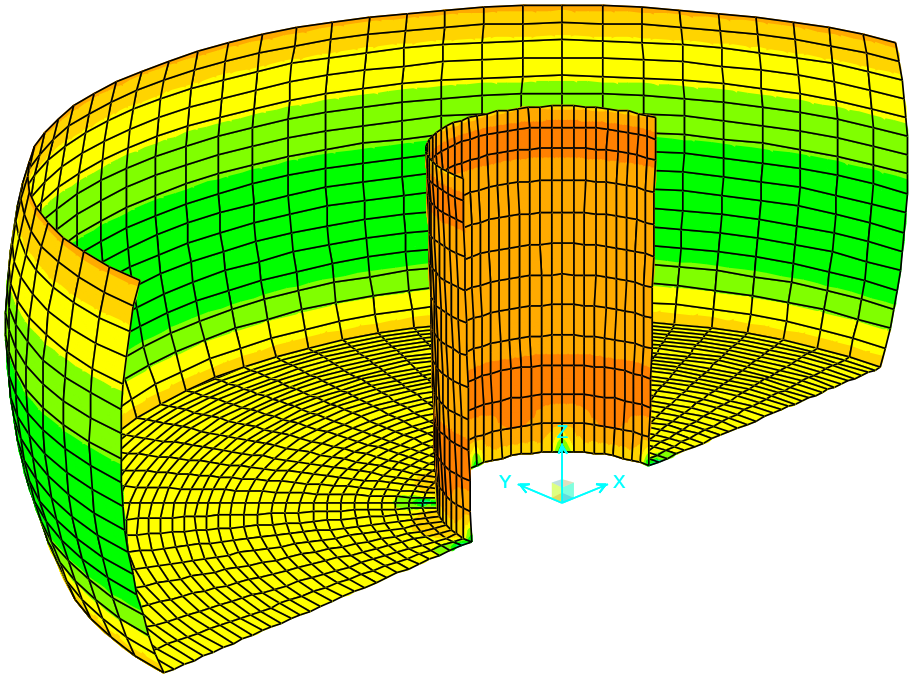
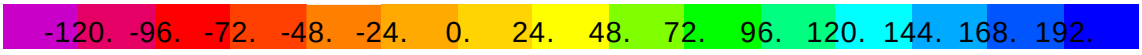
- **Lay out and concrete dimension**

- **Load**

  $water\ pressure$
- **Straining action**




| Load type | Case of loading | Tension force |
|---|---|---|
| All load | Ultimate | 92 |
| All load | Working | 62 |

Design

Section 1

$T_w = 62\ t$
$b = 100\ cm$
$t = 40\ cm$
Water section
1- Working stage

$$F_{Ct-N} = \frac{N_w}{A}$$

$$F_{Ct-N} = \frac{62 * 10 * 10^3}{1000 * 400} = 1.55\ Mpa$$

$$t_v = t * \left[1 \mp \frac{F_{Ct-N}}{F_{Ct-M}}\right]$$

$$t_v = 400 * \left[1 + \frac{1.55}{0}\right] = \infty \quad > 600\ mm \qquad \rightarrow\ \eta = 1.7$$

$$F_{ctr} = .6 * \sqrt{F_{cu}}$$

$$F_{ctr} = .6 * \sqrt{30} = 3.28\ Mpa$$

$$\frac{3.28}{1.7} = 1.933\ >\ 1.55 \qquad ok\ safe$$

Ultimate stage

$$\frac{N_u}{\frac{f_y}{\gamma_s} * \beta_{crack}}$$

$assume\ used\ \emptyset\ 16\ \ \beta_{crack} = .75 \qquad form\ coad\ table\ 4-15$

$$A_s = \frac{92 * 10^3}{\frac{3600}{1.15} * .75} = 39.18\ cm^2 \quad 16\emptyset 18\ @\ 6.25\ cm$$

Check

Horizontal par

$\mu_{m-h} = .25\%$

$$\frac{40.71}{40 * 6.25} = .16 > \mu_{m-h}$$

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Vertical par

$\mu_{m-v} = .45\%$

Assume used $5\emptyset 12\ /m$

$$\frac{5.654}{40 * 20} = 7.06 * 10^{-3} > \mu_{m-v} \qquad used\ 5\emptyset 12/m$$