Gusset Plate Straining actions :

Tension = T = 12 \* cos(3) + 34 \* cos(45) = 36 tons

Shear = Q = 12 \* sin(3) + 34 \* cos(45) = 35 tons

use gusset plate = 20mm

Bolts Design :

Group A :

Normal force = 12 tons

**Using 2 bolts , M20, grade 10.9**

Shear for bolt = 12/2 = 6 tons

Using gusset plate thickness for bolts = 10 mm

Plate Bearing resistance Rb = 1cm \* 5.2 ton/cm2 \* 2cm = 10.4 tons

Shear resistance Rsh = Bolt Area \* Fsh \* shear plans = (3.14 \* 1.22 \*0.25) \* (0.2\*10.9) \* 1 = 6.8 t

Rmax = 6.8 t

Max Normal force = 6.8 \* 2 = 13.6 tons > applied Normal force …… safe

Group B :

Normal force = 34 tons

Use 6 bolts , M20 , grade 10.9

Rmax = 6.8 \*6 = 40.8 tons > applied normal force …….. safe