9.8
Diameter (mm)	20
Bolt Numbers	8
Columns (Vertical Lines)	2
Bolts Per Column	4
End Distance (mm)	45
Edge Distance (mm)	45
Gauge Distance (mm)	50

Pitch Distance (mm)	50
Assembly	
Beam-Beam Clearance (mm)	N/A

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Design Preferences	
Bolt	
Hole Type	Over-sized
Hole Clearance (mm)	4.0
Material Grade (MPa) (overwrite)	900.0
Slip factor	N/A
Beta (non pre-tensioned)	2
Weld	
Type of Weld	Shop weld
Material Grade (MPa) (overwrite)	410.0
Detailing	
Type of Edges	a - Sheared or hand flame cut
Minimum Edge-End Distance	1.7 times the hole diameter
Are members exposed to corrosive influences?	No
Design	
Design Method	Limit State Design

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Design Check			
Check	**Required**	**Provided**	**Remark**
Tension in critical bolt (kN)	Tension in bolt due to external factored moment + Prying force = 81.396+49.968 = 131.364 [cl. 10.4.7]		
Tension capacity of critical bolt (kN)	131.364	Tension capacity = (0.9*900*245 / (1.25*1000) = 158.76 [cl. 10.4.5]	**Pass**
Bolt shear capacity (kN)	Factored shear force / Number of bolts = 40.0 / 8 = 5.0	V_{dsb} = (900*1*0.6126*20*20)/(√3*1.25*1000) = 101.8 [cl. 10.3.3]	**Pass**
Bolt bearing capacity (kN)		V_{dpb} = (2.5*0.444*20*40.0*410.0) / (1.25*1000) = 291.6 [cl. 10.3.4]	
Bolt capacity (kN)	Min (101.8, 291.6) =	101.8	
Combined shear and tension capacity of bolt	≤ 1.0	(V_{sb}/V_{db})^2 + (T_b/T_{db})^2 = (5.0/101.8+131.364/158.76) = 0.687 [cl. 10.3.6]	**Pass**
No. of bolts required		8	
No. of column(s)		2	
No. of row(s)		4	
Bolt gauge (mm)	≥ 2.5*20 = 50.0, ≤ Min(32*20.0, 300) = 300.0 [cl. 10.2.2 & cl. 10.2.3]	50	**Pass**
End distance (mm)	≥ 1.7*24 = 45, ≤ 12*20.0 = 240.0 [cl. 10.2.4]	45	**Pass**
Edge distance (mm)	≥ 1.7*24 = 45, ≤ 12*20.0 = 240.0 [cl. 10.2.4]	45	**Pass**
Plate thickness	((4*1.10*1718.385*1000)/(250.0*85.0)) ^ 0.5 = 18.863	20.0	**Pass**

(mm)	[Design of Steel Structures - N. Subramanian, 2014]		
Plate height (mm)	≥ (357.6+ 50.0 + (2*45.0)) = 497.6, ≤ (357.6+ 50.0 + (2*240.0)) = 887.6 [based on detailing requirements]	563.6	**Pass**
Plate width (mm)	≥ max ((90.0+ (2*45.0)), 170.0), ≤ max ((170.0+ 25), 180.0) [based on detailing requirements]	195.0	**Pass**
Plate moment capacity (kNm)	Moment demand M_d = ((18.863^2*250.0*85.0)/(4.4*10^2)) * 10^-6 = 1718.385	Moment capacity M_c = ((20.0^2*250.0*85.0)/(4.4*10 ^ 2)) * 10 ^ -6 = 1931.818 [Design of Steel Structures - N. Subramanian, 2014]	**Pass**
Weld thickness at flange (mm)	≥ (0.967* 10^3)/132.56=7.295 [Design of Steel Structures - N. Subramanian, 2014]	8.0	**Pass**
Weld thickness at web (mm)	≤ minimum(6.6,18.863)	6.0	**Pass**
Effective weld length on flange (each side) (mm)		720.8	
Effective weld length on flange (each side) (mm)		669.2	
Critical stress in weld at flange (N/mm^2)	≤ 410 / (√3 * 1.25) = 189.371 [cl. 10.5.7]	(288.934* 10^3)/(3 * 1441.6) = 66.809	**Pass**
Critical stress in weld at web (N/mm ^ 2)	≤ 410/(√3 * 1.25) = 189.371 [cl. 10.5.7 and cl. 10.5.10]	√((0.0)^2 + (3 * 9.962^2)) =17.255	**Pass**

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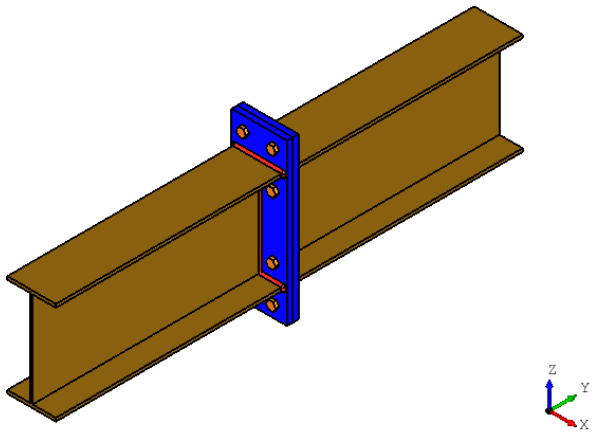
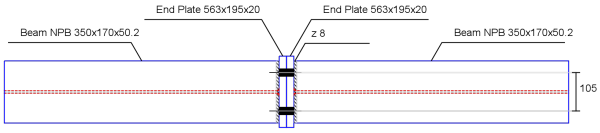
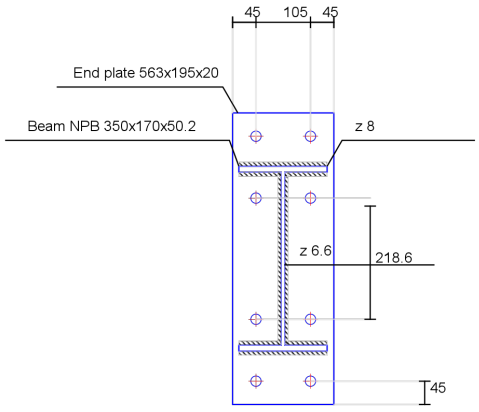
Views

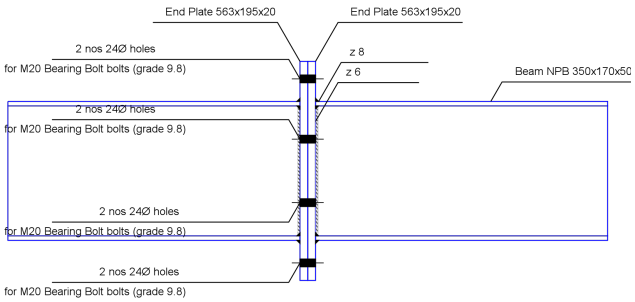




Top view (Sec A-A)
(All dimensions are in "mm")



Side view (Sec B-B)
(All dimensions are in "mm")



Front view (Sec A-A)
(All dimensions are in "mm")

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Additional Comments	