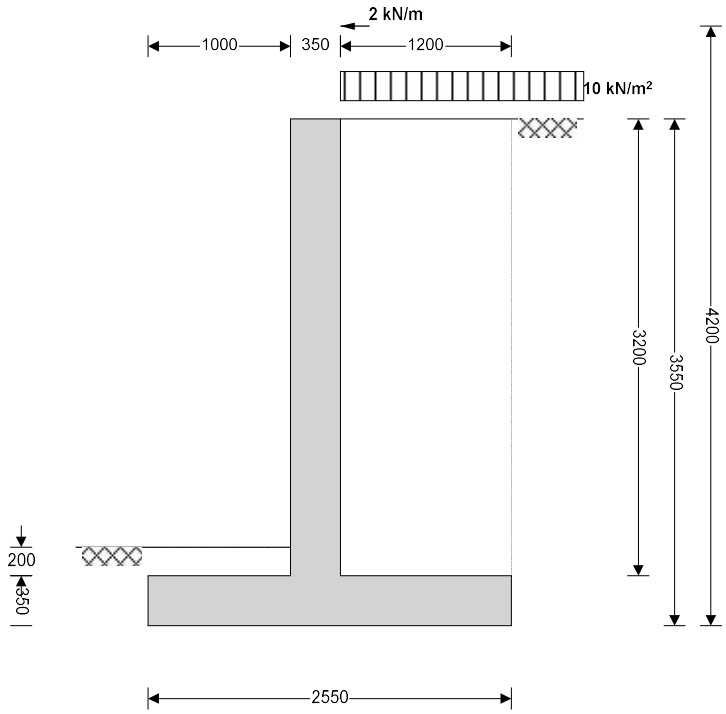
Haigh Huddleston & Associates Civil & Structural Engineering Consultants Haigh Huddleston Asc Unit 4 Bar Lane , Midgley, Wf4 4JJ	Project Jason Dyson, 3 Rotcher Lane Slaithwaite				Job no. 8464
	Calcs for Retaining Wall Design to Property and boundary				Start page no./Revision 1 A
	Calcs by MH	Calcs date 14/08/2026	Checked by	Checked date	Approved by	Approved date

RETAINING WALL ANALYSIS & DESIGN (BS8002)

RETAINING WALL ANALYSIS (BS 8002:1994)

TEDDS calculation version 1.2.01.09



Wall details

Retaining wall type	**Unpropped cantilever**
Height of retaining wall stem	h_{stem} = **3200** mm
Thickness of wall stem	t_{wall} = **350** mm
Length of toe	l_{toe} = **1000** mm
Length of heel	l_{heel} = **1200** mm
Overall length of base	$l_{base} = l_{toe} + l_{heel} + t_{wall}$ = **2550** mm
Thickness of base	t_{base} = **350** mm
Depth of downstand	d_{ds} = **0** mm
Position of downstand	l_{ds} = **1900** mm
Thickness of downstand	t_{ds} = **350** mm
Height of retaining wall	$h_{wall} = h_{stem} + t_{base} + d_{ds}$ = **3550** mm
Depth of cover in front of wall	d_{cover} = **200** mm
Depth of unplanned excavation	d_{exc} = **0** mm
Height of ground water behind wall	h_{water} = **0** mm
Height of saturated fill above base	$h_{sat} = \max(h_{water} - t_{base} - d_{ds}, 0\ mm)$ = **0** mm
Density of wall construction	γ_{wall} = **23.6** kN/m^3
Density of base construction	γ_{base} = **23.6** kN/m^3
Angle of rear face of wall	α = **90.0** deg
Angle of soil surface behind wall	β = **0.0** deg
Effective height at virtual back of wall	$h_{eff} = h_{wall} + l_{heel} \times \tan(\beta)$ = **3550** mm

Retained material details

Mobilisation factor	M = **1.5**

Moist density of retained material	γ_m = **18.0** kN/m^3
Saturated density of retained material	γ_s = **21.0** kN/m^3
Design shear strength	ϕ' = **25.8** deg
Angle of wall friction	δ = **19.9** deg

Base material details

Moist density	γ_{mb} = **18.0** kN/m^3
Design shear strength	ϕ'_b = **25.8** deg
Design base friction	δ_b = **19.9** deg
Allowable bearing pressure	$P_{bearing}$ = **100** kN/m^2

Using Coulomb theory

Active pressure coefficient for retained material

$$K_a = \sin(\alpha + \phi')^2 / (\sin(\alpha)^2 \times \sin(\alpha - \delta) \times [1 + \sqrt{(\sin(\phi' + \delta) \times \sin(\phi' - \beta) / (\sin(\alpha - \delta) \times \sin(\alpha + \beta)))}]^2) = \mathbf{0.347}$$

Passive pressure coefficient for base material

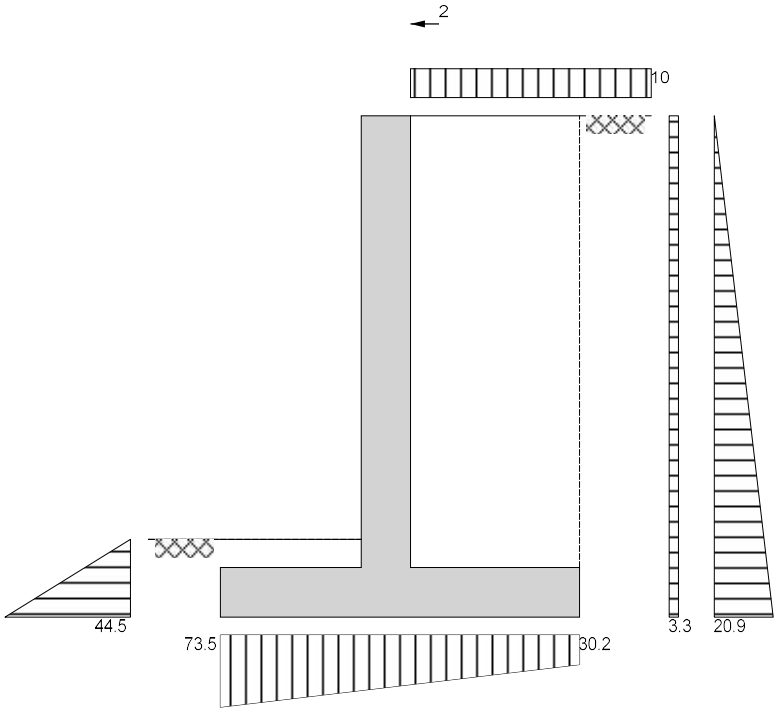
$$K_p = \sin(90 - \phi'_b)^2 / (\sin(90 - \delta_b) \times [1 - \sqrt{(\sin(\phi'_b + \delta_b) \times \sin(\phi'_b) / (\sin(90 + \delta_b)))}]^2) = \mathbf{4.785}$$

At-rest pressure

At-rest pressure for retained material	$K_0 = 1 - \sin(\phi') =$ **0.565**

Loading details

Surcharge load on plan	Surcharge = **10.0** kN/m^2
Applied vertical dead load on wall	W_{dead} = **0.0** kN/m
Applied vertical live load on wall	W_{live} = **0.0** kN/m
Position of applied vertical load on wall	l_{load} = **0** mm
Applied horizontal dead load on wall	F_{dead} = **0.0** kN/m
Applied horizontal live load on wall	F_{live} = **2.0** kN/m
Height of applied horizontal load on wall	h_{load} = **4200** mm



Loads shown in kN/m, pressures shown in kN/m^2

Haigh Huddleston & Associates
Civil & Structural Engineering Consultants

Haigh Huddleston Asc
Unit 4
Bar Lane , Midgley, Wf4 4JJ

Project				Job no.	
Jason Dyson, 3 Rotcher Lane Slaithwaite				8464	
Calcs for				Start page no./Revision	
Retaining Wall Design to Property and boundary				3 A	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
MH	14/08/2026				

Vertical forces on wall

Wall stem	$w_{wall} = h_{stem} \times t_{wall} \times \gamma_{wall}$ = **26.4** kN/m
Wall base	$w_{base} = l_{base} \times t_{base} \times \gamma_{base}$ = **21.1** kN/m
Surcharge	w_{sur} = Surcharge × l_{heel} = **12** kN/m
Moist backfill to top of wall	$w_{m_w} = l_{heel} \times (h_{stem} - h_{sat}) \times \gamma_m$ = **69.1** kN/m
Soil in front of wall	$w_p = l_{toe} \times d_{cover} \times \gamma_{mb}$ = **3.6** kN/m
Total vertical load	$W_{total} = w_{wall} + w_{base} + w_{sur} + w_{m_w} + w_p$ = **132.2** kN/m

Horizontal forces on wall

Surcharge	$F_{sur} = K_a \times \cos(90 - \alpha + \delta) \times$ Surcharge × h_{eff} = **11.6** kN/m
Moist backfill above water table	$F_{m_a} = 0.5 \times K_a \times \cos(90 - \alpha + \delta) \times \gamma_m \times (h_{eff} - h_{water})^2$ = **37** kN/m
Applied horizontal load	$F_h = F_{dead} + F_{live}$ = **2** kN/m
Total horizontal load	$F_{total} = F_{sur} + F_{m_a} + F_h$ = **50.6** kN/m

Calculate stability against sliding

Passive resistance of soil in front of wall	$F_p = 0.5 \times K_p \times \cos(\delta_b) \times (d_{cover} + t_{base} + d_{ds} - d_{exc})^2 \times \gamma_{mb}$ = **12.2** kN/m
Resistance to sliding	$F_{res} = F_p + (W_{total} - w_{sur} - w_p) \times \tan(\delta_b)$ = **54.5** kN/m

PASS - Resistance force is greater than sliding force

Overturning moments

Surcharge	$M_{sur} = F_{sur} \times (h_{eff} - 2 \times d_{ds}) / 2$ = **20.6** kNm/m
Moist backfill above water table	$M_{m_a} = F_{m_a} \times (h_{eff} + 2 \times h_{water} - 3 \times d_{ds}) / 3$ = **43.8** kNm/m
Applied horizontal load	$M_{hor} = F_h \times h_{load}$ = **8.4** kNm/m
Total overturning moment	$M_{ot} = M_{sur} + M_{m_a} + M_{hor}$ = **72.8** kNm/m

Restoring moments

Wall stem	$M_{wall} = w_{wall} \times (l_{toe} + t_{wall} / 2)$ = **31.1** kNm/m
Wall base	$M_{base} = w_{base} \times l_{base} / 2$ = **26.9** kNm/m
Moist backfill	$M_{m_r} = (w_{m_w} \times (l_{base} - l_{heel} / 2) + w_{m_s} \times (l_{base} - l_{heel} / 3))$ = **134.8** kNm/m
Total restoring moment	$M_{rest} = M_{wall} + M_{base} + M_{m_r}$ = **192.7** kNm/m

Check stability against overturning

Total overturning moment	M_{ot} = **72.8** kNm/m
Total restoring moment	M_{rest} = **192.7** kNm/m

PASS - Restoring moment is greater than overturning moment

Check bearing pressure

Surcharge	$M_{sur_r} = w_{sur} \times (l_{base} - l_{heel} / 2)$ = **23.4** kNm/m
Soil in front of wall	$M_{p_r} = w_p \times l_{toe} / 2$ = **1.8** kNm/m
Total moment for bearing	$M_{total} = M_{rest} - M_{ot} + M_{sur_r} + M_{p_r}$ = **145.1** kNm/m
Total vertical reaction	$R = W_{total}$ = **132.2** kN/m
Distance to reaction	$x_{bar} = M_{total} / R$ = **1097** mm
Eccentricity of reaction	$e = \text{abs}((l_{base} / 2) - x_{bar})$ = **178** mm

Reaction acts within middle third of base

Bearing pressure at toe	$p_{toe} = (R / l_{base}) + (6 \times R \times e / l_{base}^2)$ = **73.5** kN/m^2
Bearing pressure at heel	$p_{heel} = (R / l_{base}) - (6 \times R \times e / l_{base}^2)$ = **30.2** kN/m^2

PASS - Maximum bearing pressure is less than allowable bearing pressure

RETAINING WALL DESIGN (BS 8002:1994)

TEDDS calculation version 1.2.01.09

Ultimate limit state load factors

Dead load factor	γ_{f_d} = **1.4**
Live load factor	γ_{f_l} = **1.6**
Earth and water pressure factor	γ_{f_e} = **1.4**

Factored vertical forces on wall

Wall stem	$w_{wall_f} = \gamma_{f_d} \times h_{stem} \times t_{wall} \times \gamma_{wall}$ = **37** kN/m
Wall base	$w_{base_f} = \gamma_{f_d} \times l_{base} \times t_{base} \times \gamma_{base}$ = **29.5** kN/m
Surcharge	$w_{sur_f} = \gamma_{f_l} \times$ Surcharge $\times l_{heel}$ = **19.2** kN/m
Moist backfill to top of wall	$w_{m_w_f} = \gamma_{f_d} \times l_{heel} \times (h_{stem} - h_{sat}) \times \gamma_m$ = **96.8** kN/m
Soil in front of wall	$w_{p_f} = \gamma_{f_d} \times l_{toe} \times d_{cover} \times \gamma_{mb}$ = **5** kN/m
Total vertical load	$W_{total_f} = w_{wall_f} + w_{base_f} + w_{sur_f} + w_{m_w_f} + w_{p_f}$ = **187.5** kN/m

Factored horizontal at-rest forces on wall

Surcharge	$F_{sur_f} = \gamma_{f_l} \times K_0 \times$ Surcharge $\times h_{eff}$ = **32.1** kN/m
Moist backfill above water table	$F_{m_a_f} = \gamma_{f_e} \times 0.5 \times K_0 \times \gamma_m \times (h_{eff} - h_{water})^2$ = **89.7** kN/m
Applied horizontal load	$F_{h_f} = \gamma_{f_e} \times F_{dead} + \gamma_{f_l} \times F_{live}$ = **3.2** kN/m
Total horizontal load	$F_{total_f} = F_{sur_f} + F_{m_a_f} + F_{h_f}$ = **125** kN/m
Passive resistance of soil in front of wall	$F_{p_f} = \gamma_{f_e} \times 0.5 \times K_p \times \cos(\delta_b) \times (d_{cover} + t_{base} + d_{ds} - d_{exc})^2 \times \gamma_{mb}$ = **17.1** kN/m

Factored overturning moments

Surcharge	$M_{sur_f} = F_{sur_f} \times (h_{eff} - 2 \times d_{ds}) / 2$ = **56.9** kNm/m
Moist backfill above water table	$M_{m_a_f} = F_{m_a_f} \times (h_{eff} + 2 \times h_{water} - 3 \times d_{ds}) / 3$ = **106.1** kNm/m
Applied horizontal load	$M_{hor_f} = F_{h_f} \times h_{load}$ = **13.4** kNm/m
Total overturning moment	$M_{ot_f} = M_{sur_f} + M_{m_a_f} + M_{hor_f}$ = **176.5** kNm/m

Restoring moments

Wall stem	$M_{wall_f} = w_{wall_f} \times (l_{toe} + t_{wall} / 2)$ = **43.5** kNm/m
Wall base	$M_{base_f} = w_{base_f} \times l_{base} / 2$ = **37.6** kNm/m
Surcharge	$M_{sur_r_f} = w_{sur_f} \times (l_{base} - l_{heel} / 2)$ = **37.4** kNm/m
Moist backfill	$M_{m_r_f} = (w_{m_w_f} \times (l_{base} - l_{heel} / 2) + w_{m_s_f} \times (l_{base} - l_{heel} / 3))$ = **188.7** kNm/m
Soil in front of wall	$M_{p_r_f} = w_{p_f} \times l_{toe} / 2$ = **2.5** kNm/m
Total restoring moment	$M_{rest_f} = M_{wall_f} + M_{base_f} + M_{sur_r_f} + M_{m_r_f} + M_{p_r_f}$ = **309.7** kNm/m

Factored bearing pressure

Total moment for bearing	$M_{total_f} = M_{rest_f} - M_{ot_f}$ = **133.2** kNm/m
Total vertical reaction	$R_f = W_{total_f}$ = **187.5** kN/m
Distance to reaction	$x_{bar_f} = M_{total_f} / R_f$ = **711** mm
Eccentricity of reaction	$e_f = \text{abs}((l_{base} / 2) - x_{bar_f})$ = **564** mm
	Reaction acts outside middle third of base
Bearing pressure at toe	$p_{toe_f} = R_f / (1.5 \times x_{bar_f})$ = **175.9** kN/m^2
Bearing pressure at heel	p_{heel_f} = 0 kN/m^2 = **0** kN/m^2
Rate of change of base reaction	rate = $p_{toe_f} / (3 \times x_{bar_f})$ = **82.52** kN/m^2/m
Bearing pressure at stem / toe	$p_{stem_toe_f} = \max(p_{toe_f} - (\text{rate} \times l_{toe}), 0$ kN/m$^2)$ = **93.4** kN/m^2
Bearing pressure at mid stem	$p_{stem_mid_f} = \max(p_{toe_f} - (\text{rate} \times (l_{toe} + t_{wall} / 2)), 0$ kN/m$^2)$ = **79** kN/m^2

Bearing pressure at stem / heel $p_{stem_heel_f} = \max(p_{toe_f} - (\text{rate} \times (l_{toe} + t_{wall})), 0\ kN/m^2) =$ **64.5** kN/m^2

Design of reinforced concrete retaining wall toe (BS 8002:1994)

Material properties

Characteristic strength of concrete $f_{cu} =$ **35** N/mm^2

Characteristic strength of reinforcement $f_y =$ **500** N/mm^2

Base details

Minimum area of reinforcement $k =$ **0.13** %

Cover to reinforcement in toe $c_{toe} =$ **35** mm

Calculate shear for toe design

Shear from bearing pressure $V_{toe_bear} = (p_{toe_f} + p_{stem_toe_f}) \times l_{toe} / 2 =$ **134.7** kN/m

Shear from weight of base $V_{toe_wt_base} = \gamma_{f_d} \times \gamma_{base} \times l_{toe} \times t_{base} =$ **11.6** kN/m

Shear from weight of soil $V_{toe_wt_soil} = w_{p_f} - (\gamma_{f_d} \times \gamma_m \times l_{toe} \times d_{exc}) =$ **5** kN/m

Total shear for toe design $V_{toe} = V_{toe_bear} - V_{toe_wt_base} - V_{toe_wt_soil} =$ **118** kN/m

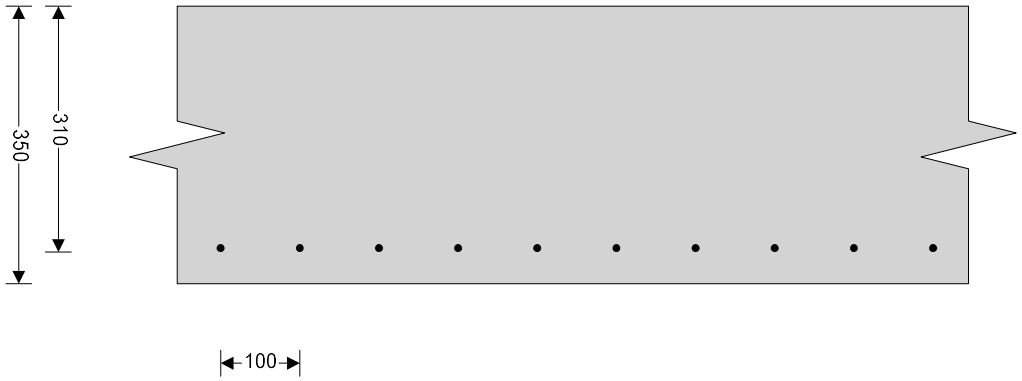
Calculate moment for toe design

Moment from bearing pressure $M_{toe_bear} = (2 \times p_{toe_f} + p_{stem_mid_f}) \times (l_{toe} + t_{wall} / 2)^2 / 6 =$ **99.1** kNm/m

Moment from weight of base $M_{toe_wt_base} = (\gamma_{f_d} \times \gamma_{base} \times t_{base} \times (l_{toe} + t_{wall} / 2)^2 / 2) =$ **8** kNm/m

Moment from weight of soil $M_{toe_wt_soil} = (w_{p_f} - (\gamma_{f_d} \times \gamma_m \times l_{toe} \times d_{exc})) \times (l_{toe} + t_{wall}) / 2 =$ **3.4** kNm/m

Total moment for toe design $M_{toe} = M_{toe_bear} - M_{toe_wt_base} - M_{toe_wt_soil} =$ **87.7** kNm/m



Check toe in bending

Width of toe $b =$ **1000** mm/m

Depth of reinforcement $d_{toe} = t_{base} - c_{toe} - (\phi_{toe} / 2) =$ **310.0** mm

Constant $K_{toe} = M_{toe} / (b \times d_{toe}^2 \times f_{cu}) =$ **0.026**

Compression reinforcement is not required

Lever arm $z_{toe} = \min(0.5 + \sqrt{}(0.25 - (\min(K_{toe}, 0.225) / 0.9)), 0.95) \times d_{toe}$

$z_{toe} =$ **295** mm

Area of tension reinforcement required $A_{s_toe_des} = M_{toe} / (0.87 \times f_y \times z_{toe}) =$ **685** mm^2/m

Minimum area of tension reinforcement $A_{s_toe_min} = k \times b \times t_{base} =$ **455** mm^2/m

Area of tension reinforcement required $A_{s_toe_req} = \text{Max}(A_{s_toe_des}, A_{s_toe_min}) =$ **685** mm^2/m

Reinforcement provided **B785 mesh**

Area of reinforcement provided $A_{s_toe_prov} =$ **785** mm^2/m

PASS - Reinforcement provided at the retaining wall toe is adequate

Check shear resistance at toe

Design shear stress $v_{toe} = V_{toe} / (b \times d_{toe}) =$ **0.381** N/mm^2

Allowable shear stress $v_{adm} = \min(0.8 \times \sqrt{}(f_{cu} / 1\ N/mm^2), 5) \times 1\ N/mm^2 =$ **4.733** N/mm^2

PASS - Design shear stress is less than maximum shear stress

From BS8110:Part 1:1997 – Table 3.8

Design concrete shear stress v_{c_toe} = **0.477** N/mm^2

v_{toe} < v_{c_toe} - No shear reinforcement required

Design of reinforced concrete retaining wall heel (BS 8002:1994)

Material properties

Characteristic strength of concrete f_{cu} = **35** N/mm^2

Characteristic strength of reinforcement f_y = **500** N/mm^2

Base details

Minimum area of reinforcement k = **0.13** %

Cover to reinforcement in heel c_{heel} = **35** mm

Calculate shear for heel design

Shear from bearing pressure $V_{heel_bear} = p_{stem_heel_f} \times ((3 \times x_{bar_f}) - l_{toe} - t_{wall}) / 2$ = **25.2** kN/m

Shear from weight of base $V_{heel_wt_base} = \gamma_{f_d} \times \gamma_{base} \times l_{heel} \times t_{base}$ = **13.9** kN/m

Shear from weight of moist backfill $V_{heel_wt_m} = w_{m_w_f}$ = **96.8** kN/m

Shear from surcharge $V_{heel_sur} = w_{sur_f}$ = **19.2** kN/m

Total shear for heel design $V_{heel} = - V_{heel_bear} + V_{heel_wt_base} + V_{heel_wt_m} + V_{heel_sur}$ = **104.6** kN/m

Calculate moment for heel design

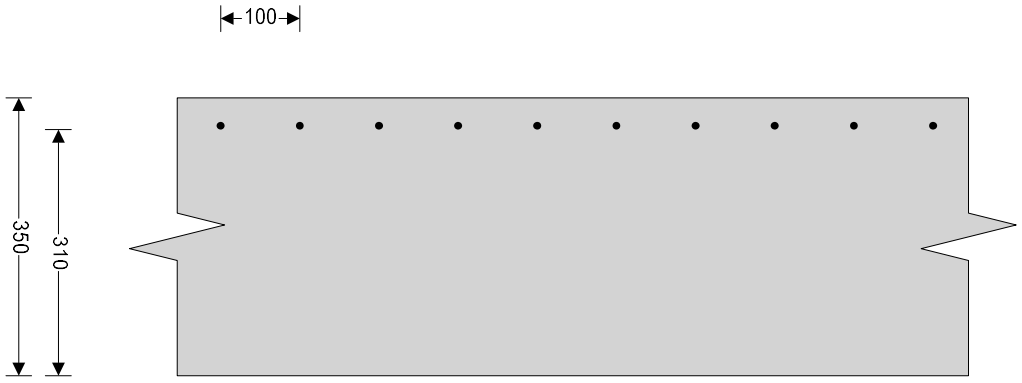
Moment from bearing pressure $M_{heel_bear} = p_{stem_mid_f} \times ((3 \times x_{bar_f}) - l_{toe} - t_{wall} / 2)^2 / 6$ = **12** kNm/m

Moment from weight of base $M_{heel_wt_base} = (\gamma_{f_d} \times \gamma_{base} \times t_{base} \times (l_{heel} + t_{wall} / 2)^2 / 2)$ = **10.9** kNm/m

Moment from weight of moist backfill $M_{heel_wt_m} = w_{m_w_f} \times (l_{heel} + t_{wall}) / 2$ = **75** kNm/m

Moment from surcharge $M_{heel_sur} = w_{sur_f} \times (l_{heel} + t_{wall}) / 2$ = **14.9** kNm/m

Total moment for heel design $M_{heel} = - M_{heel_bear} + M_{heel_wt_base} + M_{heel_wt_m} + M_{heel_sur}$ = **88.8** kNm/m



Check heel in bending

Width of heel b = **1000** mm/m

Depth of reinforcement $d_{heel} = t_{base} - c_{heel} - (\phi_{heel} / 2)$ = **310.0** mm

Constant $K_{heel} = M_{heel} / (b \times d_{heel}^2 \times f_{cu})$ = **0.026**

Compression reinforcement is not required

Lever arm $z_{heel} = \min(0.5 + \sqrt{}(0.25 - (\min(K_{heel}, 0.225) / 0.9)), 0.95) \times d_{heel}$

z_{heel} = **295** mm

Area of tension reinforcement required $A_{s_heel_des} = M_{heel} / (0.87 \times f_y \times z_{heel})$ = **693** mm^2/m

Minimum area of tension reinforcement $A_{s_heel_min} = k \times b \times t_{base}$ = **455** mm^2/m

Area of tension reinforcement required $A_{s_heel_req} = \text{Max}(A_{s_heel_des}, A_{s_heel_min})$ = **693** mm^2/m

Reinforcement provided **B785 mesh**

Area of reinforcement provided — $A_{s_heel_prov}$ = **785** mm²/m

PASS - Reinforcement provided at the retaining wall heel is adequate

Check shear resistance at heel

Design shear stress — $v_{heel} = V_{heel} / (b \times d_{heel})$ = **0.338** N/mm²

Allowable shear stress — $v_{adm} = \min(0.8 \times \sqrt{(f_{cu} / 1\ N/mm^2)}, 5) \times 1\ N/mm^2$ = **4.733** N/mm²

PASS - Design shear stress is less than maximum shear stress

From BS8110:Part 1:1997 – Table 3.8

Design concrete shear stress — v_{c_heel} = **0.477** N/mm²

$v_{heel} < v_{c_heel}$ - No shear reinforcement required

Design of reinforced concrete retaining wall stem (BS 8002:1994)

Material properties

Characteristic strength of concrete — f_{cu} = **35** N/mm²

Characteristic strength of reinforcement — f_y = **500** N/mm²

Wall details

Minimum area of reinforcement — k = **0.13** %

Cover to reinforcement in stem — c_{stem} = **30** mm

Cover to reinforcement in wall — c_{wall} = **30** mm

Factored horizontal at-rest forces on stem

Surcharge — $F_{s_sur_f} = \gamma_{f_l} \times K_0 \times \text{Surcharge} \times (h_{eff} - t_{base} - d_{ds})$ = **28.9** kN/m

Moist backfill above water table — $F_{s_m_a_f} = 0.5 \times \gamma_{f_e} \times K_0 \times \gamma_m \times (h_{eff} - t_{base} - d_{ds} - h_{sat})^2$ = **72.9** kN/m

Applied horizontal load — $F_{s_h_f} = \gamma_{f_d} \times F_{dead} + \gamma_{f_l} \times F_{live}$ = **3.2** kN/m

Calculate shear for stem design

Shear at base of stem — $V_{stem} = F_{s_sur_f} + F_{s_m_a_f} + F_{s_h_f}$ = **105** kN/m

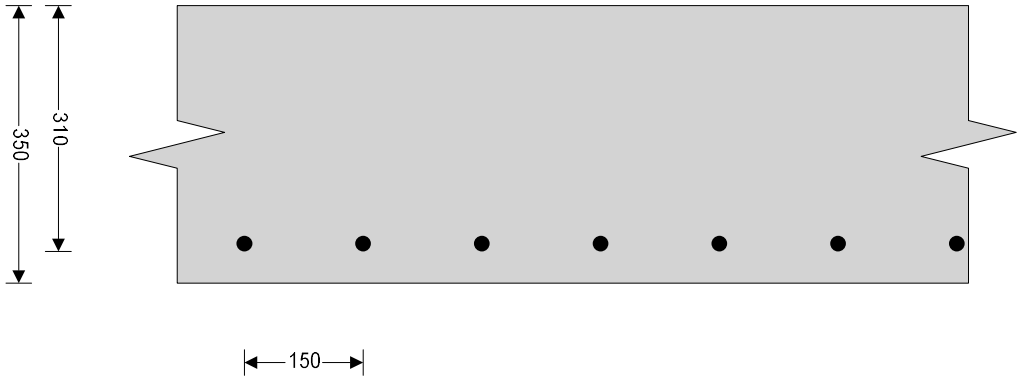
Calculate moment for stem design

Surcharge — $M_{s_sur} = F_{s_sur_f} \times (h_{stem} + t_{base}) / 2$ = **51.3** kNm/m

Moist backfill above water table — $M_{s_m_a} = F_{s_m_a_f} \times (2 \times h_{sat} + h_{eff} - d_{ds} + t_{base} / 2) / 3$ = **90.5** kNm/m

Applied horizontal load — $M_{s_hor} = F_{s_h_f} \times (h_{load} - t_{base} / 2)$ = **12.9** kNm/m

Total moment for stem design — $M_{stem} = M_{s_sur} + M_{s_m_a} + M_{s_hor}$ = **154.7** kNm/m



Check wall stem in bending

Width of wall stem — b = **1000** mm/m

Depth of reinforcement — $d_{stem} = t_{wall} - c_{stem} - (\phi_{stem} / 2)$ = **310.0** mm

Constant — $K_{stem} = M_{stem} / (b \times d_{stem}^2 \times f_{cu})$ = **0.046**

Compression reinforcement is not required

Lever arm — $z_{stem} = \min(0.5 + \sqrt{(0.25 - (\min(K_{stem}, 0.225) / 0.9))}, 0.95) \times d_{stem}$

z_{stem} = **293** mm

Area of tension reinforcement required — $A_{s_stem_des} = M_{stem} / (0.87 \times f_y \times z_{stem})$ = **1213** mm²/m

Minimum area of tension reinforcement — $A_{s_stem_min} = k \times b \times t_{wall}$ = **455** mm²/m

Area of tension reinforcement required — $A_{s_stem_req} = \text{Max}(A_{s_stem_des}, A_{s_stem_min})$ = **1213** mm²/m

Reinforcement provided — **20 mm dia.bars @ 150 mm centres**

Area of reinforcement provided — $A_{s_stem_prov}$ = **2094** mm²/m

PASS - Reinforcement provided at the retaining wall stem is adequate

Check shear resistance at wall stem

Design shear stress — $v_{stem} = V_{stem} / (b \times d_{stem})$ = **0.339** N/mm²

Allowable shear stress — $v_{adm} = \min(0.8 \times \sqrt{(f_{cu} / 1\ \text{N/mm}^2)}, 5) \times 1\ \text{N/mm}^2$ = **4.733** N/mm²

PASS - Design shear stress is less than maximum shear stress

From BS8110:Part 1:1997 – Table 3.8

Design concrete shear stress — v_{c_stem} = **0.661** N/mm²

$v_{stem} < v_{c_stem}$ - No shear reinforcement required

Check retaining wall deflection

Basic span/effective depth ratio — ratio_{bas} = **7**

Design service stress — $f_s = 2 \times f_y \times A_{s_stem_req} / (3 \times A_{s_stem_prov})$ = **193.0** N/mm²

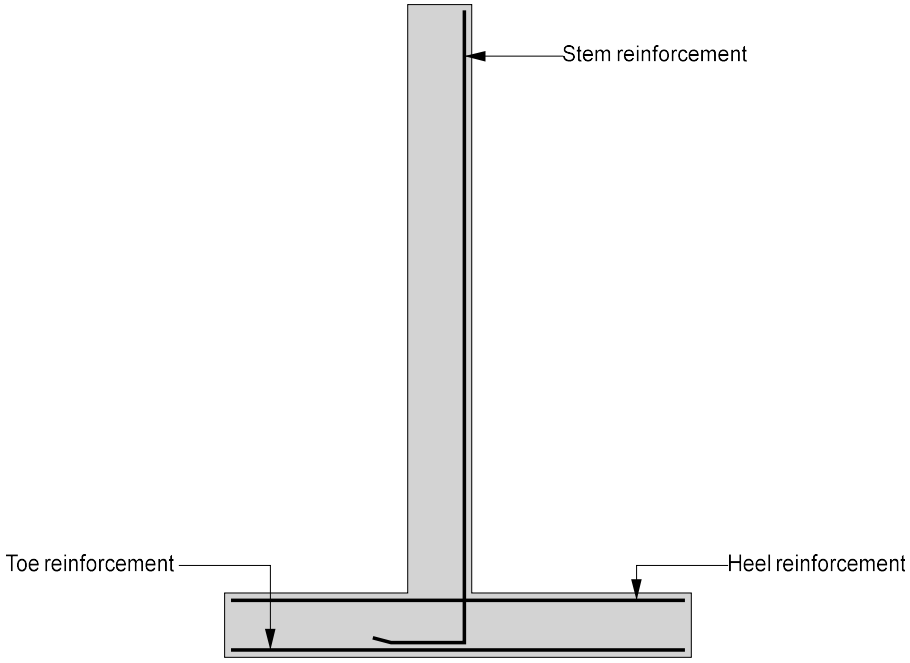
Modification factor — $\text{factor}_{tens} = \min(0.55 + (477\ \text{N/mm}^2 - f_s)/(120 \times (0.9\ \text{N/mm}^2 + (M_{stem}/(b \times d_{stem}^2)))),2)$ = **1.49**

Maximum span/effective depth ratio — $\text{ratio}_{max} = \text{ratio}_{bas} \times \text{factor}_{tens}$ = **10.45**

Actual span/effective depth ratio — $\text{ratio}_{act} = h_{stem} / d_{stem}$ = **10.32**

PASS - Span to depth ratio is acceptable

Indicative retaining wall reinforcement diagram



Toe mesh - B785 - (785 mm^2/m)
Heel mesh - B785 - (785 mm^2/m)
Stem bars - 20 mm dia.@ 150 mm centres - (2094 mm^2/m)