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Company Name	IIT Bombay	**Project Title**	**Connection Design**
Group/Team Name	Osdag	**Subtitle**	**Cover Plate Design**
Designer	Engineer#2	**Job Number**	**1.2.1.1.1.4**
Date	12 /06 /2019	**Client**	**Manas M. Ghosh, INSDAG, Kolkata**

Design Conclusion

Beam to Beam Spliced Cover Plate	**Pass**

Beam to Beam Spliced Cover Plate

Connection Properties

Connection

Connection Title	Beam to Beam Spliced Cover Plate
Connection Type	Moment Connection

Connection Category

Connectivity	Bolted

Loading (Factored Load)

Moment (kNm)	175.0
Shear Force (kN)	115.0
Axial Force (kN)	100.0

Components

Beam Section	UB 457 x 191 x 82
Material	Fe 410.0
Hole	Standard
Flange Splice Plate	1145 X 191 X 16
Preference	Outside + Inside
Thickness (mm)	16
Height (mm)	1145
Width (mm)	191
Hole	Standard
Web Splice Plate	240 X 165 X 10
Thickness (mm)	10
Height (mm)	240
Width (mm)	165
Hole	Standard
Bolts	
Type	Friction Grip Bolt
Grade	8.8
Diameter (mm)	20
Flange Splice Plate	
Total no. of Bolts	64
No. of Rows (Parallel to Beam Length; Connecting Each Beam)	8

No. of Columns (Perpendicular to Beam Length; Connecting Each Beam)	2
Gauge (mm)	117
Pitch (mm)	70
End Distance (mm)	40
Edge Distance (mm)	37
Web Splice Plate	
Total no. of Bolts	6
No. of Rows (Parallel to Beam Length; Connecting Each Beam)	3
No. of Columns (Perpendicular to Beam Length; Connecting Each Beam)	1
Gauge (mm)	85
Pitch (mm)	80
End Distance (mm)	40
Edge Distance (mm)	40
Assembly	
Beam-Beam Clearance (mm)	5.0

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Design Preferences

Bolt

Hole Type	Standard
Hole Clearance (mm)	2.0
Material Grade (MPa) (overwrite)	800.0
Slip Factor	0.3

Detailing

Type of Edges	Sheared or hand flame cut
Minimum Edge/End Distance	1.7 times the hole diameter
Gap between Beams (mm)	5.0
Are Members Exposed to Corrosive Influences?	No

Design

Design Method	Limit State Design

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Design Check: Flange Splice Plate

Check	Required	Provided	Remark
Bolt shear capacity (kN)		V_{dsf} = ((0.3 * 1 * 1.0 * 137.2) / (1.25)) = 32.93 [cl. 10.4.3]	
Bolt bearing capacity (kN)		N/A	
Bolt capacity (kN)		32.93	
No. of bolts parallel to beam length; connecting each beam	(1.05 * 444.14) / 32.93 = 14.2	16	Pass
No. of rows of bolt (parallel to beam length; connecting each beam)		8	
No. of column(s) of bolt (perpendicular to beam length; connecting each beam)		2	
Total no. of bolts	4 * 16 = 64	64	Pass
Bolt pitch (mm)	≥ 2.5 * 20 = 50.0, ≤ min(32 * 16.0, 300) = 300.0 [cl. 10.2.2]	70	Pass
Bolt gauge (mm)	≥ 2.5 * 20 = 50, ≤ min(32 * 16.0, 300) = 300.0 [cl. 10.2.2]	117	Pass
End distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 16.0 = 118.8 [cl. 10.2.4]	40	Pass
Edge distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 16.0 = 118.8 [cl. 10.2.4]	37	Pass
Block shear capacity (kN)	≥ 444.14	V_{db} = 2472.45 [cl. 6.4.1]	Pass
Strength due to yielding of gross section (kN)	≥ 444.14	V_{db} = 695.64 [cl. 6.2]	Pass
Strength due to rupture of critical section (kN)	≥ 444.14	V_{db} = 695.73 [cl. 6.3.1]	Pass
Outer flange splice plate thickness (mm)	8.5 [Cl. 6.2]	16	Pass
Outer flange splice plate height (mm)	≥ 2 * min(191.3, 225) + 5.0 = 387.6 [SCI - 6th edition, page-754]	1145	Pass

Outer flange splice plate width (mm)	≥ 171.3, ≤191.3	191	**Pass**
Inner flange splice plate thickness (mm)	8.5 [Cl. 6.2]	16	**Pass**
Inner flange splice plate height (mm)	≥ 2 * min(191.3, 225) + 5.0 = 387.6 [SCI - 6th edition, page-754]	1145	**Pass**
Inner flange splice plate width (mm)	≥ 74	80.5	**Pass**

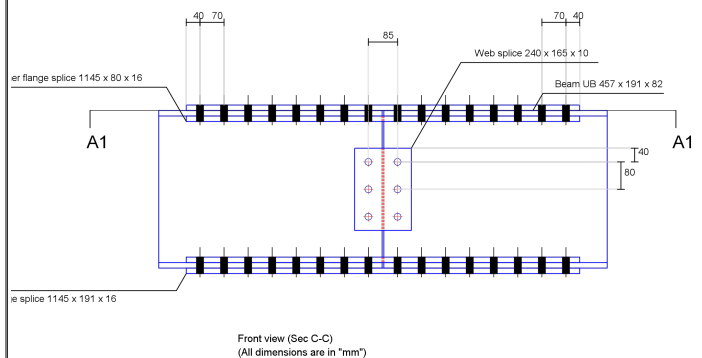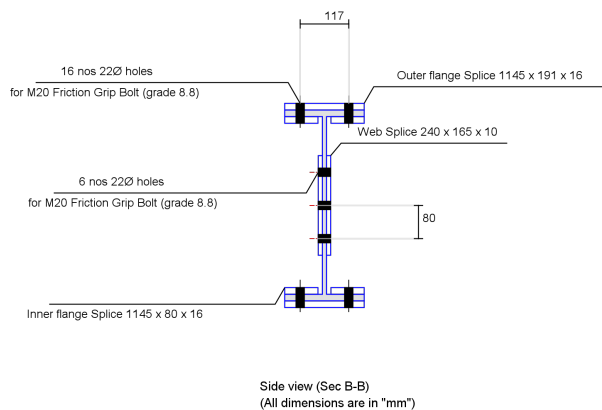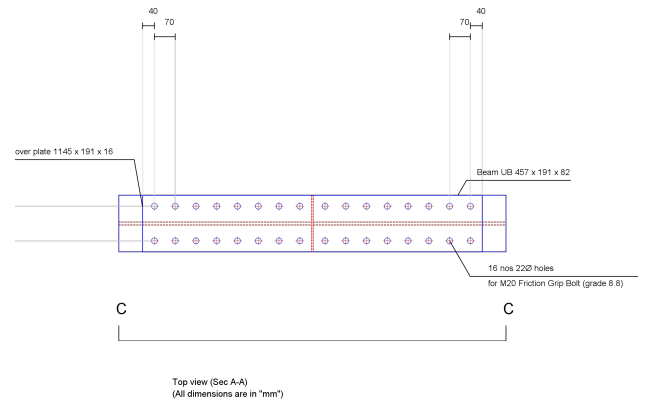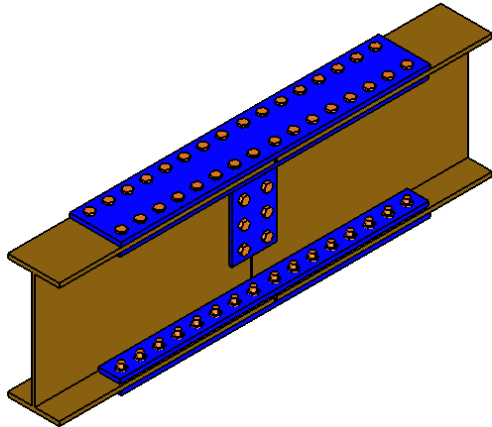| Company Name	IIT Bombay	Project Title	Connection Design
Group/Team Name	Osdag	Subtitle	Cover Plate Design
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Design Check: Web Splice Plate

Check	Required	Provided	Remark
Bolt shear capacity (kN)		V_{dsf} = ((0.3 * 2 * 1.0 * 137.2) / (1.25)) = 65.86 [cl. 10.4.3]	
Bolt bearing capacity (kN)		N/A	
Bolt capacity (kN)		65.86	
No. of bolts parallel to beam length; connecting each beam	115.0 / 65.86 = 1.75	3.0	Pass
No. of rows of bolt (parallel to beam length; connecting each beam)		3	
No. of column(s) of bolt (perpendicular to beam length; connecting each beam)		1	
Total no. of bolts	2 * 3.0 = 6	6	Pass
Bolt pitch (mm)	≥ 2.5 * 20 = 50.0, ≤ min(32 * 9.9, 300) = 300.0 [cl. 10.2.2]	80	Pass
Bolt gauge (mm)	≥ 2.5 * 20 = 50, ≤ min(32 * 9.9, 300) = 300.0 [cl. 10.2.2]	85	Pass
End distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 9.9 = 118.8 [cl. 10.2.4]	40	Pass
Edge distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 9.9 = 118.8 [cl. 10.2.4]	40	Pass
Block shear capacity (kN)	≥ 115.0	V_{db} = 344.56 [cl. 6.4.1]	Pass
Shear yielding (kN)	≥ 115.0	V_{db} = 283.43 [cl. 8.4.1]	Pass
Shear rupture (kN)	≥ 115.0	V_{db} = 398.52 [cl. 8.4.1]	Pass
Web plate thickness (mm)	≥ max(10.0, 4.95) = 10.0	10	Pass
Web plate height (mm)	≤ 460.0 - 2 * 16.0 - 2 * 10.2 - 2 * 5 = 387.6 [SCI - 6th edition, page 754]	240	Pass

Web plate width (mm)		165	

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Views

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

over plate 1145 x 191 x 16
Beam UB 457 x 191 x 82
16 nos 22Ø holes
for M20 Friction Grip Bolt (grade 8.8)

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

16 nos 22Ø holes
for M20 Friction Grip Bolt (grade 8.8)
Outer flange Splice 1145 x 191 x 16
Web Splice 240 x 165 x 10
6 nos 22Ø holes
for M20 Friction Grip Bolt (grade 8.8)
Inner flange Splice 1145 x 80 x 16

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

er flange splice 1145 x 80 x 16
Web splice 240 x 165 x 10
Beam UB 457 x 191 x 82
e splice 1145 x 191 x 16

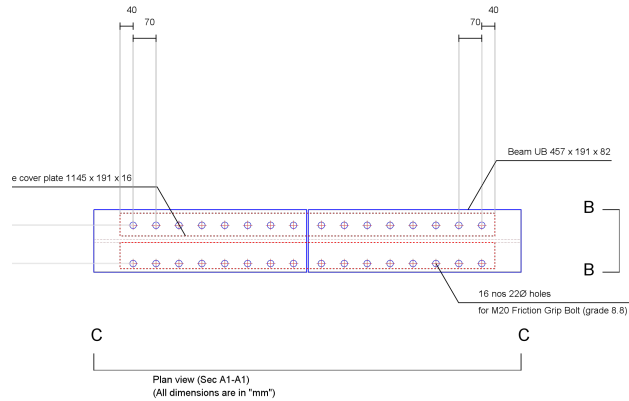| Company Name	IIT Bombay	Project Title	Connection Design
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Views

Beam UB 457 x 191 x 82

e cover plate 1145 x 191 x 16

16 nos 22Ø holes
for M20 Friction Grip Bolt (grade 8.8)

Plan view (Sec A1-A1)
(All dimensions are in "mm")

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Additional Comments	