		Created with	Osdag
Company Name	IIT B	**Project Title**	Connection Designs
Group/Team Name	Osdag	**Subtitle**	Moment End Plate
Designer	Engineer 3	**Job Number**	1.2.2.1.2.1.1
Date	12 /06 /2019	**Client**	S R Satish Kumar

Design Conclusion

Beam to Column End Plate Moment Connection	**Pass**

Connection Properties

Connection

Connection Type	Moment Connection
Connection Title	Extended End Plate
End plate type	Extended one way

Connection Category

Connectivity	Column flange-Beam web
Beam to end plate Connection	Welded
Column flange to end plate Connection	Bolted

Loading Details

Bending Moment (kNm)	25.0
Shear Force (kN)	35.0
Axial Force (kN)	12.0

Components

Beam Section	WPB 300x300x96.8
Grade of Steel	Fe 410.0
Column Section	UC 305 x 305 x 137
Grade of Steel	Fe 410.0
Plate Section	410.0 X 300.0 X 26.0
Thickness (t) (mm)	26.0
Width (mm)	300.0
Depth (mm)	410.0
Clearance holes for fasteners	Standard
Weld	
Type	Fillet Weld
Weld at Flange (mm)	10
Weld at Web (mm)	6
Bolts	
Type	Bearing Bolt
Property Class	10.9
Diameter (d) (mm)	24
Hole diameter (d_o) (mm)	26.0

Number of Bolts (n)	8
End Distance (e)(mm)	45
Edge Distance (e') (mm)	100
Cross-centre gauge (g') (mm)	100.0
Pitch Distance (p) (mm)	
Pitch-1,2	115.0
Pitch-2,3	60.0
Pitch-3,4	110.0

Company Name	IIT B	Project Title	Connection Designs
Group/Team Name	Osdag	Subtitle	Moment End Plate
Designer	Engineer 3	Job Number	1.2.2.1.2.1.1
Date	12 /06 /2019	Client	S R Satish Kumar

Design Preferences

Bolt

Hole Type	Standard
Hole Clearance (mm)	2.0
Ultimate Strength (f_u) (MPa)	1000.0
Slip factor	N/A
Beta (β)(non pre-tensioned)	2

Weld

Type of Weld	Shop weld

Detailing

Type of Edges	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

Company Name	IIT B	Project Title	Connection Designs
Group/Team Name	Osdag	Subtitle	Moment End Plate
Designer	Engineer 3	Job Number	1.2.2.1.2.1.1
Date	12 /06 /2019	Client	S R Satish Kumar

Created with | Osdag

Design Check

Check	Required	Provided	Remark
Bolt Checks			
Bolt shear capacity (kN)	Factored shear force / Number of bolts = 35.0 / 8 = 4.375	$V_{dsb} = $ (1000*1*0.6126*24*24)/($\sqrt{3}$*1.25) = 163.044 [cl. 10.3.3]	Pass
Bolt bearing capacity (kN)		$V_{dpb} = (2.5 * k_b * d * t * f_u = $ 341.194 [cl. 10.3.4]	
Bolt capacity (kN)	min(Shear Capacity, Bearing Capacity) = min (163.044, 341.194)	163.044	
Tension capacity of bolt (kN)	≥ Tension in bolt due to external moment + external axial load + prying force =165.66+1.5+67.431=234.591	Tension capacity = (0.9*1000*353) / (1.25*1000) = 254.16 [cl. 10.4.5]	Pass
Combined shear and tension capacity of bolt	≤ 1.0	(V_{sb}/V_{db})^2 + (T_b/T_{db})^2 = (4.375/163.044)^2 + (234.591/254.16)^2 = 0.853 [cl. 10.3.6]	Pass
No. of bolts	≥ 4 , ≤ 12	8.0	
Pitch distance (mm)	≥ 2.5 * d = 60, ≤ min(32 * t, 300) = 300 [cl. 10.2.2 & cl. 10.2.3]	60	Pass
End distance (mm)	≥ 1.7 d_o = 44.2, ≤ 12*t*ε = 260.4 [cl. 10.2.4]	45	Pass
Edge distance (mm)	≥ 1.7 d_o = 44.2, ≤ 12*t*ε = 260.4 [cl. 10.2.4]	45	Pass
Distance to the centre line of bolt from face of beam flange (mm)	25mm ≤ l_v ≤ 63.5mm	50	Pass
Plate Checks			
Plate thickness (mm)	≥ √ (M *(1.1/fy) *(4/b_e)) = ≥ √ (165.66*(1.1/250.0) * (4/150.0)) =25.181	26.0	Pass
Plate height (mm)		410.0	Pass

Plate width (mm)	≥ width of beam flange , ≥300.0	300.0	**Pass**

<table>
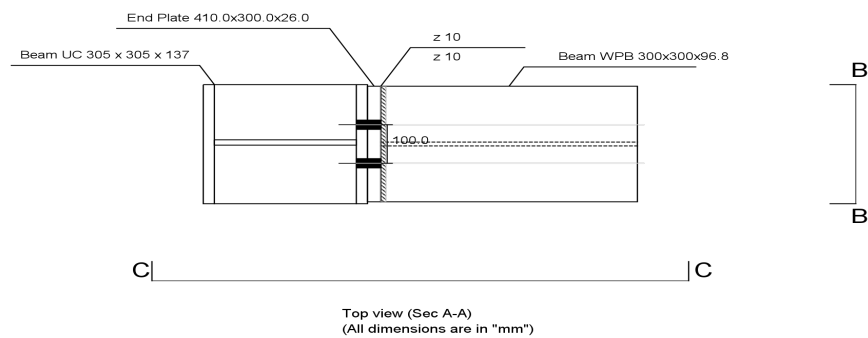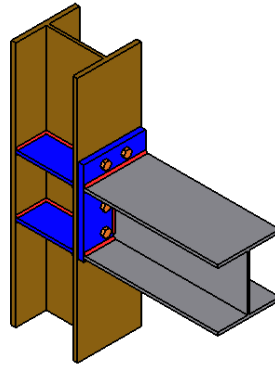<tr><td colspan="4" align="center">**Weld Checks**</td></tr>
<tr><td colspan="4" align="center">**Flange**</td></tr>
<tr><td>Effective weld length on top flange (mm)</td><td></td><td>280.0</td><td></td></tr>
<tr><td>Effective weld length on bottom flange (mm)</td><td></td><td>122.3</td><td></td></tr>
<tr><td>Weld throat thickness at flange (mm)</td><td>< 15.0,> 6.0</td><td>10.0</td><td>**Pass**</td></tr>
<tr><td>Critical stress in weld at flange (N/mm^2)</td><td>$\geq ((M/Z_{weld,flange}) + (P/A_{weld}))$ =177.945</td><td>$(f_u / \sqrt{3} * \square_{mb}) = 189.371$</td><td>**Pass**</td></tr>
<tr><td colspan="4" align="center">**Web**</td></tr>
<tr><td>Effective weld length at web (each side) (mm)</td><td></td><td>252.6</td><td></td></tr>
<tr><td>Weld throat thickness at web (mm)</td><td>< 10.0,> 6.0</td><td>6.0</td><td>**Pass**</td></tr>
<tr><td>Critical stress in weld at web (N/mm^2)</td><td>$\geq \sqrt{((M/Z_{weld,web} + P/A_{weld})^2)) + (V/A_{weld,web})^2}$ =157.961</td><td>$(f_u / \sqrt{3} * \square_{mb}) = 189.371$</td><td>**Pass**</td></tr>
<tr><td colspan="4" align="center">**Stiffener Checks**</td></tr>
<tr><td colspan="4" align="center">**Horizontal Continuity Plate in Tension**</td></tr>
<tr><td>Length (mm)</td><td></td><td>277.1</td><td></td></tr>
<tr><td>Width (mm)</td><td></td><td>147.7</td><td></td></tr>
<tr><td>Thickness (mm)</td><td>≥15.713</td><td>16.0</td><td></td></tr>
<tr><td>Weld (mm)</td><td></td><td>8.0</td><td></td></tr>
<tr><td colspan="4" align="center">**Horizontal Continuity Plate in Compression**</td></tr>
<tr><td>Length (mm)</td><td></td><td>277.1</td><td></td></tr>
<tr><td>Width (mm)</td><td></td><td>147.7</td><td></td></tr>
<tr><td>Thickness (mm)</td><td>≥15.713</td><td>16.0</td><td></td></tr>
<tr><td>Weld (mm)</td><td></td><td>8.0</td><td></td></tr>
<tr><td colspan="4" align="center">**End Plate Stiffeners**</td></tr>
<tr><td>Length (mm)</td><td></td><td>245.0</td><td></td></tr>
<tr><td>Height (mm)</td><td></td><td>155.0</td><td></td></tr>
<tr><td>Thickness (mm)</td><td></td><td>10.0</td><td></td></tr>
<tr><td>Noch at top side of plate (mm)</td><td></td><td>50.0</td><td></td></tr>
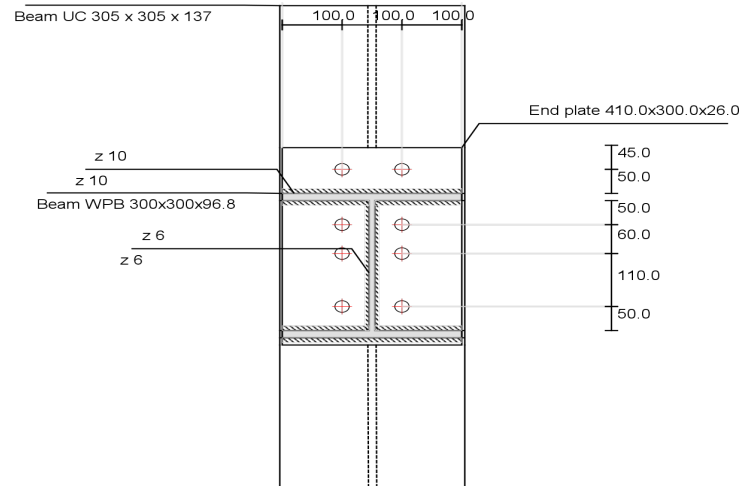<tr><td>Noch at bottom side of plate</td><td></td><td>10.0</td><td></td></tr>
</table>

(mm)			
Fillet weld size (mm)		8.0	

		Created with	Osdag
Company Name	IIT B	**Project Title**	Connection Designs
Group/Team Name	Osdag	**Subtitle**	Moment End Plate
Designer	Engineer 3	**Job Number**	1.2.2.1.2.1.1
Date	12 /06 /2019	**Client**	S R Satish Kumar

Fabrication Drawings

End Plate 410.0x300.0x26.0

Beam UC 305 x 305 x 137

z 10
z 10

Beam WPB 300x300x96.8

B

100.0

B

C | | C

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

Fabrication Drawings

Beam UC 305 x 305 x 137

100,0   100,0   100,0

End plate 410.0x300.0x26.0

z 10
z 10

Beam WPB 300x300x96.8

z 6
z 6

45.0
50.0
50.0
60.0
110.0
50.0

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

A   A

Beam UC 305 x 305 x 137

End Plate 410.0x300.0x26.0

2 nos 26Ø holes
for M24 Bearing Bolt bolts (grade 10.9)

z 10
z 10

Beam WPB 300x300x96.8

4 nos 26Ø holes
for M24 Bearing Bolt bolts (grade 10.9)

z 6
z 6

2 nos 26Ø holes
for M24 Bearing Bolt bolts (grade 10.9)
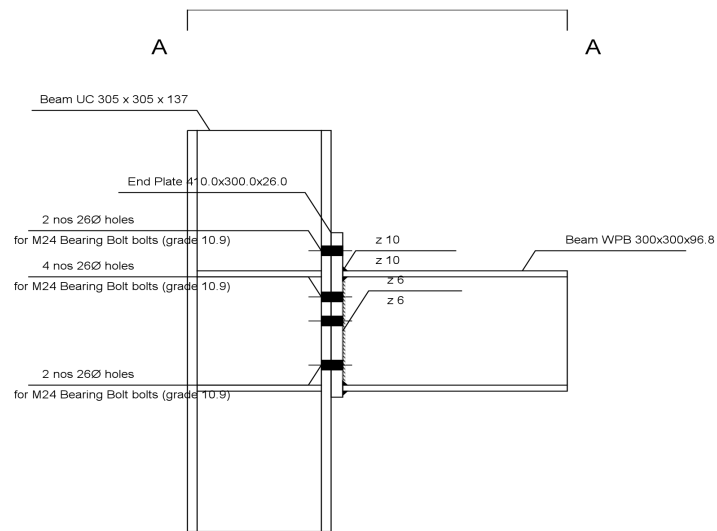
Front view (Sec C-C)
(All dimensions are in "mm")

Company Name	IIT B	Project Title	Connection Designs
Group/Team Name	Osdag	Subtitle	Moment End Plate
Designer	Engineer 3	Job Number	1.2.2.1.2.1.1
Date	12 /06 /2019	Client	S R Satish Kumar

Additional Comments	