Torque Calculation

1) Inputs:

(i) Module specification:

(a) Size : 1.640 x 0.990 x 0.040 [LxBxH] in meters

(b) weight : 20 kg/module

(c) Capacity : 250 W/module

(ii) Structural details:

(a) weight of steel per structure : 200.2 kg

(b) No. of module per structure : 12 nos

(c) No. of structures : 06 nos

(d) weight of module per structure = 12 x 20
= 240 kg

(iii) Wind zone [4] : 47 m/s [from structural engineer]

(iv) Drive details:

(i) Electrically actuated

(ii) operated by lever

(v)

2) Assumptions

(i) Initially structure is tilted to -45°.
It is rotated from -45 to +45°

(ii) The coefficient of friction (μ) is assumed to be 0.2 for SKF composite bearing

3] Calculation.

Dead load = (weight of steel component per structure) X (No. of structures)
+ (weight of module per structure) X (No. of structures)

= (200.2 × 6) + (240 × 6)

= 2641.2 Kg

Wind load = 177.77 Kg/module

wind load ~~on~~ acting vertically downwards

= 177.77 × sin 45

= 125.7 Kg/module

wind load per structure = 125.7 × 12 modules

= 1508.4 Kg

wind load on 6 structures = 9050.4 Kg

Total load = Dead load + wind load

= 2641.2 + 9050.4

Total load = 11691.4 Kg

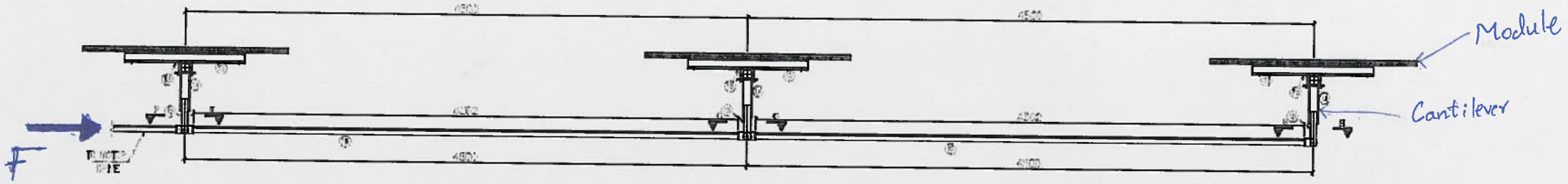
Assuming the structure to be at (-) 45° tilt, torque required to rotate it would ~~be~~ only be the frictional force.

$$Torque_{(max)} = (Total\ load) \times (g) \times (perpendicular\ distance) \times \mu$$

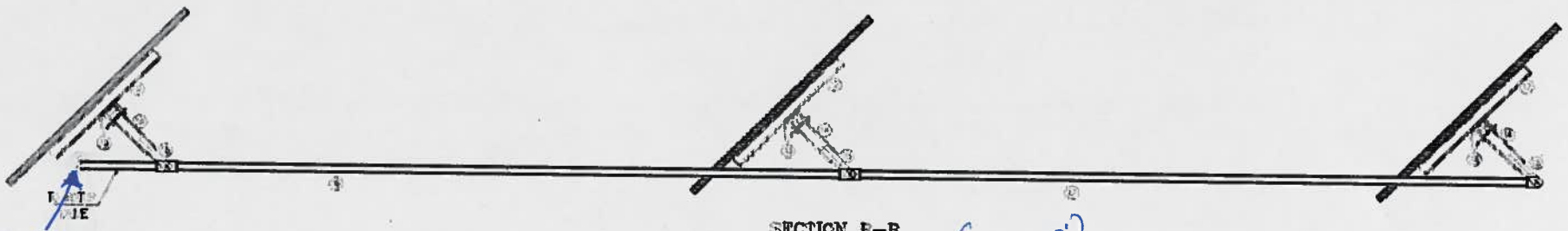
$$= 11691.4 \times 9.81 \times \frac{354}{1000} \times 0.2$$

$$= 8120.24\ Nm.$$

$$Torque_{(max)} = 8.12\ KNm$$

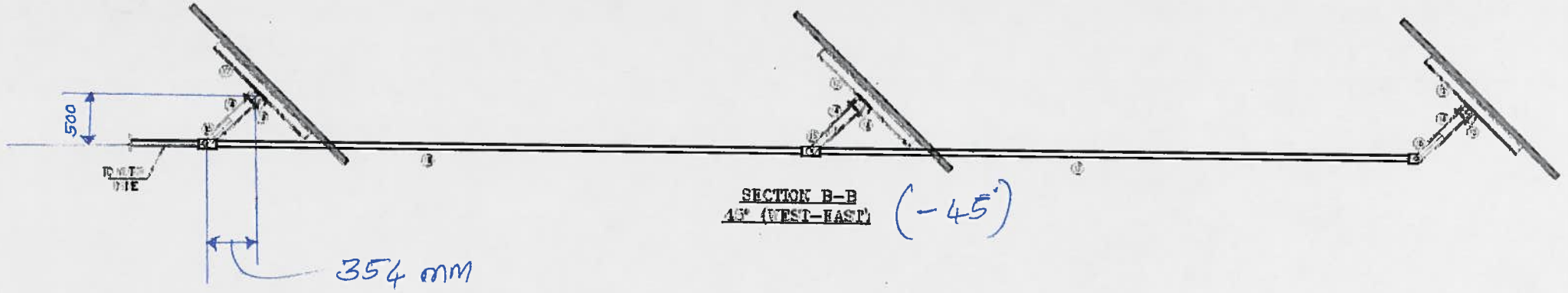


SECTION B-B [0]



THIS END WILL BE CONNECTED TO DRIVE UNIT

SECTION B-B
45° (EAST-WEST) (+45°)



SECTION B-B
45° (WEST-EAST) (-45°)