

RED SQUARE RETAIL PARK

for

D48 INSTALLATION

for



Quality Management

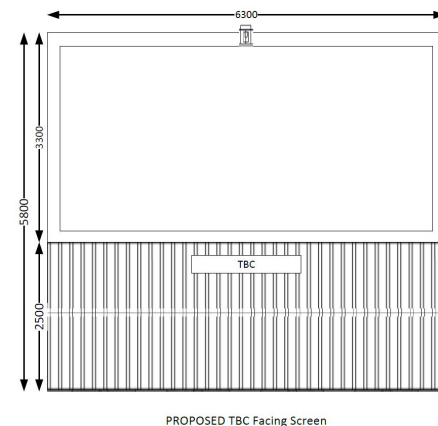
Job No	14979		
Project	Red Square Retail Park		
Location	Worthing		
Title	New LED Signboard		
Document Ref	Desk Study Report	Issue / Revision	01
File reference	S:\01-Contracts\14979 LED 1 Red Square, Worthing\02 - Calculations\Basic.docx		
Date	2/2/26		
Prepared by	Mark B Donohue BEng(hons) CEng MStructE	Signature (for file)	
Checked by	R Andrew James MEng CEng MStructE	Signature (for file)	

Revision History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked
01	2.2.26	Drawings calculations for approval	MD	RAJ

Proposed works:

Construction of a new sign board as shown below.



Design Solution:

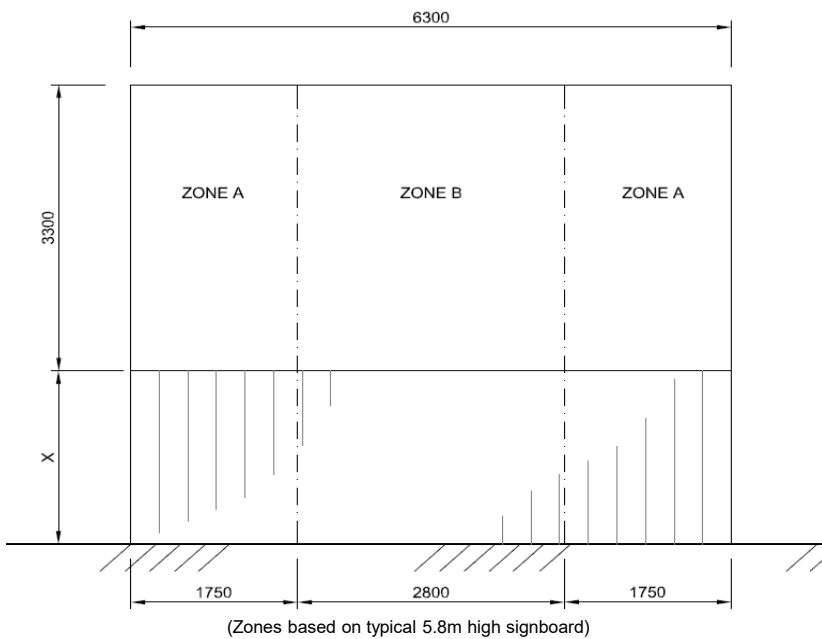
The Client has requested a pad base solution the calculations and drawing for which are appended to this report.

Advisory Note:

Should the contractor encounter poor or difficult ground conditions, ie very soft ground, high ground water, running sands, obvious contamination, below ground services etc the foundation solution may require adjustment. Footings should not be cast if the contractor has any concerns on the quality of the ground.

Photographic record of the formation should be taken prior to casting.

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Section Pad Base				Sheet no./rev 01	
Calc. by md	Date Feb-26	Checked by	Date	Approved by	Date



X = **2.5** m Total Height H **5.8** m

Site Altitude = **19** m

Upwind distance to sea = **2.5** km

Distance inside town = **2.5** km

V_{b, map} (Fig NA.1) **22.0** m/s

For wind calculation see pages 2-3

Zone A = **1.27** kN/m²

Zone B = **0.77** kN/m²

Column Design:

Worst case load on end column w: 1.272 x 1.65 = 2.10 kN/m

BM = w.H² / 2 2.099 x 5.8 x 2.9 = 35.3 kNm SLS 52.95 kNm ULS

Therefore adopt: **203x203x46UB** (see pages 4-5)

Foundation Design:

Due to software constrains assume load is applied via two columns only.

BM @ base of each = 3 x 5.8 x 1.272 + 3.3 x 5.8 x 0.774 x 2.9 ÷ 2
= 53.6 kNm SLS

Shear @ base of each: = 18.5 kN SLS

Threrefore adopt : **1.9 x 6.4 x 0.7m** deep pad base as pages 6-11

Baseplate Design:

Refer to pages 12-13 for baseplate design

Location: Wind loads

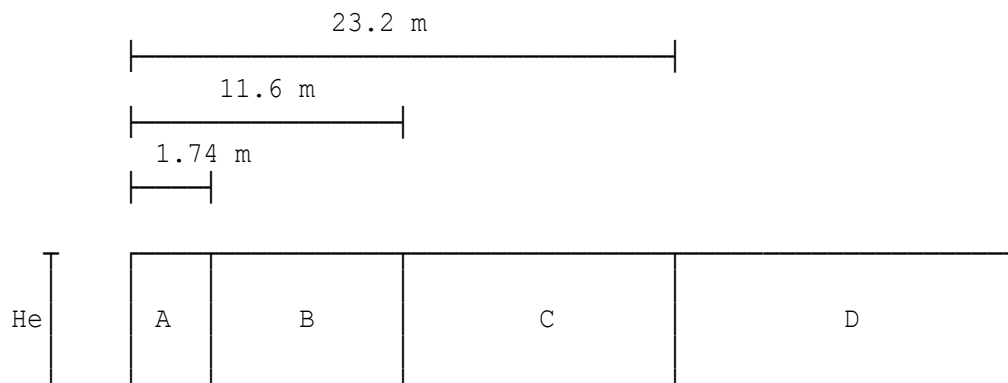
Wind load assessment based on BS EN 1991-1-4:2005+A1:2010

The proforma utilises the simplified procedure for determining the peak velocity pressure for all buildings where orography is not significant and for buildings $\leq 50\text{m}$ tall where orography is significant. Where the building height $> 50\text{m}$ and where orography is significant the procedure in Annex A of the NA to BS EN 1991-1-4:2005+A1:2010 will be adopted.

Chosen site is the Town; area with regular cover of vegetation or buildings or with isolated obstacles with separations of maximum 20 obstacle heights (such as villages, suburban terrain, permanent forest) or area in which at least 15% of the surface is covered with buildings and their average height exceeds 15m.

Free-standing wall details

Eff.height of free-standing wall $H_e=5.8\text{ m}$
 Height of wall $H=5.8\text{ m}$



ELEVATION ON FREE-STANDING WALL

Standard wind loads

Basic wind velocity (Fig. NA.1) $V_{bmap}=22\text{ m/s}$
 Structure is not located at the crest of a hill or escarpment and the orography is not significant.
 Altitude above mean sea level $A_{site}=19\text{ m}$
 Altitude factor $C_a=1+0.001*A_{site}=1+0.001*19=1.019$
 Directional factor $C_{di}=1$
 The structure is permanent or exposed to the wind for a continuous period of more than 6 months.
 Seasonal factor $C_{season}=1.0$
 Distance upwind to shoreline $Dist=2.5\text{ km}$
 Distance inside town terrain $D_{it}=2.5\text{ km}$
 Probability factor $C_p=1$
 Town terrain with the closest distance to the sea being 2.5 km.
 Basic wind velocity $V_b=C_{di}*C_{season}*C_p*C_a*V_{bmap}=1*1*1*1.019*22=22.42\text{ m/s}$

Basic velocity pressure $q_b = 0.613 \cdot V_b^2 / 1000 = 0.613 \cdot 22.42^2 / 1000 = 0.3081 \text{ kN/m}^2$
Exposure factor (Fig. NA.7) $C_{ez} = \text{LookUp} = 2.247$
Correction factor (Fig. NA.8) $C_{et} = \text{LookUp} = 0.799$
Peak velocity pressure $q_p = C_{ez} \cdot C_{et} \cdot q_b = 2.247 \cdot 0.799 \cdot 0.3081 = 0.553 \text{ kN/m}^2$

	Effective height	He	5.8 m
DESIGN	Altitude factor	Ca	1.019
SUMMARY	Direction factor	C_{di}	1
	Seasonal factor	C_{season}	1
	Probability factor	C_p	1
	Peak velocity pressure	q_p	0.553 kN/m²

Size factor C_s

The size factor C_s will be taken as 1.0.

Length of wall $L_{wall} = 6.3 \text{ m}$
Ratio $l_w H_e = L_{wall} / H_e = 6.3 / 5.8 = 1.086$
Solidity value $Zeta = 1$

Net pressure coefficients

Wall return corners are not present or have been ignored.

Net pressure coefficient zone A $C_{pA} = \text{TABLE 7.91 for } l_w H_e = 1.086 = 2.3$
Net pressure coefficient zone B $C_{pB} = \text{TABLE 7.92 for } l_w H_e = 1.086 = 1.4$
Net pressure coefficient zone C $C_{pC} = \text{TABLE 7.93 for } l_w H_e = 1.086 = 1.2$
Net pressure coefficient zone D $C_{pD} = \text{TABLE 7.94 for } l_w H_e = 1.086 = 1.2$

Net pressure on wall

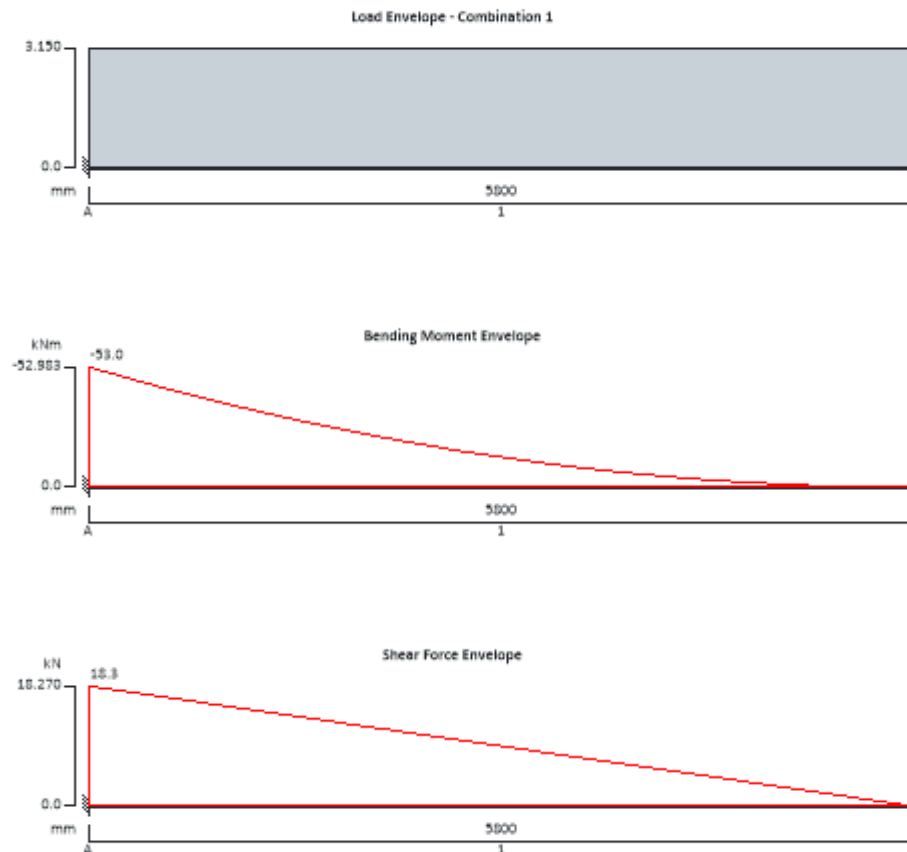
Net pressure on wall zone A $C_{pwin} = q_p \cdot C_{pA} = 0.553 \cdot 2.3 = 1.272 \text{ kN/m}^2$
Net pressure on wall zone B $C_{pwin} = q_p \cdot C_{pB} = 0.553 \cdot 1.4 = 0.7742 \text{ kN/m}^2$
Net pressure on wall zone C $C_{pwin} = q_p \cdot C_{pC} = 0.553 \cdot 1.2 = 0.6636 \text{ kN/m}^2$
Net pressure on wall zone D $C_{pwin} = q_p \cdot C_{pD} = 0.553 \cdot 1.2 = 0.6636 \text{ kN/m}^2$

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STEEL BEAM ANALYSIS & DESIGN (EN1993-1-1:2005)

In accordance with EN1993-1-1:2005 incorporating Corrigenda February 2006 and April 2009 and the UK national annex

TEDDS calculation version 3.0.14



Support conditions

Support A	Vertically restrained
	Rotationally restrained
Support B	Vertically free
	Rotationally free

Applied loading

Beam loads	wind - Variable full UDL 2.1 kN/m
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Load combinations

Load combination 1	Support A	Permanent $\times 1.35$
		Variable $\times 1.50$
	Support B	Permanent $\times 1.35$
		Variable $\times 1.50$

Analysis results

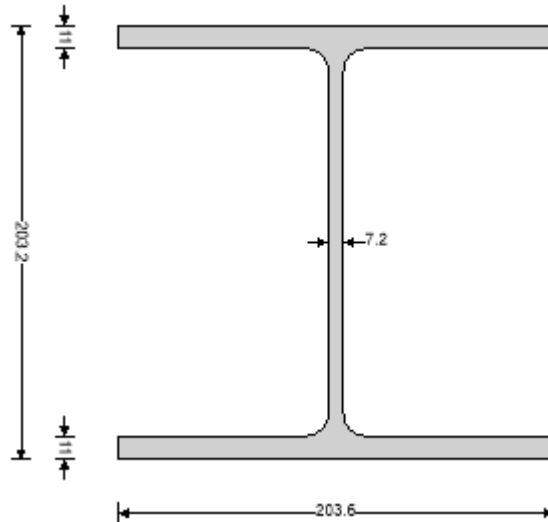
Maximum moment	$M_{max} = 0 \text{ kNm}$	$M_{min} = -53 \text{ kNm}$
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Maximum shear	$V_{\max} = 18.3 \text{ kN}$	$V_{\min} = 0 \text{ kN}$
Deflection	$\delta_{\max} = 31 \text{ mm}$	$\delta_{\min} = 0 \text{ mm}$
Maximum reaction at support A	$R_{A_{\max}} = 18.3 \text{ kN}$	$R_{A_{\min}} = 18.3 \text{ kN}$
Unfactored variable load reaction at support A	$R_{A_{\text{Variable}}} = 12.2 \text{ kN}$	
Maximum reaction at support B	$R_{B_{\max}} = 0 \text{ kN}$	$R_{B_{\min}} = 0 \text{ kN}$

Section details

Section type **UC 203x203x46 (BS4-1)** Steel grade **S355**



Section classification **Class 2**

Check shear - Section 6.2.6

Design shear force	$V_{Ed} = 18 \text{ kN}$	Design shear resistance	$V_{c,Rd} = 347.9 \text{ kN}$
<i>PASS - Design shear resistance exceeds design shear force</i>			

Check bending moment - Section 6.2.5

Design bending moment	$M_{Ed} = 53 \text{ kNm}$	Des.bending resist.moment	$M_{c,Rd} = 176.6 \text{ kNm}$
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Slenderness ratio for lateral torsional buckling

LTB slenderness ratio	$\bar{\lambda}_{LT} = 0.715$	Limiting slenderness ratio	$\bar{\lambda}_{LT,0} = 0.400$
$\bar{\lambda}_{LT} > \bar{\lambda}_{LT,0}$ - Lateral torsional buckling cannot be ignored			

Design resistance for buckling - Section 6.3.2.1

Des.buckling resist.moment	$M_{b,Rd} = 176.6 \text{ kNm}$	<i>PASS - Design buckling resistance moment exceeds design bending moment</i>	
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Check vertical deflection - Section 7.2.1

Consider deflection due to variable loads

Limiting deflection	$\delta_{lim} = 32.2 \text{ mm}$	Maximum deflection	$\delta = 30.968 \text{ mm}$
<i>PASS - Maximum deflection does not exceed deflection limit</i>			

FOUNDATION ANALYSIS

In accordance with EN1997-1:2004 + A1:2013 incorporating corrigendum February 2009 and the UK National Annex incorporating corrigendum No.1

Tedds calculation version 3.3.05

Summary table

Description	Unit	Allowable	Actual	Utilisation	Result
Sliding	kN	249.3	49.4	0.198	Pass
Base pressure	kN/m ²	75	63.4	0.845	Pass
Description	Unit	Provided	Required	Utilisation	Result
Reinforcement x-dir, top	mm ²	3142	1749	0.557	Pass
Reinforcement x-direction	mm ²	3142	1749	0.557	Pass
Reinforcement y-dir, top	mm ²	10367	6076	0.586	Pass
Reinforcement y-direction	mm ²	10367	6076	0.586	Pass
Description	Unit	Allowable	Actual	Utilisation	Result
Shear x-axis	kN	440	5	0.012	Pass
Shear y-axis	kN	1477	38	0.026	Pass
Punching shear	N/mm ²	0.359	0.003	0.009	Pass

Pad foundation details

Length of foundation

$L_x = 6400$ mm

Width of foundation

$L_y = 1900$ mm

Depth of foundation

$h = 700$ mm

Depth of soil over foundation

$h_{soil} = 200$ mm

Level of water

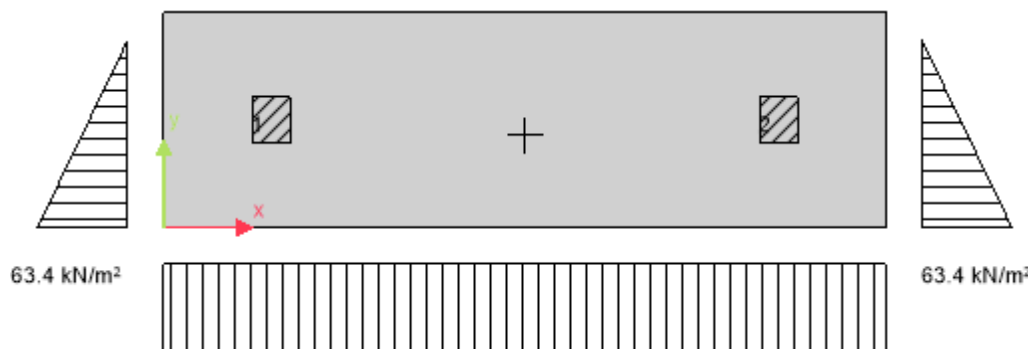
$h_{water} = 0$ mm

Density of water

$\gamma_{water} = 9.8$ kN/m³

Density of concrete

$\gamma_{conc} = 25.0$ kN/m³



Column no.1 details

Length of column

$l_{x1} = 340$ mm

Width of column

$l_{y1} = 400$ mm

position in x-direction

$x_1 = 950$ mm

position in y-direction

$y_1 = 950$ mm

Column no.2 details

Length of column

$l_{x2} = 340$ mm

Width of column

$l_{y2} = 400$ mm

position in x-direction

$x_2 = 5450$ mm

position in y-direction

$y_2 = 950$ mm

Soil properties

Density of soil

$\gamma_{soil} = 18.0$ kN/m³

Net ultimate bearing pressure

$n_f = 75$ kN/m²

Friction angle

$\delta_k = 20$ deg

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Foundation loads

Variable surcharge load	$F_{Qsur} = 5.0 \text{ kN/m}^2$	Self weight	$F_{swt} = 17.5 \text{ kN/m}^2$
Soil weight	$F_{soil} = 3.6 \text{ kN/m}^2$		

Column no.1 loads

Permanent axial load	$F_{Gz1} = 9.0 \text{ kN}$	Variable load in y-dir	$F_{Qy1} = -19.0 \text{ kN}$
Variable moment in y-dir	$M_{Qy1} = -53.6 \text{ kNm}$		

Column no.2 loads

Permanent axial load	$F_{Gz2} = 9.0 \text{ kN}$	Variable load in y-dir	$F_{Qy2} = -19.0 \text{ kN}$
Variable moment in y-dir	$M_{Qy2} = -53.6 \text{ kNm}$		

Bearing resistance (Section 6.5.2)
Forces on foundation

Force in y-direction	$F_{dy} = -38.0 \text{ kN}$	Force in z-direction	$F_{dz} = 335.4 \text{ kN}$
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Moments on foundation

Moment in x-direction	$M_{dx} = 1073.2 \text{ kNm}$	Moment in y-direction	$M_{dy} = 184.8 \text{ kNm}$
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Eccentricity of base reaction

Eccentricity in x-axis	$e_x = 0 \text{ mm}$	Eccentricity in y-axis	$e_y = -399 \text{ mm}$
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Eccentricity of base reaction

Eccentricity in x-axis	$e_x = 0 \text{ mm}$	Eccentricity in y-axis	$e_y = -399 \text{ mm}$
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Pad base pressure

$q_1 = 63.4 \text{ kN/m}^2$	$q_2 = 0.0 \text{ kN/m}^2$	$q_3 = 63.4 \text{ kN/m}^2$	$q_4 = 0.0 \text{ kN/m}^2$
Minimum base pressure	$q_{min} = 0.0 \text{ kN/m}^2$	Maximum base pressure	$q_{max} = 63.4 \text{ kN/m}^2$

Presumed bearing capacity

Presumed bearing capacity	$P_{bearing} = 75.0 \text{ kN/m}^2$
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PASS - Presumed bearing capacity exceeds design base pressure

Design approach 1
Partial factors on actions - Combination1

Partial factor set	A1		
Permanent action	$\gamma_G = 1.35$	Variable action	$\gamma_Q = 1.50$

Partial factors for spread foundations - Combination1

Resistance factor set	R1		
Bearing	$\gamma_{R.v} = 1.00$	Sliding	$\gamma_{R.h} = 1.00$

Forces on foundation

Force in y-direction	$F_{dy} = -57.0 \text{ kN}$	Force in z-direction	$F_{dz} = 461.9 \text{ kN}$
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Moments on foundation

Moment in x-direction	$M_{dx} = 1478.0 \text{ kNm}$	Moment in y-direction	$M_{dy} = 238.1 \text{ kNm}$
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Eccentricity of base reaction

Eccentricity in x-direction	$e_x = 0 \text{ mm}$	Eccentricity in y-direction	$e_y = -435 \text{ mm}$
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Effective area of base

Effective length	$L'_x = 6400 \text{ mm}$	Effective width	$L'_y = 1031 \text{ mm}$
Effective area	$A' = 6.598 \text{ m}^2$		

Pad base pressure

Design base pressure	$f_{dz} = 70.0 \text{ kN/m}^2$
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Sliding resistance (Section 6.5.3)

Forces on foundation

Force in y-direction $F_{dy} = -57.0$ kN

Force in z-direction $F_{dz} = 274.6$ kN

Sliding resistance verification (Section 6.5.3)

Horizontal force on foundation $H = 57.0$ kN

Sliding resistance $R_{H,d} = 354.4$ kN

$H / R_{H,d} = 0.161$

PASS - Foundation is not subject to failure by sliding

Library item: Check sliding summary

Design approach 1

Partial factors on actions - Combination2

Partial factor set A2

Permanent action $\gamma_G = 1.00$

Variable action $\gamma_Q = 1.30$

Partial factors for spread foundations - Combination2

Resistance factor set R1

Bearing $\gamma_{R,v} = 1.00$

Sliding $\gamma_{R,h} = 1.00$

Forces on foundation

Force in y-direction $F_{dy} = -49.4$ kN

Force in z-direction $F_{dz} = 353.6$ kN

Moments on foundation

Moment in x-direction $M_{dx} = 1131.6$ kNm

Moment in y-direction $M_{dy} = 162.0$ kNm

Eccentricity of base reaction

Eccentricity in x-direction $e_x = 0$ mm

Eccentricity in y-direction $e_y = -492$ mm

Effective area of base

Effective length $L'_x = 6400$ mm

Effective width $L'_y = 916$ mm

Effective area $A' = 5.864$ m²

Pad base pressure

Design base pressure $f_{dz} = 60.3$ kN/m²

Sliding resistance (Section 6.5.3)

Forces on foundation

Force in y-direction $F_{dy} = -49.4$ kN

Force in z-direction $F_{dz} = 274.6$ kN

Sliding resistance verification (Section 6.5.3)

Horizontal force on foundation $H = 49.4$ kN

Sliding resistance $R_{H,d} = 249.3$ kN

$H / R_{H,d} = 0.198$

PASS - Foundation is not subject to failure by sliding

Library item: Check sliding summary

FOUNDATION DESIGN

In accordance with EN1992-1-1:2004 + A1:2014 incorporating corrigenda January 2008, November 2010 and January 2014 and the UK National Annex incorporating National Amendment No.1 and No.2

Tedds calculation version 3.3.05

Concrete details (Table 3.1 - Strength and deformation characteristics for concrete)

Concrete strength class C28/35

Char.comp.cylinder strength $f_{ck} = 28$ N/mm²

Partial factor for concrete $\gamma_c = 1.50$

Maximum aggregate size $h_{agg} = 20$ mm

Design compressive strength $f_{cd} = 15.9$ N/mm²

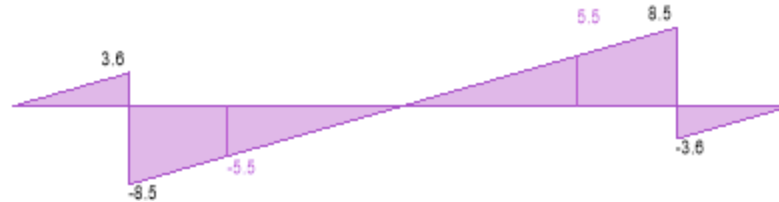
Design tensile strength, plain $f_{ctd,pl} = 1.0$ N/mm²

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Reinforcement details

Characteristic yield strength $f_{yk} = 500 \text{ N/mm}^2$ Partial factor for reinforcement $\gamma_s = 1.15$
Design yield strength $f_{yd} = 435 \text{ N/mm}^2$ Nominal cover to top $C_{nom_t} = 30 \text{ mm}$
Nominal cover to bottom $C_{nom_b} = 30 \text{ mm}$ Nominal cover to side $C_{nom_s} = 30 \text{ mm}$
Nominal cover to top reinforcement $C_{nom_t} = 30 \text{ mm}$

Shear diagram, x axis (kN)



Moment diagram, x axis (kNm)



Rectangular section in flexure (Section 6.1)

Design bending moment $M_{Ed,x,max} = 1.2 \text{ kNm}$ $K = 0.000$ $K' = 0.176$
 $K' > K$ - No compression reinforcement is required
Tens.reinforcement required $A_{sx,bot,req} = 1749 \text{ mm}^2$
Tens.reinforcement provided $20 \phi \text{ bars @ } 200 \text{ c/c bottom}$ $A_{sx,bot,prov} = 3142 \text{ mm}^2$
Min.area of reinforcement $A_{s,min} = 1749 \text{ mm}^2$ Max.area of reinforcement $A_{s,max} = 48640 \text{ mm}^2$
PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control (Section 7.3)

Limiting crack width $w_{max} = 0.3 \text{ mm}$ Maximum crack width $w_k = 0.001 \text{ mm}$
PASS - Maximum crack width is less than limiting crack width

Rectangular section in flexure (Section 6.1)

Design bending moment $abs(M_{Ed,x,min}) = 7.9 \text{ kNm}$ $K = 0.000$ $K' = 0.176$
 $K' > K$ - No compression reinforcement is required
Tens.reinforcement required $A_{sx,top,req} = 1749 \text{ mm}^2$
Tens.reinforcement provided $20 \phi \text{ bars @ } 200 \text{ c/c top}$ $A_{sx,top,prov} = 3142 \text{ mm}^2$
Min.area of reinforcement $A_{s,min} = 1749 \text{ mm}^2$ Max.area of reinforcement $A_{s,max} = 48640 \text{ mm}^2$
PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control (Section 7.3)

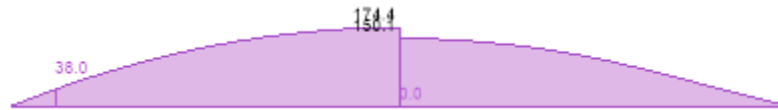
Limiting crack width $w_{max} = 0.3 \text{ mm}$ Maximum crack width $w_k = 0.004 \text{ mm}$
PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear (Section 6.2)

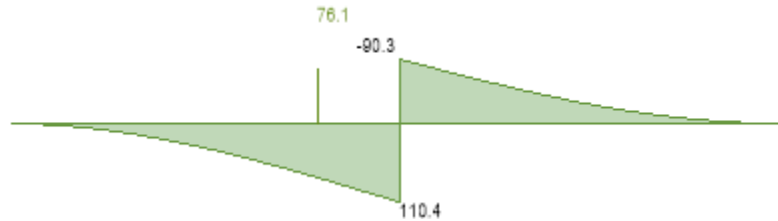
Design shear force $V_{Ed,x,max} = 5.5 \text{ kN}$ Design shear resistance $V_{Rd,c} = 440 \text{ kN}$
PASS - Design shear resistance exceeds design shear force

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Shear diagram, y axis (kN)



Moment diagram, y axis (kNm)



Rectangular section in flexure (Section 6.1)

Design bending moment	$M_{Ed,y,max} = 76.1$ kNm	$K = 0.001$	$K' = 0.176$
$K' > K$ - No compression reinforcement is required			
Tens.reinforcement required	$A_{s,bot,req} = 6076$ mm ²		
Tens.reinforcement provided	20 ϕ bars @ 200 c/c bottom	$A_{s,bot,prov} = 10367$ mm ²	
Min.area of reinforcement	$A_{s,min} = 6076$ mm ²	Max.area of reinforcement	$A_{s,max} = 168960$ mm ²
PASS - Area of reinforcement provided is greater than area of reinforcement required			

Crack control (Section 7.3)

Limiting crack width	$w_{max} = 0.3$ mm	Maximum crack width	$w_k = 0.002$ mm
PASS - Maximum crack width is less than limiting crack width			

Rectangular section in flexure (Section 6.1)

Design bending moment	$abs(M_{Ed,y,min}) = 60.8$ kNm	$K = 0.001$	$K' = 0.176$
$K' > K$ - No compression reinforcement is required			
Tens.reinforcement required	$A_{s,top,req} = 6076$ mm ²		
Tens.reinforcement provided	20 ϕ bars @ 200 c/c top	$A_{s,top,prov} = 10367$ mm ²	
Min.area of reinforcement	$A_{s,min} = 6076$ mm ²	Max.area of reinforcement	$A_{s,max} = 168960$ mm ²
PASS - Area of reinforcement provided is greater than area of reinforcement required			

Crack control (Section 7.3)

Limiting crack width	$w_{max} = 0.3$ mm	Maximum crack width	$w_k = 0.002$ mm
PASS - Maximum crack width is less than limiting crack width			

Rectangular section in shear (Section 6.2)

Design shear force	$V_{Ed,y,max} = 38$ kN	Design shear resistance	$V_{Rd,c} = 1476.7$ kN
PASS - Design shear resistance exceeds design shear force			

Punching shear (Section 6.4)

Maximum shear resistance	$V_{Rd,max} = 4.227$ N/mm ²	Punching shear resistance	$V_{Rd,c} = 0.361$ N/mm ²
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Column No.1 - Punching shear perimeter at column face

Punching shear perimeter	$u_0 = 1480$ mm	Area within shear perimeter	$A_0 = 0.136$ m ²
Max.punching shear force	$V_{Ed,max} = 10.4$ kN		
Punching shear stress factor	$\beta = 1.500$	Max.punching shear stress	$V_{Ed,max} = 0.016$ N/mm ²
PASS - Maximum punching shear resistance exceeds maximum punching shear stress			

Column No.1 - Punching shear perimeter at 1d from column face

Punching shear perimeter	$u_1 = 5564$ mm	Area within shear perimeter	$A_1 = 2.425$ m ²
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Design punching shear force $V_{Ed,1} = 5.2$ kN

Punching shear stress factor $\beta = 1.500$

Design punching shear stress $v_{Ed,1} = 0.002$ N/mm²

PASS - Design punching shear resistance exceeds increased design punching shear stress

Column No.1 - Punching shear perimeter at 2d from column face

Punching shear perimeter $u_2 = 1999$ mm

Area within shear perimeter $A_2 = 4.484$ m²

Design punching shear force $V_{Ed,2} = 2.8$ kN

Punching shear stress factor $\beta = 1.500$

Design punching shear stress $v_{Ed,2} = 0.003$ N/mm²

PASS - Design punching shear resistance exceeds design punching shear stress

Column No.2 - Punching shear perimeter at column face

Punching shear perimeter $u_0 = 1480$ mm

Area within shear perimeter $A_0 = 0.136$ m²

Max.punching shear force $V_{Ed,max} = 10.4$ kN

Punching shear stress factor $\beta = 1.500$

Max.punching shear stress $v_{Ed,max} = 0.016$ N/mm²

PASS - Maximum punching shear resistance exceeds maximum punching shear stress

Column No.2 - Punching shear perimeter at 1d from column face

Punching shear perimeter $u_1 = 5564$ mm

Area within shear perimeter $A_1 = 2.425$ m²

Design punching shear force $V_{Ed,1} = 5.2$ kN

Punching shear stress factor $\beta = 1.500$

Design punching shear stress $v_{Ed,1} = 0.002$ N/mm²

PASS - Design punching shear resistance exceeds increased design punching shear stress

Column No.2 - Punching shear perimeter at 2d from column face

Punching shear perimeter $u_2 = 1999$ mm

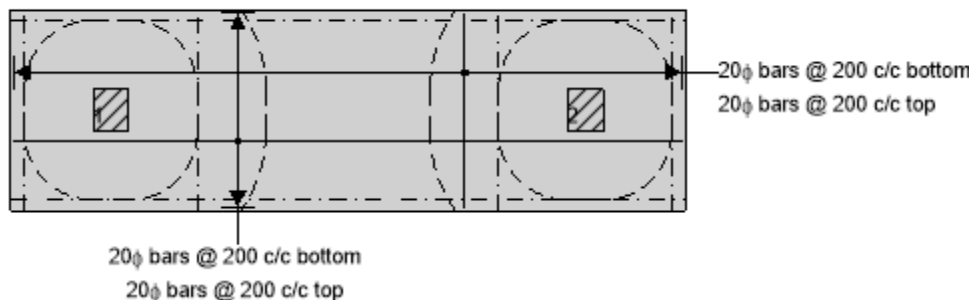
Area within shear perimeter $A_2 = 4.484$ m²

Design punching shear force $V_{Ed,2} = 2.8$ kN

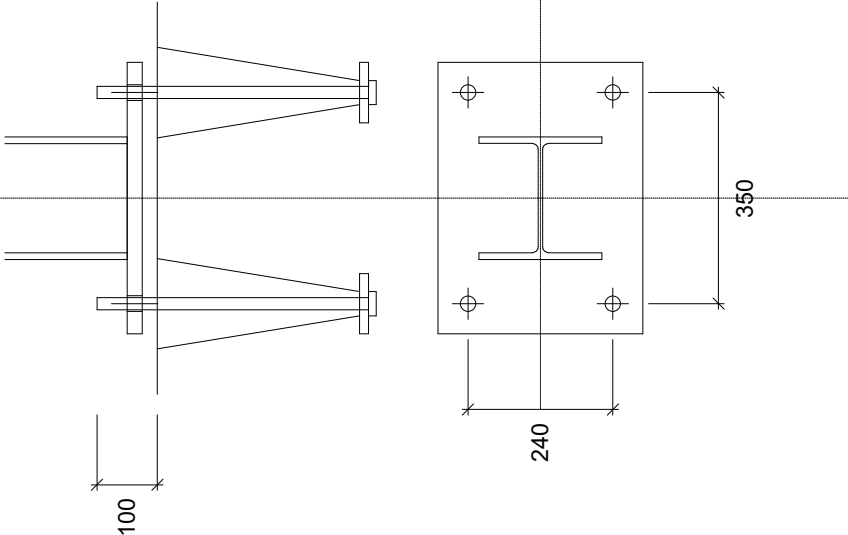
Punching shear stress factor $\beta = 1.500$

Design punching shear stress $v_{Ed,2} = 0.003$ N/mm²

PASS - Design punching shear resistance exceeds design punching shear stress



203x203x46UC S355
6 fillet weld to flange
6 fillet weld to web
Prepared for bearing



$f_{ck}/f_{ck,cube} = 28/35$
 $\alpha = 1.500$
 $C_f, d = 0.30$
25 mm. grout
Use DD CEN/TS 1992-4-2

Combination: Dead+Super	
V _{y,Ed}	21.00 kN.
V _{z,Ed}	0.00 kN.
N _{c,Ed}	3.00 kN.
M _{Ed}	53.00 kN.m.

340 x 25 FL x 450 LG S275
2 bolt rows
M20 Gr8.8 Sq-Hd H.D. Bolts x 450 LG

Printed	: 05/02/2026	Sheet	: 12
Project	: Small	File	: 203 base plae
Title		: Red Square Retail Base Plate base plate	
Designed		: MD	Checked : :

Printed	: 05/02/2026	Sheet	: 13
Project	: Small	File	: 203 base plae
Title	: Red Square Retail Base Plate base plate		
Designed	: MD	Checked	:

WARNING Concrete edge distance for holding down bolt assumed > 525 mm.
See: DD CEN/TS 1992-4-2:2009 6.2.5.3

Summary of results	Unity	Verdict	Comment
Resistance in pure compression	0.00	Passed	
Resistance moment	0.95	Passed	
Flange weld	0.72	Passed	
Web weld	0.07	Passed	
Shear resistance			
Bolts in shear	0.05	Passed	See EN 1993-1-8 6.2.2(5)
Base plate in bearing	0.02	Passed	
Combined shear and tension	0.74	Passed	
Anchor bolt	0.13	Passed	
Overall		Passed	