

Center of Mass and Rigidity

FLOOR - 2 - X AXIS

$$\begin{aligned} \text{AnDn}_{C,t_{\text{res}}} &= \Sigma(\text{AnDn}_{C,t}) \\ &= \Sigma([17.670 \text{ kN} \cdot \text{m}, 736.250 \text{ kN} \cdot \text{m}, 2.385 \text{ MN} \cdot \text{m}, 3.658 \text{ MN} \cdot \text{m}, 4.718 \text{ MN} \cdot \text{m}, 5.990 \text{ MN} \cdot \text{m}, 7.050 \text{ MN} \cdot \text{m}, 6.473 \text{ MN} \cdot \text{m}, 5.213 \text{ MN} \cdot \text{m}]) \\ &= 36.341 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{G,t_{\text{res}}} &= \Sigma(\text{AnDn}_{G,t}) \\ &= \Sigma([70.680 \text{ kN}, 117.800 \text{ kN}, 212.040 \text{ kN}, 212.040 \text{ kN}, 212.040 \text{ kN}, 212.040 \text{ kN}, 164.920 \text{ kN}, 117.800 \text{ kN}]) \\ &= 1.531 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G,t_{\text{res}}} &= \Sigma(\text{RuDn}_{G,t}) \\ &= \Sigma([390625000000.000 \text{ mm}^5, 162760416000000.656 \text{ mm}^5, 52734374999999.938 \text{ mm}^5, 80859374999999.875 \text{ mm}^5, 1.043 \text{ m}^5, 1.324 \text{ m}^5, 1.559 \text{ m}^5, 1.431 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 8.012 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G,t_{\text{rad}}} &= \Sigma(\text{RuDn}_{G,t}) \\ &= \Sigma([15025000000.000 \text{ mm}^4, 20041600000.607 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 3045833333.333 \text{ mm}^4, 20041600000.607 \text{ mm}^4]) \\ &= 338541600000.607 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B,am_{t_{\text{res}}}} &= \Sigma(\text{AnDn}_{B,am}) \\ &= \Sigma([33.926 \text{ kN} \cdot \text{m}, 848.160 \text{ kN} \cdot \text{m}, 2.799 \text{ MN} \cdot \text{m}, 4.292 \text{ MN} \cdot \text{m}, 5.536 \text{ MN} \cdot \text{m}, 7.028 \text{ MN} \cdot \text{m}, 8.272 \text{ MN} \cdot \text{m}, 7.102 \text{ MN} \cdot \text{m}, 8.007 \text{ MN} \cdot \text{m}]) \\ &= 43.918 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B,am_{t_{\text{rad}}}} &= \Sigma(\text{AnDn}_{B,am}) \\ &= \Sigma([135.706 \text{ kN}, 135.706 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 180.941 \text{ kN}, 180.941 \text{ kN}]) \\ &= 1.877 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW,t_{\text{res}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([7.641 \text{ MN} \cdot \text{m}]) \\ &= 7.641 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW,t_{\text{rad}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([367.536 \text{ kN}]) \\ &= 367.536 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW,t_{\text{res}}} &= \Sigma(\text{RuDn}_{SW,t_{\text{res}}}) \\ &= \Sigma(240.320 \text{ m}^3) \\ &= 240.320 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW,t_{\text{rad}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([10.806 \text{ m}^4]) \\ &= 10.806 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{T_{\text{res}}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([110.641 \text{ MN} \cdot \text{m}]) \\ &= 110.641 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{t_{\text{res}}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{H,all_{t_{\text{res}}}} &= \Sigma(\text{AnDn}_{H,all}) \\ &= \Sigma([22.348 \text{ MN} \cdot \text{m}]) \\ &= 22.348 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{H,all_{t_{\text{rad}}}} &= \Sigma(\text{AnDn}_{H,all}) \\ &= \Sigma([1.108 \text{ MN}]) \\ &= 1.108 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C,t_{\text{res}}} + \text{AnDn}_{SW,t_{\text{res}}} + \text{AnDn}_{Slab_{T_{\text{res}}}} + \text{AnDn}_{H,all_{t_{\text{res}}}} + \text{AnDn}_{B,am_{t_{\text{res}}}}) \\ &= \Sigma(36.341 \text{ MN} \cdot \text{m} + 7.641 \text{ MN} \cdot \text{m} + 110.641 \text{ MN} \cdot \text{m} + 22.348 \text{ MN} \cdot \text{m} + 43.918 \text{ MN} \cdot \text{m}) \\ &= 220.788 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C,t_{\text{res}}} + \text{AnDn}_{SW,t_{\text{res}}} + \text{AnDn}_{Slab_{T_{\text{res}}}} + \text{AnDn}_{H,all_{t_{\text{res}}}} + \text{AnDn}_{B,am_{t_{\text{res}}}}) \\ &= \Sigma(1.531 \text{ MN} + 367.536 \text{ kN} + 4.851 \text{ MN} + 1.108 \text{ MN} + 1.877 \text{ MN}) \\ &= 9.736 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C,t_{\text{res}}} + \text{RuDn}_{SW,t_{\text{res}}}) \\ &= \Sigma(8.012 \text{ m}^5 + 240.320 \text{ m}^3) \\ &= 248.332 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{Rn} &= \Sigma(\text{RuDn}_{C,t_{\text{res}}} + \text{RuDn}_{SW,t_{\text{res}}}) \\ &= \Sigma(338541600000.607 \text{ mm}^4 + 10.800 \text{ m}^4) \\ &= 11.145 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(220.788 \text{ MN} \cdot \text{m})}{\Sigma(9.736 \text{ MN})} \\ &= 22.678 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(248.332 \text{ m}^5)}{\Sigma(11.145 \text{ m}^4)} \\ &= 22.282 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C,t_{\text{res}}} &= \Sigma(\text{AnDn}_{C,t}) \\ &= \Sigma([15.461 \text{ kN} \cdot \text{m}, 644.219 \text{ kN} \cdot \text{m}, 2.067 \text{ MN} \cdot \text{m}, 3.200 \text{ MN} \cdot \text{m}, 4.128 \text{ MN} \cdot \text{m}, 5.241 \text{ MN} \cdot \text{m}, 6.169 \text{ MN} \cdot \text{m}, 5.664 \text{ MN} \cdot \text{m}, 4.561 \text{ MN} \cdot \text{m}]) \\ &= 31.711 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{G,t_{\text{res}}} &= \Sigma(\text{AnDn}_G) \\ &= \Sigma([61.845 \text{ kN}, 103.075 \text{ kN}, 185.535 \text{ kN}, 144.305 \text{ kN}, 103.075 \text{ kN}]) \\ &= 1.340 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G,t_{\text{res}}} &= \Sigma(\text{RuDn}_G) \\ &= \Sigma([390625000000.000 \text{ mm}^5, 162760416000000.656 \text{ mm}^5, 52734374999999.938 \text{ mm}^5, 808593749999999.875 \text{ mm}^5, 1.043 \text{ m}^5, 1.324 \text{ m}^5, 1.559 \text{ m}^5, 1.431 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 8.012 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G,t_{\text{res}}} &= \Sigma(\text{RuDn}_G) \\ &= \Sigma([15025000000.000 \text{ mm}^4, 20041600000.607 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 20041600000.607 \text{ mm}^4]) \\ &= 338541600000.607 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B,beam_{t_{\text{res}}}} &= \Sigma(\text{AnDn}_{B,beam}) \\ &= \Sigma([33.926 \text{ kN} \cdot \text{m}, 848.160 \text{ kN} \cdot \text{m}, 2.799 \text{ MN} \cdot \text{m}, 4.292 \text{ MN} \cdot \text{m}, 5.536 \text{ MN} \cdot \text{m}, 7.028 \text{ MN} \cdot \text{m}, 8.272 \text{ MN} \cdot \text{m}, 7.102 \text{ MN} \cdot \text{m}, 8.007 \text{ MN} \cdot \text{m}]) \\ &= 43.918 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{beam_{t_{\text{res}}}} &= \Sigma(\text{AnDn}_{beam}) \\ &= \Sigma([135.706 \text{ kN}, 135.706 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 180.941 \text{ kN}, 180.941 \text{ kN}]) \\ &= 1.877 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW,t_{\text{res}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([6.685 \text{ MN} \cdot \text{m}]) \\ &= 6.685 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW,t_{\text{res}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([321.594 \text{ kN}]) \\ &= 321.594 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW,t_{\text{res}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([240.320 \text{ m}^3]) \\ &= 240.320 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW,t_{\text{res}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([10.806 \text{ m}^4]) \\ &= 10.806 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{T,aa}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([110.641 \text{ MN} \cdot \text{m}]) \\ &= 110.641 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{t,aa}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{H,wall_{t,aa}} &= \Sigma(\text{AnDn}_{H,wall}) \\ &= \Sigma([19.555 \text{ MN} \cdot \text{m}]) \\ &= 19.555 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{H,wall_{t_{\text{res}}}} &= \Sigma(\text{AnDn}_{H,wall}) \\ &= \Sigma([969.730 \text{ kN}]) \\ &= 969.730 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C,t_{\text{res}}} + \text{AnDn}_{SW,t_{\text{res}}} + \text{AnDn}_{Slab_{T,aa}} + \text{AnDn}_{H,wall_{t,aa}} + \text{AnDn}_{beam_{t_{\text{res}}}}) \\ &= \Sigma(31.711 \text{ MN} \cdot \text{m} + 6.685 \text{ MN} \cdot \text{m} + 110.641 \text{ MN} \cdot \text{m} + 19.555 \text{ MN} \cdot \text{m} + 43.918 \text{ MN} \cdot \text{m}) \\ &= 212.510 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C,t_{\text{res}}} + \text{AnDn}_{SW,t_{\text{res}}} + \text{AnDn}_{Slab_{T,aa}} + \text{AnDn}_{H,wall_{t,aa}} + \text{AnDn}_{beam_{t_{\text{res}}}}) \\ &= \Sigma(1.340 \text{ MN} + 321.594 \text{ kN} + 4.851 \text{ MN} + 969.730 \text{ kN} + 1.877 \text{ MN}) \\ &= 9.360 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C,t_{\text{res}}} + \text{RuDn}_{SW,t_{\text{res}}}) \\ &= \Sigma(8.012 \text{ m}^5 + 240.320 \text{ m}^3) \\ &= 248.332 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Rn} &= \Sigma(\text{RuDn}_{C,t_{\text{res}}} + \text{RuDn}_{SW,t_{\text{res}}}) \\ &= \Sigma(338541600000.607 \text{ mm}^4 + 10.800 \text{ m}^4) \\ &= 11.145 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(212.510 \text{ MN} \cdot \text{m})}{\Sigma(9.360 \text{ MN})} \\ &= 22.704 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(248.332 \text{ m}^3)}{\Sigma(11.145 \text{ m}^4)} \\ &= 22.282 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C,t_{\text{rea}}} &= \Sigma(\text{AnDn}_{C,t}) \\ &= \Sigma([15.461 \text{ kN} \cdot \text{m}, 644.219 \text{ kN} \cdot \text{m}, 2.067 \text{ MN} \cdot \text{m}, 3.200 \text{ MN} \cdot \text{m}, 4.128 \text{ MN} \cdot \text{m}, 5.241 \text{ MN} \cdot \text{m}, 6.169 \text{ MN} \cdot \text{m}, 5.664 \text{ MN} \cdot \text{m}, 4.561 \text{ MN} \cdot \text{m}]) \\ &= 31.711 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{G,t_{\text{rea}}} &= \Sigma(\text{AnDn}_{G,t}) \\ &= \Sigma([61.845 \text{ kN}, 103.075 \text{ kN}, 185.535 \text{ kN}, 144.305 \text{ kN}, 103.075 \text{ kN}]) \\ &= 1.340 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G,t_{\text{rea}}} &= \Sigma(\text{RuDn}_{G,t}) \\ &= \Sigma([390625000000.000 \text{ mm}^5, 162760416000000.656 \text{ mm}^5, 52734374999999.938 \text{ mm}^5, 808593749999999.875 \text{ mm}^5, 1.043 \text{ m}^5, 1.324 \text{ m}^5, 1.559 \text{ m}^5, 1.431 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 8.012 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G,t_{\text{rea}}} &= \Sigma(\text{RuDn}_{G,t}) \\ &= \Sigma([15025000000.000 \text{ mm}^4, 20041600000.607 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 20041600000.607 \text{ mm}^4]) \\ &= 338541600000.607 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B,beam_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{B,beam}) \\ &= \Sigma([33.926 \text{ kN} \cdot \text{m}, 848.160 \text{ kN} \cdot \text{m}, 2.799 \text{ MN} \cdot \text{m}, 4.292 \text{ MN} \cdot \text{m}, 5.536 \text{ MN} \cdot \text{m}, 7.028 \text{ MN} \cdot \text{m}, 8.272 \text{ MN} \cdot \text{m}, 7.102 \text{ MN} \cdot \text{m}, 8.007 \text{ MN} \cdot \text{m}]) \\ &= 43.918 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{beam_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{beam}) \\ &= \Sigma([135.706 \text{ kN}, 135.706 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 180.941 \text{ kN}, 180.941 \text{ kN}]) \\ &= 1.877 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([6.685 \text{ MN} \cdot \text{m}]) \\ &= 6.685 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([321.594 \text{ kN}]) \\ &= 321.594 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{t_{\text{rea}}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([240.320 \text{ m}^3]) \\ &= 240.320 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{t_{\text{rea}}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([10.806 \text{ m}^4]) \\ &= 10.806 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{T,rea}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([110.641 \text{ MN} \cdot \text{m}]) \\ &= 110.641 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{W,wall_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{W,wall}) \\ &= \Sigma([19.555 \text{ MN} \cdot \text{m}]) \\ &= 19.555 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{W,wall_{t_{\text{rea}}}} &= \Sigma(\text{AnDn}_{W,wall}) \\ &= \Sigma([969.730 \text{ kN}]) \\ &= 969.730 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C,t_{\text{rea}}} + \text{AnDn}_{SW,t_{\text{rea}}} + \text{AnDn}_{Slab_{T,rea}} + \text{AnDn}_{W,wall_{t_{\text{rea}}}} + \text{AnDn}_{beam_{t_{\text{rea}}}}) \\ &= \Sigma(31.711 \text{ MN} \cdot \text{m} + 6.685 \text{ MN} \cdot \text{m} + 110.641 \text{ MN} \cdot \text{m} + 19.555 \text{ MN} \cdot \text{m} + 43.918 \text{ MN} \cdot \text{m}) \\ &= 212.510 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C,t_{\text{rea}}} + \text{AnDn}_{SW_{t_{\text{rea}}}} + \text{AnDn}_{Slab_{T,rea}} + \text{AnDn}_{W,wall_{t_{\text{rea}}}} + \text{AnDn}_{beam_{t_{\text{rea}}}}) \\ &= \Sigma(1.340 \text{ MN} + 321.594 \text{ kN} + 4.851 \text{ MN} + 969.730 \text{ kN} + 1.877 \text{ MN}) \\ &= 9.360 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C,t_{\text{rea}}} + \text{RuDn}_{SW_{t_{\text{rea}}}}) \\ &= \Sigma(8.012 \text{ m}^5 + 240.320 \text{ m}^3) \\ &= 248.332 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Rn} &= \Sigma(\text{RuDn}_{C,t_{\text{rea}}} + \text{RuDn}_{SW_{t_{\text{rea}}}}) \\ &= \Sigma(338541600000.607 \text{ mm}^4 + 10.800 \text{ m}^4) \\ &= 11.145 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(212.510 \text{ MN} \cdot \text{m})}{\Sigma(9.360 \text{ MN})} \\ &= 22.704 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(248.332 \text{ m}^3)}{\Sigma(11.145 \text{ m}^4)} \\ &= 22.282 \text{ m} \end{aligned}$$

Grid = 1

$$\begin{aligned} \text{AnDn}_{\text{Col},\text{ext}} &= \text{Col}_y, \cdot \text{distance} \cdot \text{length}_{\text{ext}} \cdot \text{width}_{\text{ext}} \cdot \text{height}_{\text{ext}} \cdot \gamma_c = 3.000 \cdot 250.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 & = 7.731 \text{ kN} \cdot \text{m} \\ \text{AnDn}_{\text{Col},\text{int}} &= \text{Col}_y, \cdot \text{length}_{\text{ext}} \cdot \text{width}_{\text{ext}} \cdot \text{height}_{\text{ext}} \cdot \gamma_c = 3.000 \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 & = 30.922 \text{ kN} \\ \text{RuDn}_{\text{Col},\text{ext}} &= \text{Col}_y, \cdot \left(\frac{(\text{length}_{\text{ext}})^4}{12} \right) \cdot \text{distance} = 3.000 \cdot \left(\frac{(500.000 \text{ mm})^4}{12} \right) \cdot 250.000 \text{ mm} & = 390625000000.000 \text{ mm}^5 \\ \text{RuDn}_{\text{Col},\text{int}} &= \text{Col}_y, \cdot \frac{(\text{length}_{\text{ext}})^4}{12} - 3.000 \cdot \frac{(500.000 \text{ mm})^4}{12} & = 15625000000.000 \text{ mm}^4 \end{aligned}$$

$$\Delta n_{Bamper_{real}} = \Sigma (\text{length}_{\text{girder}} \cdot \text{width}_{\text{girder}} \cdot \text{height}_{\text{girder}} \cdot \gamma_c \cdot \text{distance}) = \Sigma ((nan, nan, nan, 6,000 \text{ m}, 6,000 \text{ m}, 6,000 \text{ m}, 6,000 \text{ m}) \cdot 400,000 \text{ mm} \cdot 600,000 \text{ mm} \cdot 23,560 \text{ kN/m}^3 \cdot 250,000 \text{ mm}) = 33,926 \text{ kN} \cdot \text{m}$$

Grid = 2

$$\begin{aligned} \Delta u_{Col_{\text{load}}} &= Col_{N_c} \cdot \text{distance} \cdot \text{length}_{\text{col}} \cdot \text{width}_{\text{col}} \cdot \text{height}_{\text{col}} \cdot \gamma_c = 5.000 \cdot 6.250 \text{ m} \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 & = 322.109 \text{ kN} \cdot \text{m} \\ \Delta u_{Col_{\text{load}}} &= Col_{N_c} \cdot \text{length}_{\text{col}} \cdot \text{width}_{\text{col}} \cdot \text{height}_{\text{col}} \cdot \gamma_c = 5.000 \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 & = 51.538 \text{ kN} \\ RuDn_{Col_{\text{load}}} &= Col_{N_c} \cdot \left(\frac{(\text{length}_{\text{col}})^4}{12} \right) \cdot \text{distance} = 5.000 \cdot \left(\frac{(500.000 \text{ mm})^4}{12} \right) \cdot 6.250 \text{ m} & = 162760416666666.656 \text{ mm}^5 \\ RuDn_{Col_{\text{load}}} &= Col_{N_c} \cdot \frac{(\text{length}_{\text{col}})^4}{12} = 5.000 \cdot \frac{(500.000 \text{ mm})^4}{12} & = 26041666666.667 \text{ mm}^4 \end{aligned}$$

$$\Delta n_{XnD_{\text{beam,iso}}} = \Sigma (\text{length}_{\text{girder}} \cdot \text{width}_{\text{girder}} \cdot \text{height}_{\text{girder}} \cdot \gamma_c \cdot \text{distance}) = \Sigma ((nan, nan, nan, nan, 6.000\text{m}, 6.000\text{m}, 6.000\text{m}, 6.000\text{m}) \cdot 400.000\text{ mm} \cdot 600.000\text{ mm} \cdot 32.560\text{ kN/m}^3 \cdot 6.250\text{ m}) = 848.160\text{ kN m}$$

$$\Delta n_{D_{\text{beam,iso}}} = \Sigma (\text{length}_{\text{girder}} \cdot \text{width}_{\text{girder}} \cdot \text{height}_{\text{girder}} \cdot \gamma_c) = \Sigma ((nan, nan, nan, nan, 6.000\text{m}, 6.000\text{m}, 6.000\text{m}, 6.000\text{m}) \cdot 400.000\text{ mm} \cdot 600.000\text{ mm} \cdot 23.560\text{ kN/m}^3) = 135.706\text{ kN}$$

Grid = 3

$$\begin{aligned} \text{AnDn}_{\text{GJ},\text{red}} &= \text{Col}_{\text{Yo}} \cdot \text{distance} \cdot \text{length}_{\text{red}} \cdot \text{width}_{\text{red}} \cdot \text{height}_{\text{red}} \cdot \gamma_c = 9.000 \cdot 11.250 \text{ m} \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 & 1.044 \text{ MN} \\ \text{AnC}_{\text{red}} &= \text{Col}_{\text{Yo}} \cdot \text{length}_{\text{red}} \cdot \text{width}_{\text{red}} \cdot \text{height}_{\text{red}} \cdot \gamma_c = 9.000 \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 & = 92.767 \\ \text{RnDn}_{\text{GJ},\text{red}} &= \text{Col}_{\text{Yo}} \cdot \left(\frac{(\text{length}_{\text{red}})^4}{12} \right) \cdot \text{distance} = 9.000 \cdot \left(\frac{(500.000 \text{ mm})^4}{12} \right) \cdot 11.250 \text{ m} & = 527343749999999.938 \text{ m} \\ \text{RnC}_{\text{red}} &= \text{Col}_{\text{Yo}} \cdot \frac{(\text{length}_{\text{red}})^4}{12} = 9.000 \cdot \frac{(500.000 \text{ mm})^4}{12} & 48875000000.000 \text{ m} \\ \text{AnXn}_{\text{P},\text{GJ},\text{red}} &= \Sigma (\text{length}_{\text{gj},\text{red}} \cdot \text{width}_{\text{gj},\text{red}} \cdot \text{height}_{\text{gj},\text{red}} \cdot \gamma_c \cdot \text{distance}) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot 400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^2 \cdot 11.250 \text{ m}) & = 2.799 \text{ MN} \\ \text{AnDn}_{\text{GJ},\text{green}} &= \Sigma (\text{length}_{\text{gj},\text{green}} \cdot \text{width}_{\text{gj},\text{green}} \cdot \text{height}_{\text{gj},\text{green}} \cdot \gamma_c) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot 400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^2) & = 248.794 \end{aligned}$$

$G_{\text{rid}} = 4$

$$\begin{aligned} \text{AnDn}_{\gamma_{\text{fixed}}} &= \text{Col}_{\gamma_{\text{r}}}\cdot \text{distance}\cdot \text{length}_{\text{col}}\cdot \text{width}_{\text{col}}\cdot \text{height}_{\text{col}}\cdot \gamma_c - 9.000\cdot 17.250 \text{ m}\cdot 500.000 \text{ mm}\cdot 500.000 \text{ mm}\cdot 1.750 \text{ m}\cdot 23.560 \text{ kN/m}^3 & 1.600 \text{ MN} \\ \text{An}_{\gamma_{\text{fixed}}} &= \text{Col}_{\gamma_{\text{r}}}\cdot \text{length}_{\text{col}}\cdot \text{width}_{\text{col}}\cdot \text{height}_{\text{col}}\cdot \gamma_c - 9.000\cdot 500.000 \text{ mm}\cdot 500.000 \text{ mm}\cdot 1.750 \text{ m}\cdot 23.560 \text{ kN/m}^3 & -92.767 \\ \text{RnDn}_{\gamma_{\text{fixed}}} &= \text{Col}_{\gamma_{\text{r}}}\cdot \left(\frac{(\text{length}_{\text{col}})^4}{12}\right)\cdot \text{distance} - 9.000\cdot \left(\frac{(500.000 \text{ mm})^4}{12}\right)\cdot 17.250 \text{ m} & -808593749999999.875 \text{ m} \\ \text{Rn}_{\gamma_{\text{fixed}}} &= \text{Col}_{\gamma_{\text{r}}}\cdot \frac{(\text{length}_{\text{col}})^4}{12} - 9.000\cdot \frac{(500.000 \text{ mm})^4}{12} & 46875000000.000 \text{ m} \\ \text{AnXn}_{D_{\text{P},\text{fixed}}} &= \Sigma (\text{length}_{\text{girder}}\cdot \text{width}_{\text{girder}}\cdot \text{height}_{\text{girder}}\cdot \gamma_c\cdot \text{distance}) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot [400.000 \text{ mm}, 600.000 \text{ mm}, 23.560 \text{ kN/m}^2] \cdot 17.250 \text{ m}) & = 4.293 \text{ MN} \\ \text{AnDn}_{\text{beam fixed}} &= \Sigma (\text{length}_{\text{girder}}\cdot \text{width}_{\text{girder}}\cdot \text{height}_{\text{girder}}\cdot \gamma_c) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot [400.000 \text{ mm}, 600.000 \text{ mm}, 23.560 \text{ kN/m}^2]) & = 248.794 \end{aligned}$$

Grjd = 5

$$\begin{aligned} \text{AnDn}_{\gamma_{T,td}} &= \text{Col}_{N_0} \cdot \text{distance} \cdot \text{length}_{td} \cdot \text{width}_{td} \cdot \text{height}_{td} \cdot \gamma_c = 9.000 \cdot 22.250 \text{ m} \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^2 & = 2.064 \text{ MN} \cdot \text{m} \\ \text{An}_{\gamma_{T,td}} &= \text{Col}_{N_0} \cdot \text{length}_{td} \cdot \text{width}_{td} \cdot \text{height}_{td} \cdot \gamma_c = 9.000 \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^2 & = 92.767 \text{ kN} \\ \text{RuDn}_{\gamma_{T,td}} &= \text{Col}_{N_0} \cdot \left(\frac{(\text{length}_{td})^4}{12} \right) \cdot \text{distance} = 9.000 \cdot \left(\frac{(500.000 \text{ mm})^4}{12} \right) \cdot 22.250 \text{ m} & = 1.043 \text{ m}^3 \\ \text{Ru}_{\gamma_{T,td}} &= \text{Col}_{N_0} \cdot \frac{(\text{length}_{td})^4}{12} \cdot 9.000 \cdot \frac{(500.000 \text{ mm})^4}{12} & 4687500000.000 \text{ mm}^4 \\ \text{AnXn}_{\delta_{T,td}} &= \Sigma (\text{length}_{girder} \cdot \text{width}_{girder} \cdot \text{height}_{girder} \cdot \gamma_c \cdot \text{distance}) - \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}] \cdot 400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^2 \cdot 22.250 \text{ m}) & = 5.536 \text{ MN} \cdot \text{m} \\ \text{An}_{\delta_{T,td}} &= \Sigma (\text{length}_{girder} \cdot \text{width}_{girder} \cdot \text{height}_{girder} \cdot \gamma_c) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot 400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^2) & = 248.794 \text{ kN} \end{aligned}$$

Grid = 6

$\text{AnDn}_{\cap,t_{\text{end}}} = \text{Col}_{N^*} \cdot \text{distance} \cdot \text{length}_{\text{col}} \cdot \text{width}_{\text{col}} \cdot \text{height}_{\text{col}} \cdot \gamma_c - 0.000 \cdot 38.250 \text{ m} \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^2$	— 2.621 MN · m
$\text{An}_{\cap,t_{\text{end}}} = \text{Col}_{N^*} \cdot \text{length}_{\text{col}} \cdot \text{width}_{\text{col}} \cdot \text{height}_{\text{col}} \cdot \gamma_c - 0.000 \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^2$	— 92.767 kN
$\text{RnDn}_{\cap,t_{\text{end}}} = \text{Col}_{N^*} \cdot \left(\frac{(\text{length}_{\text{col}})^4}{12} \right) \cdot \text{distance} = 9.000 \cdot \left(\frac{(500.000 \text{ mm})^4}{12} \right) \cdot 28.250 \text{ m}$	= 1.324 m ⁵
$\text{Rn}_{\cap,t_{\text{end}}} = \text{Col}_{N^*} \cdot \frac{(\text{length}_{\text{col}})^4}{12} = 9.000 \cdot \frac{(500.000 \text{ mm})^4}{12}$	46875000000.000 mm ⁴
$\text{AnXn}_{\partial,\text{cam},t_{\text{end}}} = \Sigma \left(\text{length}_{\text{girder}} \cdot \text{width}_{\text{girder}} \cdot \text{height}_{\text{girder}} \cdot \gamma_c \cdot \text{distance} \right) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot [400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^3 \cdot 28.250 \text{ m}])$	7.029 MN · m
$\text{AnPn}_{\partial,\text{cam},t_{\text{end}}} = \Sigma (\text{length}_{\text{girder}} \cdot \text{width}_{\text{girder}} \cdot \text{height}_{\text{girder}} \cdot \gamma_c) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot [400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^3])$	= 248.794 kN

Grjd = 7

$$\begin{aligned} \text{AnDn}_{\gamma_{T,rd}} &= C_{01N_0} \cdot \text{distance} \cdot \text{length}_{h_{rd}} \cdot \text{width}_{h_{rd}} \cdot \text{height}_{h_{rd}} \cdot \gamma_c = 9.000 \cdot 33.250 \text{ m} \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 &= 3.085 \text{ MN} \cdot \text{m} \\ \text{An}_{\gamma_{T,rd}} &= C_{01N_0} \cdot \text{length}_{h_{rd}} \cdot \text{width}_{h_{rd}} \cdot \text{height}_{h_{rd}} \cdot \gamma_c = 9.000 \cdot 500.000 \text{ mm} \cdot 500.000 \text{ mm} \cdot 1.750 \text{ m} \cdot 23.560 \text{ kN/m}^3 &= 92.767 \text{ kN} \\ \text{RnDn}_{\gamma_{T,rd}} &= C_{01N_0} \cdot \left(\frac{(\text{length}_{h_{rd}})^4}{12} \right) \cdot \text{distance} = 9.000 \cdot \left(\frac{(500.000 \text{ mm})^4}{12} \right) \cdot 33.250 \text{ m} &= 1.559 \text{ m}^5 \\ \text{Ru}_{\gamma_{T,rd}} &= C_{01N_0} \cdot \frac{(\text{length}_{h_{rd}})^4}{12} = 9.000 \cdot \frac{(500.000 \text{ mm})^4}{12} &= 408.500000.000 \text{ mm}^4 \\ \text{AnXn}_{\delta_{com},T,rd} &= \Sigma (\text{length}_{girder} \cdot \text{width}_{girder} \cdot \text{height}_{girder} \cdot \gamma_c \cdot \text{distance}) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}] \cdot 400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^3 \cdot 33.250 \text{ m}) &= 8.272 \text{ MN} \cdot \text{m} \\ \text{An}_{\delta_{com},T,rd} &= \Sigma (\text{length}_{girder} \cdot \text{width}_{girder} \cdot \text{height}_{girder} \cdot \gamma_c) = \Sigma ([5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 5.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}, 6.000 \text{ m}] \cdot 400.000 \text{ mm} \cdot 600.000 \text{ mm} \cdot 23.560 \text{ kN/m}^3) &= 248.794 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C_{T, \text{tot}}} &= \Sigma(\text{AnDn}_{C_{\text{tot}}}) \\ &= \Sigma([7.731 \text{ kN} \cdot \text{m}, 322.109 \text{ kN} \cdot \text{m}, 1.044 \text{ MN} \cdot \text{m}, 1.600 \text{ MN} \cdot \text{m}, 2.064 \text{ MN} \cdot \text{m}, 2.621 \text{ MN} \cdot \text{m}, 3.085 \text{ MN} \cdot \text{m}, 2.832 \text{ MN} \cdot \text{m}, 2.281 \text{ MN} \cdot \text{m}]) \\ &= 15.856 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{G_{T, \text{tot}}} &= \Sigma(\text{AnDn}_{G_{\text{tot}}}) \\ &= \Sigma([30.922 \text{ kN}, 51.538 \text{ kN}, 92.767 \text{ kN}, 92.767 \text{ kN}, 92.767 \text{ kN}, 92.767 \text{ kN}, 72.153 \text{ kN}, 51.538 \text{ kN}]) \\ &= 669.987 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G_{T, \text{tot}}} &= \Sigma(\text{RuDn}_{G_{\text{tot}}}) \\ &= \Sigma([390625000000.000 \text{ mm}^5, 162760416000000.656 \text{ mm}^5, 527343749999999.938 \text{ mm}^5, 808593749999999.875 \text{ mm}^5, 1.043 \text{ m}^5, 1.324 \text{ m}^5, 1.559 \text{ m}^5, 1.431 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 8.012 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{C_{T, \text{tot}}} &= \Sigma(\text{RuDn}_{C_{\text{tot}}}) \\ &= \Sigma([15025000000.000 \text{ mm}^4, 20041600000.007 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 46875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 20041600000.007 \text{ mm}^4]) \\ &= 338541600000.007 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{\text{beam}, \text{tot}}} &= \Sigma(\text{AnDn}_{B_{\text{beam}}}) \\ &= \Sigma([33.926 \text{ kN} \cdot \text{m}, 848.160 \text{ kN} \cdot \text{m}, 2.799 \text{ MN} \cdot \text{m}, 4.292 \text{ MN} \cdot \text{m}, 5.536 \text{ MN} \cdot \text{m}, 7.028 \text{ MN} \cdot \text{m}, 8.272 \text{ MN} \cdot \text{m}, 7.102 \text{ MN} \cdot \text{m}, 8.007 \text{ MN} \cdot \text{m}]) \\ &= 43.918 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{\text{beam}, \text{tot}}} &= \Sigma(\text{AnDn}_{B_{\text{beam}}}) \\ &= \Sigma([135.706 \text{ kN}, 135.706 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 180.941 \text{ kN}, 180.941 \text{ kN}]) \\ &= 1.877 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{\text{rot}, \text{tot}}} &= \Sigma(\text{AnDn}_{SW_{\text{rot}}}) \\ &= \Sigma([3.343 \text{ MN} \cdot \text{m}]) \\ &= 3.343 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{\text{rot}, \text{tot}}} &= \Sigma(\text{AnDn}_{SW_{\text{rot}}}) \\ &= \Sigma([160.797 \text{ kN}]) \\ &= 160.797 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{\text{rot}, \text{tot}}} &= \Sigma(\text{RuDn}_{SW_{\text{rot}, \text{tot}}}) \\ &= \Sigma([240.320 \text{ m}^5]) \\ &= 240.320 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{\text{rot}, \text{tot}}} &= \Sigma(\text{RuDn}_{SW_{\text{rot}}}) \\ &= \Sigma([10.806 \text{ m}^4]) \\ &= 10.806 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{S_{\text{lab}, \text{tot}}} &= \Sigma(\text{AnDn}_{S_{\text{lab}}}) \\ &= \Sigma([110.641 \text{ MN} \cdot \text{m}]) \\ &= 110.641 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{S_{\text{lab}, \text{tot}}} &= \Sigma(\text{AnDn}_{S_{\text{lab}}}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{H_{\text{wall}, \text{tot}}} &= \Sigma(\text{AnDn}_{H_{\text{wall}}}) \\ &= \Sigma([9.777 \text{ MN} \cdot \text{m}]) \\ &= 9.777 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{H_{\text{wall}, \text{tot}}} &= \Sigma(\text{AnDn}_{H_{\text{wall}}}) \\ &= \Sigma([484.865 \text{ kN}]) \\ &= 484.865 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C_{\text{rot}, \text{tot}}} + \text{AnDn}_{SW_{\text{rot}, \text{tot}}} + \text{AnDn}_{S_{\text{lab}, \text{tot}}} + \text{AnDn}_{H_{\text{wall}, \text{tot}}} + \text{AnDn}_{B_{\text{beam}, \text{tot}}}) \\ &= \Sigma(15.856 \text{ MN} \cdot \text{m} + 3.343 \text{ MN} \cdot \text{m} + 110.641 \text{ MN} \cdot \text{m} + 9.777 \text{ MN} \cdot \text{m} + 43.918 \text{ MN} \cdot \text{m}) \\ &= 183.534 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C_{\text{rot}, \text{tot}}} + \text{AnDn}_{SW_{\text{rot}, \text{tot}}} + \text{AnDn}_{S_{\text{lab}, \text{tot}}} + \text{AnDn}_{H_{\text{wall}, \text{tot}}} + \text{AnDn}_{B_{\text{beam}, \text{tot}}}) \\ &= \Sigma(669.987 \text{ kN} + 160.797 \text{ kN} + 4.851 \text{ MN} + 484.865 \text{ kN} + 1.877 \text{ MN}) \\ &= 8.044 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C_{\text{rot}, \text{tot}}} + \text{RuDn}_{SW_{\text{rot}, \text{tot}}}) \\ &= \Sigma(8.012 \text{ m}^5 + 240.320 \text{ m}^5) \\ &= 248.332 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{Rn} &= \Sigma(\text{RuDn}_{C_{\text{rot}, \text{tot}}} + \text{RuDn}_{SW_{\text{rot}, \text{tot}}}) \\ &= \Sigma(3385416000000.007 \text{ mm}^4 + 10.806 \text{ m}^4) \\ &= 11.145 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(148.332 \text{ MN} \cdot \text{m})}{\Sigma(8.044 \text{ MN})} \\ &= 22.815 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(248.332 \text{ m}^5)}{\Sigma(11.145 \text{ m}^4)} \\ &= 22.282 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C_{1,1,1}} &= \Sigma(\text{AnDn}_{C_{1,1}}) \\ &= \Sigma([29.450 \text{ kN} \cdot \text{m}, 865.830 \text{ kN} \cdot \text{m}, 1.690 \text{ MN} \cdot \text{m}, 2.515 \text{ MN} \cdot \text{m}, 4.294 \text{ MN} \cdot \text{m}, 5.566 \text{ MN} \cdot \text{m}, 6.838 \text{ MN} \cdot \text{m}, 6.308 \text{ MN} \cdot \text{m}, 5.213 \text{ MN} \cdot \text{m}]) \\ &= 33.320 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C_{1,1,2}} &= \Sigma(\text{AnDn}_{C_{1,1}}) \\ &= \Sigma([117.800 \text{ kN}, 164.920 \text{ kN}, 164.920 \text{ kN}, 164.920 \text{ kN}, 212.040 \text{ kN}, 212.040 \text{ kN}, 212.040 \text{ kN}, 164.920 \text{ kN}, 117.800 \text{ kN}]) \\ &= 1.531 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{C_{1,1,3}} &= \Sigma(\text{RuDn}_{C_{1,1}}) \\ &= \Sigma([6510416000000.000 \text{ mm}^5, 191406249999999.969 \text{ mm}^5, 373697916000000.625 \text{ mm}^5, 55598958333333.188 \text{ mm}^5, 94921874999999.875 \text{ mm}^5, 1.230 \text{ m}^5, 1.512 \text{ m}^5, 1.395 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 7.366 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{C_{1,1,4}} &= \Sigma(\text{RuDn}_{C_{1,1}}) \\ &= \Sigma([20410000000.007 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 2041600000.007 \text{ mm}^4]) \\ &= 338541600000.007 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{1,1,1}} &= \Sigma(\text{AnDn}_{B_{1,1}}) \\ &= \Sigma([46.649 \text{ kN} \cdot \text{m}, 979.625 \text{ kN} \cdot \text{m}, 1.913 \text{ MN} \cdot \text{m}, 2.846 \text{ MN} \cdot \text{m}, 5.098 \text{ MN} \cdot \text{m}, 6.531 \text{ MN} \cdot \text{m}, 8.024 \text{ MN} \cdot \text{m}, 7.137 \text{ MN} \cdot \text{m}, 8.257 \text{ MN} \cdot \text{m}]) \\ &= 40.771 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{1,1,2}} &= \Sigma(\text{AnDn}_{B_{1,1}}) \\ &= \Sigma([186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}]) \\ &= 1.866 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{1,1,1}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([3.944 \text{ MN} \cdot \text{m}]) \\ &= 3.944 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{1,1,2}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([169.632 \text{ kN}]) \\ &= 169.632 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{1,1,3}} &= \Sigma(\text{RuDn}_{SW_{1,1}}) \\ &= \Sigma(31.387 \text{ m}^5) \\ &= 31.387 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{1,1,4}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([1.350 \text{ m}^4]) \\ &= 1.350 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slob_{Taa}} &= \Sigma(\text{AnDn}_{Slob}) \\ &= \Sigma([108.350 \text{ MN} \cdot \text{m}]) \\ &= 108.350 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slob_{1,1,1}} &= \Sigma(\text{AnDn}_{Slob}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Hwall_{1,1,1}} &= \Sigma(\text{AnDn}_{Hwall}) \\ &= \Sigma([32.001 \text{ MN} \cdot \text{m}]) \\ &= 32.001 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Hwall_{1,1,2}} &= \Sigma(\text{AnDn}_{Hwall}) \\ &= \Sigma([1.306 \text{ MN}]) \\ &= 1.306 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C_{1,1,1}} + \text{AnDn}_{SW_{1,1,1}} + \text{AnDn}_{Slob_{Taa}} + \text{AnDn}_{Hwall_{1,1,1}} + \text{AnDn}_{B_{1,1,1}}) \\ &= \Sigma(33.320 \text{ MN} \cdot \text{m} + 3.944 \text{ MN} \cdot \text{m} + 108.350 \text{ MN} \cdot \text{m} + 32.001 \text{ MN} \cdot \text{m} + 40.771 \text{ MN} \cdot \text{m}) \\ &= 218.385 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C_{1,1,1}} + \text{AnDn}_{SW_{1,1,1}} + \text{AnDn}_{Slob_{Taa}} + \text{AnDn}_{Hwall_{1,1,1}} + \text{AnDn}_{B_{1,1,1}}) \\ &= \Sigma(1.531 \text{ MN} + 169.632 \text{ kN} + 4.851 \text{ MN} + 1.306 \text{ MN} + 1.866 \text{ MN}) \\ &= 9.725 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C_{1,1,1}} + \text{RuDn}_{SW_{1,1,1}}) \\ &= \Sigma(7.366 \text{ m}^5 + 31.387 \text{ m}^5) \\ &= 38.753 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(218.385 \text{ MN} \cdot \text{m})}{\Sigma(9.725 \text{ MN})} \\ &= 22.457 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(38.753 \text{ m}^5)}{\Sigma(1.689 \text{ m}^4)} \\ &= 22.951 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C_{d, \text{max}}} &= \Sigma(\text{AnDn}_{C_d}) \\ &= \Sigma([25.769 \text{ kN} \cdot \text{m}, 757.601 \text{ kN} \cdot \text{m}, 1.479 \text{ MN} \cdot \text{m}, 2.201 \text{ MN} \cdot \text{m}, 3.757 \text{ MN} \cdot \text{m}, 4.870 \text{ MN} \cdot \text{m}, 5.984 \text{ MN} \cdot \text{m}, 5.520 \text{ MN} \cdot \text{m}, 4.561 \text{ MN} \cdot \text{m}]) \\ &= 29.155 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{G_{d, \text{max}}} &= \Sigma(\text{AnDn}_{G_d}) \\ &= \Sigma([103.075 \text{ kN}, 144.305 \text{ kN}, 144.305 \text{ kN}, 144.305 \text{ kN}, 185.535 \text{ kN}, 185.535 \text{ kN}, 185.535 \text{ kN}, 144.305 \text{ kN}, 103.075 \text{ kN}]) \\ &= 1.340 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G_d^{\text{Total}}} &= \Sigma(\text{RuDn}_{G_d}) \\ &= \Sigma([6510416000000.000 \text{ mm}^5, 191406249999999.969 \text{ mm}^5, 373697916000000.625 \text{ mm}^5, 55598958333333.188 \text{ mm}^5, 94921874999999.875 \text{ mm}^5, 1.230 \text{ m}^5, 1.512 \text{ m}^5, 1.395 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 7.366 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{G_{\text{beam}}^{\text{Total}}} &= \Sigma(\text{RuDn}_{G_{\text{beam}}}) \\ &= \Sigma([20410000000.007 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 20041600000.007 \text{ mm}^4]) \\ &= 338541600000.007 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{\text{beam}}^{\text{Total}}} &= \Sigma(\text{AnDn}_{B_{\text{beam}}}) \\ &= \Sigma([46.649 \text{ kN} \cdot \text{m}, 979.625 \text{ kN} \cdot \text{m}, 1.913 \text{ MN} \cdot \text{m}, 2.846 \text{ MN} \cdot \text{m}, 5.098 \text{ MN} \cdot \text{m}, 6.531 \text{ MN} \cdot \text{m}, 8.024 \text{ MN} \cdot \text{m}, 7.137 \text{ MN} \cdot \text{m}, 8.257 \text{ MN} \cdot \text{m}]) \\ &= 40.771 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{\text{beam}}^{\text{Total}}} &= \Sigma(\text{AnDn}_{B_{\text{beam}}}) \\ &= \Sigma([186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}]) \\ &= 1.866 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{\text{rod}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([3.451 \text{ MN} \cdot \text{m}]) \\ &= 3.451 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{\text{rod}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([148.428 \text{ kN}]) \\ &= 148.428 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{\text{rod}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma(31.387 \text{ m}^5) \\ &= 31.387 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{\text{rod}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma(1.350 \text{ m}^4) \\ &= 1.350 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{\text{Total}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([108.350 \text{ MN} \cdot \text{m}]) \\ &= 108.350 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{\text{Total}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{W_{\text{wall, total}}} &= \Sigma(\text{AnDn}_{W_{\text{wall}}}) \\ &= \Sigma([28.001 \text{ MN} \cdot \text{m}]) \\ &= 28.001 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{W_{\text{wall, total}}} &= \Sigma(\text{AnDn}_{W_{\text{wall}}}) \\ &= \Sigma([1.143 \text{ MN}]) \\ &= 1.143 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C_{d, \text{max}}} + \text{AnDn}_{SW_{\text{rod}}} + \text{AnDn}_{Slab_{\text{Total}}} + \text{AnDn}_{W_{\text{wall, total}}} + \text{AnDn}_{B_{\text{beam}}^{\text{Total}}}) \\ &= \Sigma(29.155 \text{ MN} \cdot \text{m} + 3.451 \text{ MN} \cdot \text{m} + 108.350 \text{ MN} \cdot \text{m} + 28.001 \text{ MN} \cdot \text{m} + 40.771 \text{ MN} \cdot \text{m}) \\ &= 209.727 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C_{d, \text{max}}} + \text{AnDn}_{SW_{\text{rod}}} + \text{AnDn}_{Slab_{\text{Total}}} + \text{AnDn}_{W_{\text{wall, total}}} + \text{AnDn}_{B_{\text{beam}}^{\text{Total}}}) \\ &= \Sigma(1.340 \text{ MN} + 148.428 \text{ kN} + 4.851 \text{ MN} + 1.143 \text{ MN} + 1.866 \text{ MN}) \\ &= 9.349 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C_{d, \text{max}}} + \text{RuDn}_{SW_{\text{rod}}}) \\ &= \Sigma(7.366 \text{ m}^5 + 31.387 \text{ m}^5) \\ &= 38.753 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(209.727 \text{ MN} \cdot \text{m})}{\Sigma(9.349 \text{ MN})} \\ &= 22.434 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(38.753 \text{ m}^5)}{\Sigma(1.689 \text{ m}^4)} \\ &= 22.951 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C_{1,1,1}} &= \Sigma(\text{AnDn}_{C_{1,1}}) \\ &= \Sigma([25.769 \text{ kN} \cdot \text{m}, 757.601 \text{ kN} \cdot \text{m}, 1.479 \text{ MN} \cdot \text{m}, 2.201 \text{ MN} \cdot \text{m}, 3.757 \text{ MN} \cdot \text{m}, 4.870 \text{ MN} \cdot \text{m}, 5.984 \text{ MN} \cdot \text{m}, 5.520 \text{ MN} \cdot \text{m}, 4.561 \text{ MN} \cdot \text{m}]) \\ &= 29.155 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C_{1,1,2}} &= \Sigma(\text{AnDn}_{C_{1,1}}) \\ &= \Sigma([103.075 \text{ kN}, 144.305 \text{ kN}, 144.305 \text{ kN}, 144.305 \text{ kN}, 185.535 \text{ kN}, 185.535 \text{ kN}, 185.535 \text{ kN}, 144.305 \text{ kN}, 103.075 \text{ kN}]) \\ &= 1.340 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{C_{1,1,3}} &= \Sigma(\text{RuDn}_{C_{1,1}}) \\ &= \Sigma([6510416000000.000 \text{ mm}^5, 191406249999999.969 \text{ mm}^5, 373697916000000.625 \text{ mm}^5, 55598958333333.188 \text{ mm}^5, 94921874999999.875 \text{ mm}^5, 1.230 \text{ m}^5, 1.512 \text{ m}^5, 1.395 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 7.366 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{C_{1,1,4}} &= \Sigma(\text{RuDn}_{C_{1,1}}) \\ &= \Sigma([20041600000.007 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 20041600000.007 \text{ mm}^4]) \\ &= 338541600000.007 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{1,1,1}} &= \Sigma(\text{AnDn}_{B_{1,1}}) \\ &= \Sigma([46.649 \text{ kN} \cdot \text{m}, 979.625 \text{ kN} \cdot \text{m}, 1.913 \text{ MN} \cdot \text{m}, 2.846 \text{ MN} \cdot \text{m}, 5.098 \text{ MN} \cdot \text{m}, 6.531 \text{ MN} \cdot \text{m}, 8.024 \text{ MN} \cdot \text{m}, 7.137 \text{ MN} \cdot \text{m}, 8.257 \text{ MN} \cdot \text{m}]) \\ &= 40.771 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{B_{1,1,2}} &= \Sigma(\text{AnDn}_{B_{1,1}}) \\ &= \Sigma([186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}]) \\ &= 1.866 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{1,1,1}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([3.451 \text{ MN} \cdot \text{m}]) \\ &= 3.451 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{1,1,2}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([148.428 \text{ kN}]) \\ &= 148.428 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{1,1,3}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma(31.387 \text{ m}^5) \\ &= 31.387 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{1,1,4}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma(1.350 \text{ m}^4) \\ &= 1.350 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{Taa}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([108.350 \text{ MN} \cdot \text{m}]) \\ &= 108.350 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{1,1,1}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{W_{all,1,1}} &= \Sigma(\text{AnDn}_{W_{all}}) \\ &= \Sigma([28.001 \text{ MN} \cdot \text{m}]) \\ &= 28.001 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{W_{all,1,2}} &= \Sigma(\text{AnDn}_{W_{all}}) \\ &= \Sigma([1.143 \text{ MN}]) \\ &= 1.143 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C_{1,1,1}} + \text{AnDn}_{SW_{1,1,1}} + \text{AnDn}_{Slab_{Taa}} + \text{AnDn}_{W_{all,1,1}} + \text{AnDn}_{B_{1,1,1}}) \\ &= \Sigma(29.155 \text{ MN} \cdot \text{m} + 3.451 \text{ MN} \cdot \text{m} + 108.350 \text{ MN} \cdot \text{m} + 28.001 \text{ MN} \cdot \text{m} + 40.771 \text{ MN} \cdot \text{m}) \\ &= 209.727 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C_{1,1,1}} + \text{AnDn}_{SW_{1,1,1}} + \text{AnDn}_{Slab_{Taa}} + \text{AnDn}_{W_{all,1,1}} + \text{AnDn}_{B_{1,1,1}}) \\ &= \Sigma(1.340 \text{ MN} + 148.428 \text{ kN} + 4.851 \text{ MN} + 1.143 \text{ MN} + 1.866 \text{ MN}) \\ &= 9.349 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C_{1,1,1}} + \text{RuDn}_{SW_{1,1,1}}) \\ &= \Sigma(7.366 \text{ m}^5 + 31.387 \text{ m}^5) \\ &= 38.753 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(209.727 \text{ MN} \cdot \text{m})}{\Sigma(9.349 \text{ MN})} \\ &= 22.434 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(38.753 \text{ m}^5)}{\Sigma(1.689 \text{ m}^4)} \\ &= 22.951 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{C,t_{\text{res}}} &= \Sigma(\text{AnDn}_{C,t}) \\ &= \Sigma([12.884 \text{ kN} \cdot \text{m}, 378.801 \text{ kN} \cdot \text{m}, 739.563 \text{ kN} \cdot \text{m}, 1.100 \text{ MN} \cdot \text{m}, 1.879 \text{ MN} \cdot \text{m}, 2.435 \text{ MN} \cdot \text{m}, 2.992 \text{ MN} \cdot \text{m}, 2.760 \text{ MN} \cdot \text{m}, 2.281 \text{ MN} \cdot \text{m}]) \\ &= 14.577 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{G,t_{\text{res}}} &= \Sigma(\text{AnDn}_{G,t}) \\ &= \Sigma([51.538 \text{ kN}, 72.153 \text{ kN}, 72.153 \text{ kN}, 92.767 \text{ kN}, 92.767 \text{ kN}, 72.153 \text{ kN}, 51.538 \text{ kN}]) \\ &= 669.987 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{Gd_{T,\text{res}}} &= \Sigma(\text{RuDn}_{Gd}) \\ &= \Sigma([6510416000000.007 \text{ mm}^5, 191406249999999.969 \text{ mm}^5, 373697916000000.025 \text{ mm}^5, 55598958333333.188 \text{ mm}^5, 94921874999999.875 \text{ mm}^5, 1.230 \text{ m}^5, 1.512 \text{ m}^5, 1.395 \text{ m}^5, 1.152 \text{ m}^5]) \\ &= 7.366 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{Gd_{T,\text{res}}} &= \Sigma(\text{RuDn}_{Gd}) \\ &= \Sigma([200410000000.007 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 40875000000.000 \text{ mm}^4, 30458333333.333 \text{ mm}^4, 20041600000.007 \text{ mm}^4]) \\ &= 338541600000.007 \text{ mm}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Bam_{T,\text{res}}} &= \Sigma(\text{AnDn}_{Bam}) \\ &= \Sigma([46.649 \text{ kN} \cdot \text{m}, 979.625 \text{ kN} \cdot \text{m}, 1.913 \text{ MN} \cdot \text{m}, 2.846 \text{ MN} \cdot \text{m}, 5.098 \text{ MN} \cdot \text{m}, 6.531 \text{ MN} \cdot \text{m}, 8.024 \text{ MN} \cdot \text{m}, 7.137 \text{ MN} \cdot \text{m}, 8.257 \text{ MN} \cdot \text{m}]) \\ &= 40.771 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Beam_{T,\text{res}}} &= \Sigma(\text{AnDn}_{Beam}) \\ &= \Sigma([186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 248.794 \text{ kN}, 186.595 \text{ kN}, 186.595 \text{ kN}]) \\ &= 1.866 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{T,\text{res}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([1.725 \text{ MN} \cdot \text{m}]) \\ &= 1.725 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{SW_{T,\text{res}}} &= \Sigma(\text{AnDn}_{SW}) \\ &= \Sigma([74.214 \text{ kN}]) \\ &= 74.214 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{T,\text{res}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma(31.387 \text{ m}^5) \\ &= 31.387 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{RuDn}_{SW_{T,\text{res}}} &= \Sigma(\text{RuDn}_{SW}) \\ &= \Sigma([1.350 \text{ m}^4]) \\ &= 1.350 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{T,\text{res}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([108.350 \text{ MN} \cdot \text{m}]) \\ &= 108.350 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Slab_{T,\text{res}}} &= \Sigma(\text{AnDn}_{Slab}) \\ &= \Sigma([4.851 \text{ MN}]) \\ &= 4.851 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Hd_{T,\text{res}}} &= \Sigma(\text{AnDn}_{Hd}) \\ &= \Sigma([14.000 \text{ MN} \cdot \text{m}]) \\ &= 14.000 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{AnDn}_{Wd_{T,\text{res}}} &= \Sigma(\text{AnDn}_{Wd}) \\ &= \Sigma([571.448 \text{ kN}]) \\ &= 571.448 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{AnDn} &= \Sigma(\text{AnDn}_{C,t_{\text{res}}} + \text{AnDn}_{SW_{T,\text{res}}} + \text{AnDn}_{Slab_{T,\text{res}}} + \text{AnDn}_{Wd_{T,\text{res}}} + \text{AnDn}_{Beam_{T,\text{res}}}) \\ &= \Sigma(14.577 \text{ MN} \cdot \text{m} + 1.725 \text{ MN} \cdot \text{m} + 108.350 \text{ MN} \cdot \text{m} + 14.000 \text{ MN} \cdot \text{m} + 40.771 \text{ MN} \cdot \text{m}) \\ &= 179.424 \text{ MN} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{An} &= \Sigma(\text{AnDn}_{C,t_{\text{res}}} + \text{AnDn}_{SW_{T,\text{res}}} + \text{AnDn}_{Slab_{T,\text{res}}} + \text{AnDn}_{Wd_{T,\text{res}}} + \text{AnDn}_{Beam_{T,\text{res}}}) \\ &= \Sigma(669.987 \text{ kN} + 74.214 \text{ kN} + 4.851 \text{ MN} + 571.448 \text{ kN} + 1.866 \text{ MN}) \\ &= 8.033 \text{ MN} \end{aligned}$$

$$\begin{aligned} \text{RuDn} &= \Sigma(\text{RuDn}_{C,t_{\text{res}}} + \text{RuDn}_{SW_{T,\text{res}}}) \\ &= \Sigma(7.366 \text{ m}^5 + 31.387 \text{ m}^5) \\ &= 38.753 \text{ m}^5 \end{aligned}$$

$$\begin{aligned} \text{Rn} &= \Sigma(\text{RuDn}_{Gd_{T,\text{res}}} + \text{RuDn}_{SW_{T,\text{res}}}) \\ &= \Sigma(338541600000.007 \text{ mm}^4 + 1.350 \text{ m}^4) \\ &= 1.689 \text{ m}^4 \end{aligned}$$

$$\begin{aligned} C_m &= \frac{\Sigma(\text{AnDn})}{\Sigma(\text{An})} \\ &= \frac{\Sigma(179.424 \text{ MN} \cdot \text{m})}{\Sigma(8.033 \text{ MN})} \\ &= 22.336 \text{ m} \end{aligned}$$

$$\begin{aligned} C_r &= \frac{\Sigma(\text{RuDn})}{\Sigma(\text{Rn})} \\ &= \frac{\Sigma(38.753 \text{ m}^5)}{\Sigma(1.689 \text{ m}^4)} \\ &= 22.951 \text{ m} \end{aligned}$$

$$\begin{aligned}
A_c &= 0.3 \cdot 6 \\
A_c - \Sigma &\left(A_c \cdot \left(0.2 + \left(\frac{D_c}{(\Sigma(H_a))^2} \right) \right) \right) \\
&\Sigma \left(1.60000 \cdot \left(0.2 + \left(\frac{[5.50000, 5.50000]}{(\Sigma([4.50000, 3.50000, 3.50000, 3.50000]))^2} \right) \right) \right) \\
&= 0.80800
\end{aligned}$$

$$\begin{aligned}
C_t &= 0.0743 \cdot \sqrt{A_c} \\
&= 0.0743 \cdot \sqrt{0.80800} \\
&= 0.06679
\end{aligned}$$

Parameters

$$\begin{aligned}
Zone &= 0.40000 & SeismicSource &= A & Soil &= SD \\
I &= 1 & R &= 8.50000 & Distance &= 5.00000 km \\
H_a &= 15.00000 & C_t &= 0.06679 & W &= 48.71354 MN
\end{aligned}$$

Nv, Na, Cv, Ca, T

Since, Distance $\geq 5 \rightarrow (5 \geq 5)$: (Table 208-6)

$$\begin{aligned}
Na &= 1.2 \cdot \left(\left(\frac{Distance - 5}{5} \right) \cdot (1.2 - 1) \right) \\
&= 1.2 - \left(\left(\frac{5 - 5}{5} \right) \cdot (1.2 - 1) \right) \\
&= 1.20000
\end{aligned}$$

Since, Distance $> 5 \rightarrow (5 > 5)$: (Table 208-5)

$$\begin{aligned}
Nv &= 1.6 \cdot \left(\left(\frac{Distance - 5}{5} \right) \cdot (1.6 - 1.2) \right) \\
&- 1.6 - \left(\left(\frac{5 - 5}{5} \right) \cdot (1.6 - 1.2) \right) \\
&= 1.60000
\end{aligned}$$

Since, Soil $p_{soil} \rightarrow (SD)$: (Table 208-7)

$$\begin{aligned}
Ca &= 0.44 \cdot na \\
&= 0.44 \cdot 1.20000 \\
&= 0.52800
\end{aligned}$$

Since, Soil $p_{soil} \rightarrow (SD)$: (Table 208-8)

$$\begin{aligned}
Cv &= 0.64 \cdot nv \\
&= 0.64 \cdot 1.60000 \\
&= 1.02400
\end{aligned}$$

$$\begin{aligned}
T &= C_t \cdot (\Sigma(H_a))^{(4)} \\
&= 0.06679 \cdot (\Sigma([4.50000, 3.50000, 3.50000, 3.50000]))^{(4)} \\
&= 0.50905 \text{ (Equation 208-12)}
\end{aligned}$$

Base Shear

$$\begin{aligned}
V &= \left(\frac{cv \cdot I}{r \cdot t} \right) \cdot w \\
&= \left(\frac{1.02400 \cdot 1}{8.50000 \cdot 0.50905} \right) \cdot 48.71354 \text{ MN} \\
&= 11.52837 \text{ MN} \text{ (Equation 208-8)}
\end{aligned}$$

$$\begin{aligned}
V &= \left(\frac{2.5 \cdot ca \cdot I}{r} \right) \cdot w \\
&- \left(\frac{2.5 \cdot 0.52800 \cdot 1}{8.50000} \right) \cdot 48.71354 \text{ MN} \\
&= 7.56493 \text{ MN} \text{ (Equation 208-9)}
\end{aligned}$$

$$\begin{aligned}
V &= 0.11 \cdot ca \cdot I \cdot w \\
&= 0.11 \cdot 0.52800 \cdot 1 \cdot 48.71354 \text{ MN} \\
&= 2.82928 \text{ MN} \text{ (Equation 208-10)}
\end{aligned}$$

$$\begin{aligned}
V &= \left(\frac{0.8 \cdot z \cdot nv \cdot I}{r} \right) \cdot w \\
&= \left(\frac{0.8 \cdot 0.40000 \cdot 1.60000 \cdot 1}{8.50000} \right) \cdot 48.71354 \text{ MN} \\
&= 2.93427 \text{ MN} \text{ (Equation 208-11)}
\end{aligned}$$

Since, $v > v_{max} \rightarrow (11.52837 \text{ MN} > 7.56493 \text{ MN})$:

BaseShear = 7.56493 MN

Since, $t < 0.7 \rightarrow (0.50905 < 0.7)$:

f1 = 0

Lateral Force

$$\begin{aligned}
F &= \frac{(v - ft) \cdot WxHi}{WxHb_{load}} \\
&- \frac{(7.56 \text{ MN} - 0) \cdot 196.33 \text{ MN}}{452.57 \text{ MN}} \\
&= 3.28 \text{ MN}
\end{aligned}$$

$$\begin{aligned}
F &= \frac{(v - ft) \cdot WxHi}{WxHb_{load}} \\
&= \frac{(7.56 \text{ MN} - 0) \cdot 131.55 \text{ MN}}{452.57 \text{ MN}} \\
&= 2.20 \text{ MN}
\end{aligned}$$

$$\begin{aligned}
F &= \frac{(v - ft) \cdot WxHi}{WxHb_{load}} \\
&= \frac{(7.56 \text{ MN} - 0) \cdot 87.70 \text{ MN}}{452.57 \text{ MN}} \\
&= 1.47 \text{ MN}
\end{aligned}$$

$$\begin{aligned}
 F' &= \frac{(n - f) \cdot W_{tx} H_l}{W_{tx} H_l^{\text{total}}} \\
 &= \frac{(7.56 \text{ MN} - 0) \cdot 36.99 \text{ MN}}{452.57 \text{ MN}} \\
 &= 618.23 \text{ kN}
 \end{aligned}$$