

TEDDS calculation version 1.0.04



Project Erbistock Weir Partial Removal				Job no. 60672359	
Calcs for RC Thermal Crack Width				Start page no./Revision 2	
Calcs by AM	Calcs date 11/05/2022	Checked by	Checked date	Approved by	Approved date

Reinforcement details

Type of reinforcement

Strength of reinforcement

Average concrete to steel bond strength

Reinforcement in face 1

Reinforcement in face 2

Bar diameter in face 1

Bar diameter in face 2

Mesh

$$f_y = 500 \text{ N/mm}^2$$

$$f_b = 1.6 \text{ N/mm}^2$$

$$\mathbf{B1131 \text{ Mesh } (A_{s1} = 1131 \text{ mm}^2 \text{ per metre})}$$

$$\mathbf{B1131 \text{ Mesh } (A_{s2} = 1131 \text{ mm}^2 \text{ per metre})}$$

$$\phi_1 = 12 \text{ mm}$$

$$\phi_2 = 12 \text{ mm}$$

Check minimum reinforcement (clause A.2)

Direct tensile strength of immature concrete

$$f_{ct} = 1.6 \text{ N/mm}^2$$

Critical steel ratio

$$\rho_{crit} = f_{ct}/f_y = \mathbf{0.00320}$$

Depth of surface zone to face 1

$$d_{z1} = \mathbf{250 \text{ mm}}$$

Depth of surface zone to face 2

$$d_{z2} = \mathbf{250 \text{ mm}}$$

Minimum area of steel required in face 1

$$A_{smin1} = \rho_{crit} \times d_{z1} \times 1000\text{mm} = \mathbf{800 \text{ mm}^2 \text{ per metre}}$$

Minimum area of steel required in face 2

$$A_{smin2} = \rho_{crit} \times d_{z2} \times 1000\text{mm} = \mathbf{800 \text{ mm}^2 \text{ per metre}}$$

PASS - $A_{s1} \geq A_{smin1}$ - Area of steel provided in face 1 is greater than minimum required

PASS - $A_{s2} \geq A_{smin2}$ - Area of steel provided in face 2 is greater than minimum required

Calculate estimated maximum crack widths (clause A.3)

Steel ratio for face 1

$$\rho_1 = A_{s1}/(d_{z1} \times 1000\text{mm}) = \mathbf{0.00452}$$

Steel ratio for face 2

$$\rho_2 = A_{s2}/(d_{z2} \times 1000\text{mm}) = \mathbf{0.00452}$$

Maximum crack spacing for face 1

$$s_{max1} = f_{ct}/f_b \times \phi_1/(2 \times \rho_1) = \mathbf{1326 \text{ mm}}$$

Maximum crack spacing for face 2

$$s_{max2} = f_{ct}/f_b \times \phi_2/(2 \times \rho_2) = \mathbf{1326 \text{ mm}}$$

Maximum crack width in face 1

$$w_{max1} = s_{max1} \times R \times \alpha \times (T_1 + T_2) = \mathbf{0.138 \text{ mm}}$$

Maximum crack width in face 2

$$w_{max2} = s_{max2} \times R \times \alpha \times (T_1 + T_2) = \mathbf{0.138 \text{ mm}}$$

Estimated maximum crack width for face 1 is 0.138 mm

Estimated maximum crack width for face 2 is 0.138 mm