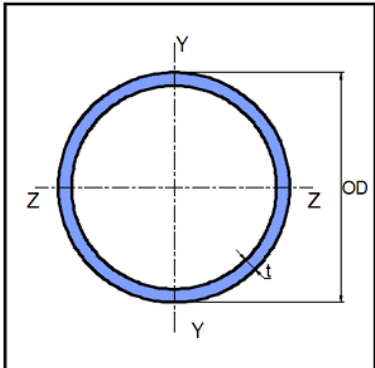




| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

1 Input Parameters

| | | | | |
|--|--------------------------------|-------------------|--|---------|
| Main Module | Moment Connection | | | |
| Module | Base Plate Connection | | | |
| Connectivity | Hollow/Tubular Column Base | | | |
| End Condition | Fixed | | | |
| Axial Compression (kN) | 775.0 | | | |
| Axial Tension/Uplift (kN) | 0.0 | | | |
| Shear Force (kN) | | | | |
| - Along major axis (z-z) | 45.0 | | | |
| - Along minor axis (y-y) | 10.0 | | | |
| Bending Moment (kNm) | | | | |
| - Major axis (M_{z-z}) | 0.0 | | | |
| - Minor axis (M_{y-y}) | 0.0 | | | |
| Column Section - Mechanical Properties | | | | |
|  | Column Section | | CHS 355.6 x 10 | |
| | Material | | E 300 (Fe 440) | |
| | Ultimate Strength, F_u (MPa) | | 440.0 | |
| | Yield Strength, F_y (MPa) | | 300.0 | |
| | Mass, m (kg/m) | 85.23 | None | None |
| | Area, A (cm ²) | 108.57 | t (mm) | 10.0 |
| | Nominal bore, NB (mm) | 350 | 2nd Moment of area, I (cm ⁴ /m) | 16223.5 |
| | Out diameter, OD (mm) | 355.6 | Radius of gyration, r (cm) | 122.2 |
| Base Plate - Design Preference | | | | |
| Material | | E 250 (Fe 410 W)A | | |
| Ultimate Strength, F_u (MPa) | | 410 | | |
| Yield Strength, F_y (MPa) | | 250 | | |
| | | | | |
| Stiffener/Shear Key - Design Preference | | | | |
| Material | | E 250 (Fe 410 W)A | | |
| Anchor Bolt - Input and Design Preference | | | | |
| Diameter (mm) | | ['M20'] | | |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

| | |
|---|--|
| Property Class | [8.8'] |
| Anchor Bolt Type | End Plate Type |
| Anchor Bolt Galvanized? | Yes |
| Designation | M20X344.5 IS5624 GALV |
| Hole Type | Over-sized |
| Total Length (mm) | 344.5 |
| Material Grade, F_u (MPa) | 830.0 |
| | |
| None | |
| Friction Coefficient (between concrete and anchor bolt) | 0.3 |
| Weld - Design Preference | |
| Type of Weld Fabrication | Shop Weld |
| Material Grade Overwrite, F_u (MPa) | 440.0 |
| Detailing - Design Preference | |
| Edge Preparation Method | b - Rolled, machine-flame cut, sawn and planed |
| Are the Members Exposed to Corrosive Influences? | Yes |
| Design - Design Preference | |
| Design Method | Limit State Design |
| Base Plate Analysis | Effective Area Method |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

2 Design Checks

| | |
|---------------|------|
| Design Status | Pass |
|---------------|------|

2.1 Design Parameters

| Check | Required | Provided | Remarks |
|---|----------|---|---------|
| Bearing Strength of Concrete (N/mm ²) | | $\sigma_{br} = 0.45f_{ck}$ $= 0.45 \times 35$ $= 15.75$ [Ref. IS 456:2000, Cl.34.4] | OK |
| Grout Thickness (mm) | | $t_g = 50$ | OK |
| Epsilon - stiffener plate | | $\epsilon_{st} = \sqrt{\frac{250}{f_{yst}}}$ $= \sqrt{\frac{250}{250}}$ $= 1.0$ [Ref. IS 800:2007, Table2] | OK |

2.2 Load Consideration

| Check | Required | Provided | Remarks |
|---|----------------|--|---------|
| Axial Compression (kN) | $P_x = 775.0$ | $P_u = \max(P_x, 0.3P_d), \text{ but, } \leq P_d$ $= \max(775.0, 0.3 \times 2961.0)$ $= \max(775.0, 888.3)$ ≤ 2961.0 $= 888.3$ [Ref. IS 800:2007, Cl.10.7] Note: P_d is the design axial capacity of the column | Pass |
| Shear Force - along major (z-z) axis (kN) | $V_d = 317.06$ | $V_1 = 45.0$ | Pass |
| Shear Force - along minor (y-y) axis (kN) | $V_d = 317.06$ | $V_2 = 10.0$ | Pass |



| | | | |
|-----------------|--------------|---------------|----------------------------|
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| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

| Check | Required | Provided | Remarks |
|-------------------|------------|---|---------|
| Interaction Ratio | I.R. < 1.0 | $\begin{aligned} \text{I.R. axial} &= P_x/P_d \\ &= 775.0/2961.0 \\ &= 0.26 \\ \\ \text{I.R. moment} &= M_z/M_{dz} \\ &= 0.0/0.0 \\ &= 0.0 \\ \\ \text{I.R. sum} &= \text{I.R. axial} + \text{I.R. moment} \\ &= 0.26 + 0.0 \\ &= 0.26 \end{aligned}$ | Pass |

2.3 Plate Washer and Nut Details

| Check | Required | Provided | Remarks |
|---------------------------------|----------|--|---------|
| Plate Washer Size (mm) | | Square – 45X45 [Ref. IS 6649:1985, Table 2] | Pass |
| Plate Washer Thickness (mm) | | $t_w = 8.5$ [Ref. IS 6649:1985, Table 2] | Pass |
| Plate Washer Hole Diameter (mm) | | $d_h = 22$ [Ref. IS 6649:1985, Table 2] | Pass |
| Nut (hexagon) Thickness (mm) | | $t_n = 18.0$ [Ref. IS 1364-3:2002, Table 1] | Pass |
| End Plate Size (mm) | | Square - 90 X 90 | Pass |
| End Plate Thickness (mm) | | 14 | Pass |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

2.4 Anchor Bolt Summary

| Check | Required | Provided | Remarks |
|-------------------|----------|---------------|---------|
| Diameter (mm) | | 20 | Pass |
| Number of Bolts | | $n_{out} = 4$ | Pass |
| Property Class | | 8.8 | Pass |

2.5 Detailing Checks

| Check | Required | Provided | Remarks |
|------------------------------|---|----------|---------|
| Min. End Distance (mm) | $e_{min} = 1.5d_0$ $= 1.5 \times 24.0$ $= 36.0$ [Ref. IS 800:2007, Cl.10.2.4.2] | 55.0 | Pass |
| Max. End Distance (mm) | $e_{max} = 40 + 4t$ Where, $t = \min(10, 10)$ $= 40 + (4 \times 10)$ $e_{max} = 80.0$ [Ref. IS 800:2007, Cl.10.2.4.3] | 55.0 | Pass |
| Min. Edge Distance (mm) | $e'_{min} = 1.5d_0$ $= 1.5 \times 24.0$ $= 36.0$ [Ref. IS 800:2007, Cl.10.2.4.2] | 55.0 | Pass |
| Max. Edge Distance (mm) | $e'_{max} = 40 + 4t$ Where, $t = \min(10, 10)$ $= 40 + (4 \times 10)$ $e'_{max} = 80.0$ [Ref. IS 800:2007, Cl.10.2.4.3] | 55.0 | Pass |
| Min. Pitch Distance (mm) | N/A | 0.0 | N/A |
| Max. Pitch Distance (mm) | N/A | 0.0 | N/A |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

2.6 Base Plate Dimension (L X W)

| Check | Required | Provided | Remarks |
|-----------------|--|----------|---------|
| Length (mm) | $L = OD + 2(c + e)$ $= 355.6 + 2 \times (55 + 55.0)$ $= 575.6$ [Ref. based on detailing requirement] | 575.6 | Pass |
| Width (mm) | $W = OD + 2(c + e')$ $= 355.6 + 2 \times (55 + 55.0)$ $= 575.6$ [Ref. based on detailing requirement] | 575.6 | Pass |

2.7 Base Plate Analysis

| Check | Required | Provided | Remarks |
|-----------------------------------|---|---|---------|
| Min. Area Required (mm^2) | $A_{reqmin} = \frac{P_u}{\sigma_{br}}$ $= \frac{888.3000000000001 \times 10^3}{15.75}$ $= 56.4 \times 10^3$ | $A_{provided} = L \times W$ $= 575.6 \times 575.6$ $= 331.32 \times 10^3$ | Pass |
| Effective Bearing Area (mm^2) | $A_{breff} = \frac{\pi}{4} \times (OD + 2c)^2$ $= \frac{\pi}{4} \times (355.6 + 2c)^2$ Note: c is the projection beyond the face of the column. [Reference: Design of Steel Structures, by N.Subramanian, (2019 edition)] | | OK |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

| Check | Required | Provided | Remarks |
|--|---|---|---------|
| Projection (mm) | $A_{b\text{reff}} = A_{\text{reqmin}}$ $= 56.4 \times 10^3$ <p>Therefore, $\frac{\pi}{4} \times (355.6 + 2c)^2 = 56.4 \times 10^3$</p> $c = 43.81$ <p>projection = max(c, e)</p> $= \max(43.81, 55.0)$ $= 55.0$ <p>[Reference: Design of Steel Structures, by N.Subramanian, (2019 edition)]</p> | 55 | Pass |
| Actual Bearing Stress (N/mm ²) | 15.75 | $\sigma_{\text{bractual}} = \frac{P_u}{A_{\text{provided}}}$ $= \frac{888.3000000000001 \times 10^3}{331.32 \times 10^3}$ $= 2.68$ | Pass |
| Thickness of Base Plate (mm) | $t < t_p \leq 120$ $10.0 < t_p \leq 120$ | $t_p = c \left[\frac{2.5 \sigma_{\text{bractual}} \gamma_{m0}}{f_{y\text{plate}}} \right]^{0.5}$ $= 55 \times \left[\frac{2.5 \times 2.68 \times 1.1}{250} \right]^{0.5}$ $= 9.44$ $= 10$ <p>[Ref. IS 800:2007, Cl.7.4.3.1]</p> | Pass |

2.8 Anchor Bolt Design

| Check | Required | Provided | Remarks |
|-------|----------|----------|---------|
|-------|----------|----------|---------|



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

| Check | Required | Provided | Remarks |
|---------------------------|----------|--|---------|
| Shear Capacity (kN) | | $V_{dsb} = \frac{f_{ub} n_n A_{nb}}{\sqrt{3} \gamma_{mb}}$ $= \frac{830.0 \times 1 \times 245}{1000 \times \sqrt{3} \times 1.25}$ $= 93.92$ <p>[Ref. IS 800:2007, Cl.10.3.3]</p> | OK |
| Kb | | $k_b = \min \left(\frac{e}{3d_0}, \frac{f_{ub}}{f_u}, 1.0 \right)$ $= \min \left(\frac{55.0}{3 \times 24.0}, \frac{830.0}{440.0}, 1.0 \right)$ $= \min(0.76, 1.89, 1.0)$ $= 0.76$ <p>[Ref. IS 800:2007, Cl.10.3.4]</p> | OK |
| Bearing Capacity (kN) | | $V_{dpb} = \frac{2.5 k_b d t f_u}{\gamma_{mb}}$ $= \frac{2.5 \times 0.76 \times 20 \times 10 \times 410}{1000 \times 1.25}$ $= 124.64$ $= 0.7 \times 124.64$ $= 87.25$ <p>Note: The bearing capacity is reduced since the hole type is Over-sized or Short-slotted.</p> <p>[Ref. IS 800:2007, Cl.10.3.4]</p> | OK |
| Bolt Capacity (kN) | | $V_{db} = \min (V_{dsb}, V_{dpb})$ $= \min (93.92, 87.25)$ $= 87.25$ <p>[Ref. IS 800:2007, Cl.10.3.2]</p> | OK |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

| Check | Required | Provided | Remarks |
|---|---|---|---------|
| Tension Demand - per anchor bolt (kN) | $T_b = \frac{P_t}{n_{out}/2}$ $= \frac{0}{4/2}$ $= \frac{0}{2}$ $= 0.0$ | $T_{db} = 0.90 f_{ub} A_n / \gamma_{mb}$ $< f_{yb} A_{sb} (\gamma_{mb} / \gamma_{m0})$ $= \min \left(0.90 \times 830.0 \times 245 / 1.25, \right.$ $\left. 660.0 \times 314 \times (1.25/1.1) \right)$ $= \min(146.41, 235.5)$ $= 146.41$ [Ref. IS 800:2007, Cl.10.3.5] | |
| Anchor Length - above concrete footing (mm) | | $l_1 = t_g + t_p + t_w + t_n + 20$ $= 50 + 10 + 8.5 + 18.0 + 20$ $= 106.5$ | Pass |
| Anchor Length - below concrete footing (mm) | | $l_2 = 238.0$ [Reference: IS 5624:1993, Table 1.] | Pass |
| Anchor Length - total (mm) | $200 \leq l_a \leq 800$ [Reference: IS 5624:1993, Table 1] | $l_a = l_1 + l_2$ $= 106.5 + 238.0$ $= 344.5$ | Pass |

2.9 Stiffener Design

| Check | Required | Provided | Remarks |
|--------------------------|----------|---|---------|
| No. of Stiffeners | | 4 | OK |
| Length of Stiffener (mm) | | $L_{st} = \frac{L - OD}{2}$ $= \frac{575.6 - 355.6}{2}$ $= 110$ | OK |
| Height of Stiffener (mm) | | $H_{st} = L_{st} + 50$ $= 110 + 50$ $= 160$ | OK |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

| Check | Required | Provided | Remarks |
|---|---|---|---------|
| Thickness of Stiffener (mm) | $t_{st} = \left(\frac{L_{st}}{13.6 \times \epsilon_{st}} \right) \geq T$ $= \left(\frac{110}{13.6 \times 1.0} \right) \geq 10.0$ $= \max(8.09, 10.0)$ <p>[Ref. IS 800:2007, Table 2.]</p> | 14 | Pass |
| Stress (average) at Stiffener (N/mm^2) | 15.75 | $\sigma_{st} = \sigma_{bractual}$ $= 2.68$ | Pass |
| Max. Shear on Stiffener (kN) | $V_{st} = \sigma_{st} (W L_{st})$ $= 2.68 \times (575.6 \times 110)$ $= 169.687$ | $V_{dst} = \frac{A_{vg} f_{yst}}{\sqrt{3} \gamma_{m0}}$ $= \frac{(H_{st} \times t_{st}) \times f_{yst}}{\sqrt{3} \times \gamma_{m0}}$ $= \frac{(160 \times 14) \times 250}{\sqrt{3} \times 1.1 \times 10^3}$ $= 293.924$ <p>Note: Stiffener is not restricted to low shear. [Ref. IS 800:2007 (Cl.8.4.1)]</p> | Pass |
| High Shear Check | $V_{st} \leq 0.6 \times V_{dst}$ $\leq 0.6 \times 293.924$ ≤ 176.35 | $V_{st} = 169.687$ | Pass |
| Section Modulus of the Stiffener (mm^3) | | $z_{est} = 59.73 \times 10^3$ | OK |
| Max. Moment on Stiffener (kNm) | $M_{st} = V_{st} \times \frac{L_{st}}{2}$ $= 169.687 \times \frac{110}{2} \times 10^{-3}$ $= 9.333$ | $M_{dst} = \frac{\beta_b z_{est} f_{yst}}{\gamma_{m0}}$ $= \frac{1 \times z_{est} f_{yst}}{\gamma_{m0}} \quad (\beta_b = 1)$ $= \frac{1 \times 59.73 \times 10^3 \times 250}{1.1 \times 10^6}$ $= 13.576$ <p>[Ref. IS 800:2007 (Cl.8.2.1.2)]</p> | Pass |
| Weld Size (mm) | 5 | 6 | Pass |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

2.10 Shear Design

| Check | Required | Provided | Remarks |
|--|-------------------------|---|------------------------|
| Shear Resistance (kN) | | $V_r = P_u \times \mu$ $= 888.3 \times 0.45$ $= 399.74$ | OK |
| Shear Key Requirement - along column depth | $V_1 = 45.0 \text{ kN}$ | $V_1 \leq V_r$ $45.0 \leq 399.74$ | Shear key not required |
| Shear Key Requirement - along column width | $V_2 = 10.0 \text{ kN}$ | $V_2 \leq V_r$ $10.0 \leq 399.74$ | Shear key not required |

2.11 Weld Design - Hollow CS to Base Plate Connection

| Check | Required | Provided | Remarks |
|----------------------------|--|------------------|---------|
| Weld Strength (N/mm^2) | $f_{uw} = \min(f_w, f_u)$ $= \min(440.0, 440.0)$ [Ref. IS 800:2007, Cl.10.5.7.1.1] | $f_{uw} = 440.0$ | Pass |
| Total Weld Length (mm) | | 1117 | Pass |
| Weld Size (mm) | 3 | 4 | Pass |



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

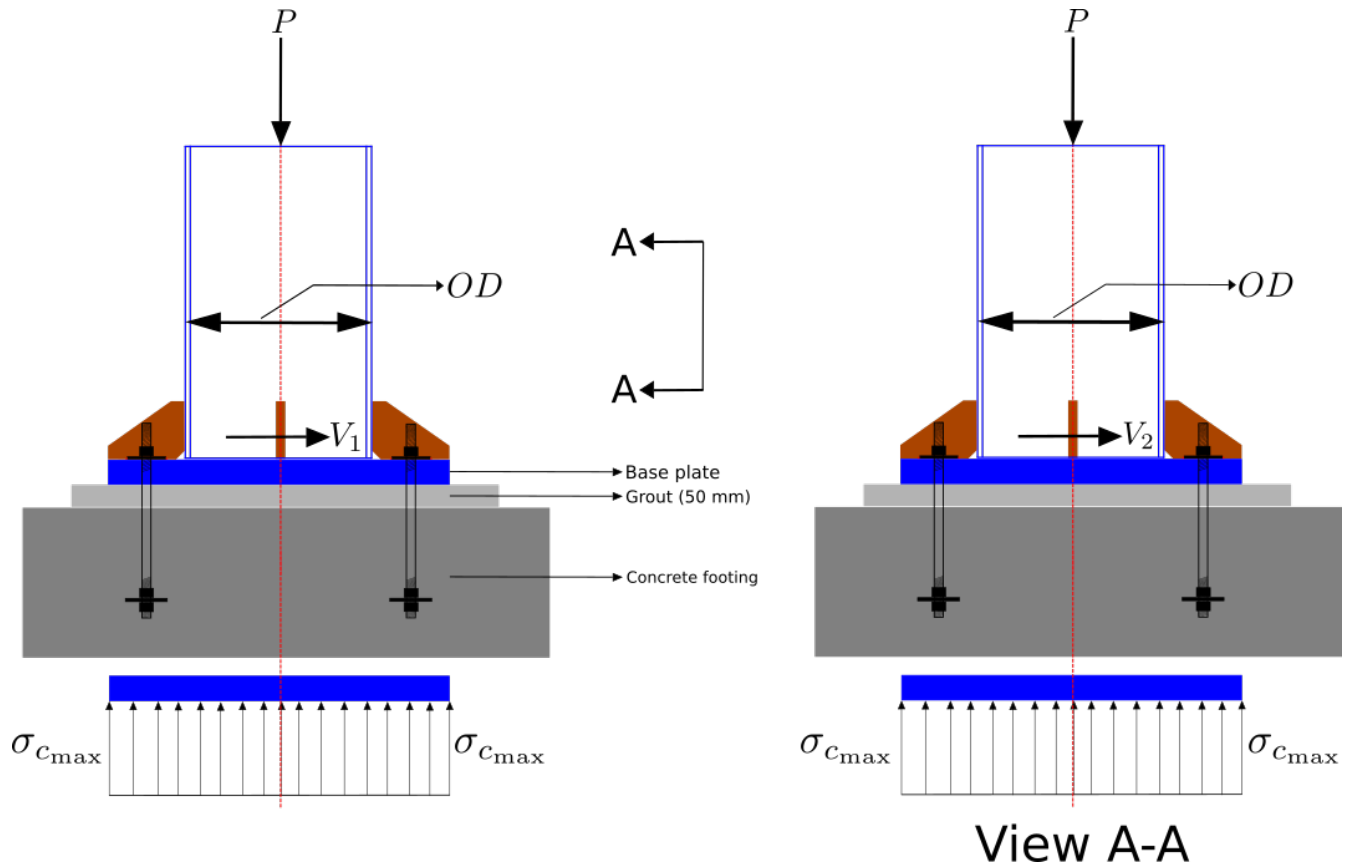


Figure 1: Typical Base Plate Details

3 2D Drawings (Typical)



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

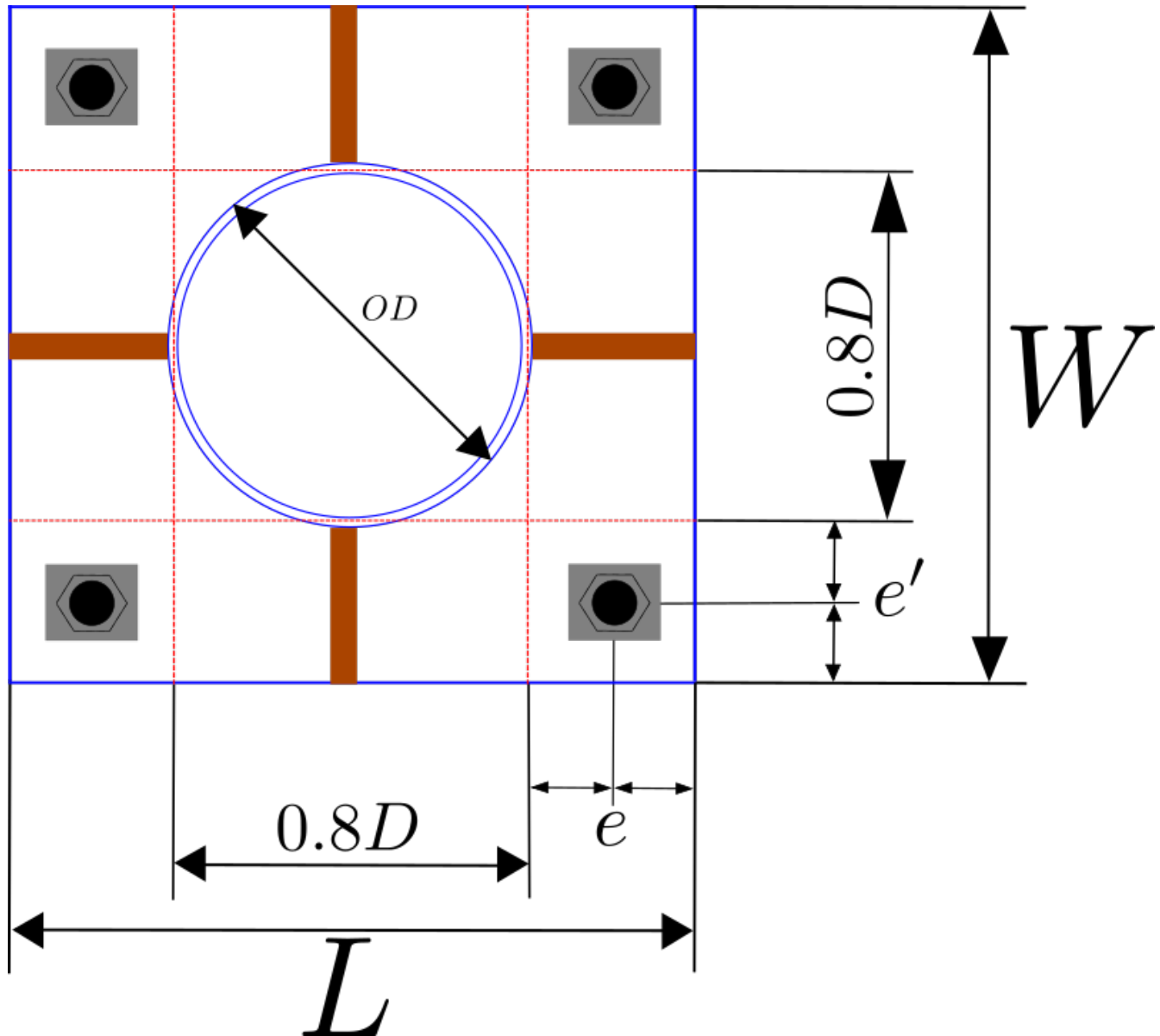


Figure 2: Typical Base Plate Detailing



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

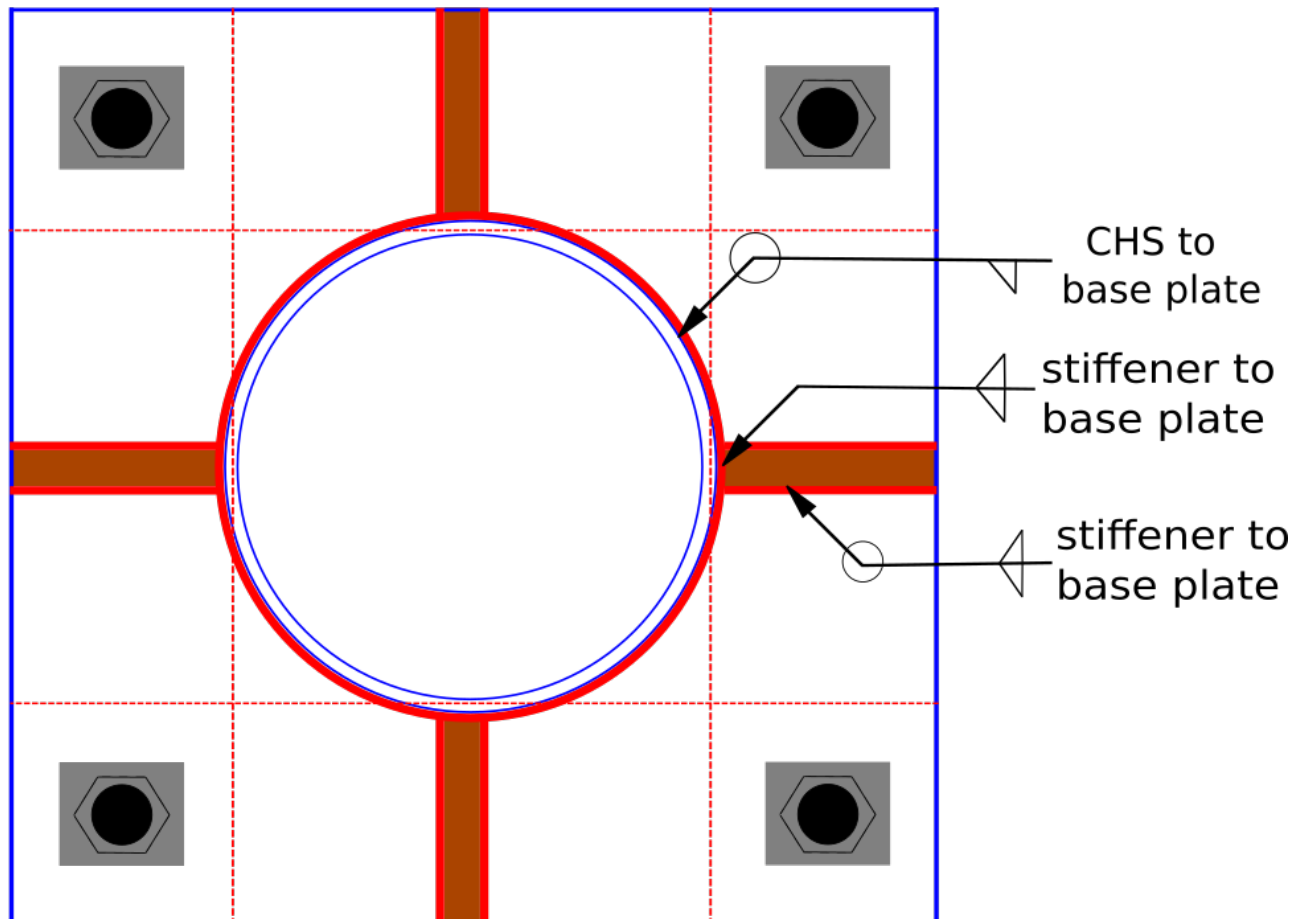
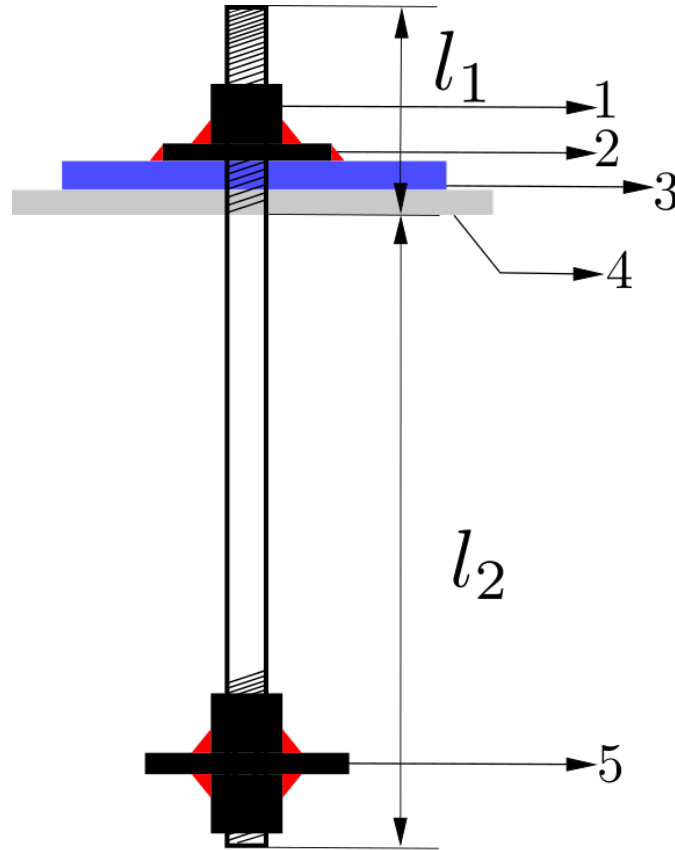


Figure 3: Typical Weld Details



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |



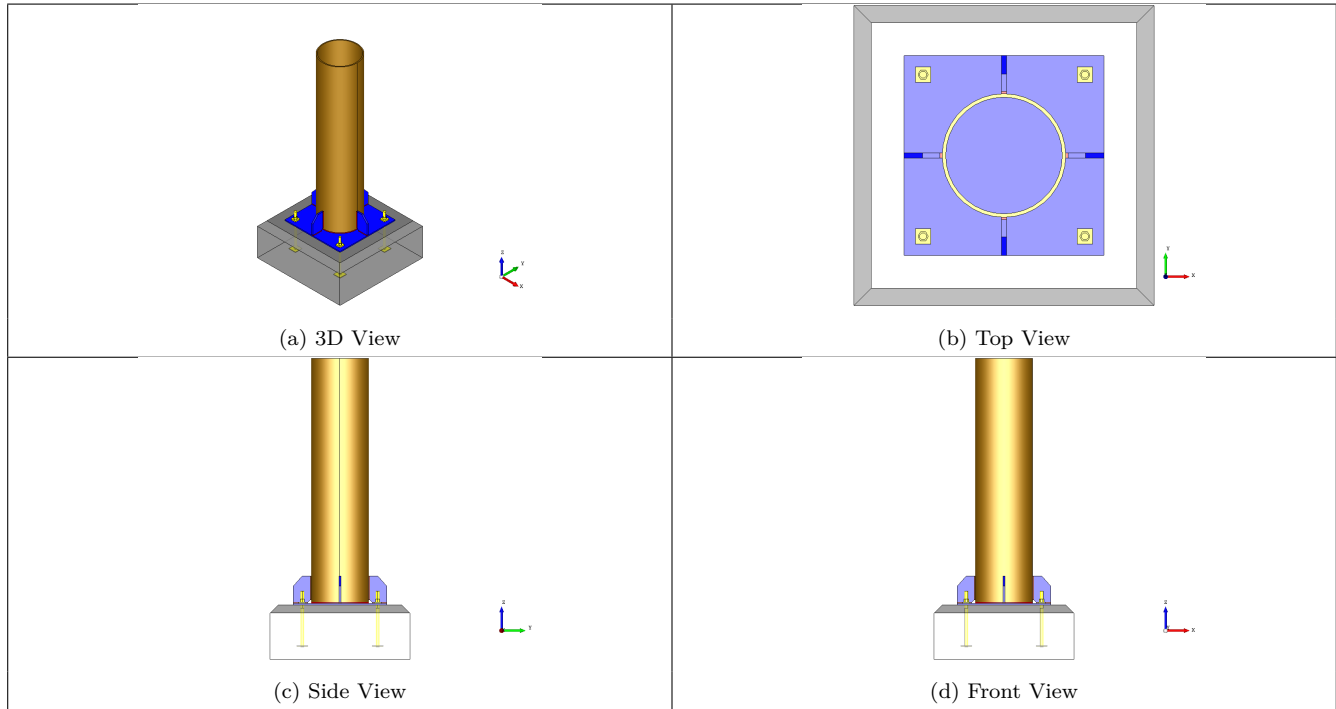
- l_1 = length above footing
 l_2 = length below footing
1 = t_n , nut thickness
2 = t_w , washer thickness
3 = t_p , plate thickness
4 = t_g , grout thickness
5 = end plate thickness

Figure 4: Typical Anchor Bolt Details



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

4 3D Views



5 Design Log

2021-02-04 15:24:43 - Osdag - WARNING - [Minimum Design Action] The defined value of axial compression (775.0 kN) is less than 0.3 times the capacity of the column section (888.3 kN) [Ref. Cl. 10.7, IS 800:2007]

2021-02-04 15:24:43 - Osdag - INFO - Setting the value of axial compression equal to the minimum recommended value

2021-02-04 15:24:43 - Osdag - WARNING - : [Analysis Error] The value of the projection (c) as per the Effective Area Method is 45 mm [Reference: Clause 7.4.1.1, IS 800: 2007]

2021-02-04 15:24:43 - Osdag - WARNING - : [Analysis Error] The computed value of c should at least be equal to the end/edge distance

2021-02-04 15:24:43 - Osdag - INFO - : [Analysis Error] Setting the value of c equal to end/edge distance

2021-02-04 15:24:43 - Osdag - INFO - [Design for Shear] The shear resistance of the base plate assembly due to the friction between the base plate and the grout/concrete material is 399.735 kN

2021-02-04 15:24:43 - Osdag - INFO - The horizontal shear force - 45.0 kN, is less than the shear resistance of the base plate

2021-02-04 15:24:43 - Osdag - INFO - Shear key is not required

2021-02-04 15:24:43 - Osdag - INFO - [Design for Shear] The shear resistance of the base plate assembly due to the friction between the base plate and the grout/concrete material is 399.735 kN

2021-02-04 15:24:43 - Osdag - INFO - The horizontal shear force - 45.0 kN, is less than the shear resistance of the base plate



| | | | |
|-----------------|--------------|---------------|----------------------------|
| Company Name | IIT Bombay | Project Title | Base Plate |
| Group/Team Name | Osdag | Subtitle | Welded Base Plate |
| Designer | Engineer#1 | Job Number | 1.3.3.2 |
| Date | 04 /02 /2021 | Client | Mr. Manas M Ghosh, Kolkata |

2021-02-04 15:24:43 - Osdag - INFO - Shear key is not required

2021-02-04 15:24:43 - Osdag - INFO - [Anchor Bolt Length] The recommended range for the length of the anchor bolt of thread size 20 mm is as follows:

2021-02-04 15:24:43 - Osdag - INFO - [Anchor Bolt Length] Minimum length = 200 mm, Maximum length = 800 mm.

2021-02-04 15:24:43 - Osdag - INFO - [Anchor Bolt Length] The provided length of the anchor bolt is 344.5 mm

2021-02-04 15:24:43 - Osdag - INFO - [Anchor Bolt] Designer/Erector should provide adequate anchorage depending on the availability of standard lengths and sizes, satisfying the recommended range

2021-02-04 15:24:43 - Osdag - INFO - [Anchor Bolt Length] Reference: IS 5624:1993, Table 1

2021-02-04 15:24:43 - Osdag - INFO - [Section Classification] The CHS subjected to purely axial load is classified as plastic section [Ref. Table 2, IS 800:2007]

2021-02-04 15:24:43 - Osdag - INFO - The column does not require additional stiffening

2021-02-04 15:24:43 - Osdag - INFO - Providing stiffeners to resist the bending of the base plate due to the bearing stress

2021-02-04 15:24:43 - Osdag - WARNING - [Shear Check - Stiffener] The stiffener fails the shear check

2021-02-04 15:24:43 - Osdag - WARNING - The shear demand on the stiffener (169.69 kN) exceeds 60% of it's capacity (125.97 kN)

2021-02-04 15:24:43 - Osdag - INFO - Increasing the thickness of the stiffener and re-checking against shear demand

2021-02-04 15:24:43 - Osdag - INFO - : ===== Design Status =====

2021-02-04 15:24:43 - Osdag - INFO - : Overall base plate connection design is SAFE

2021-02-04 15:24:43 - Osdag - INFO - : ===== End Of Design =====