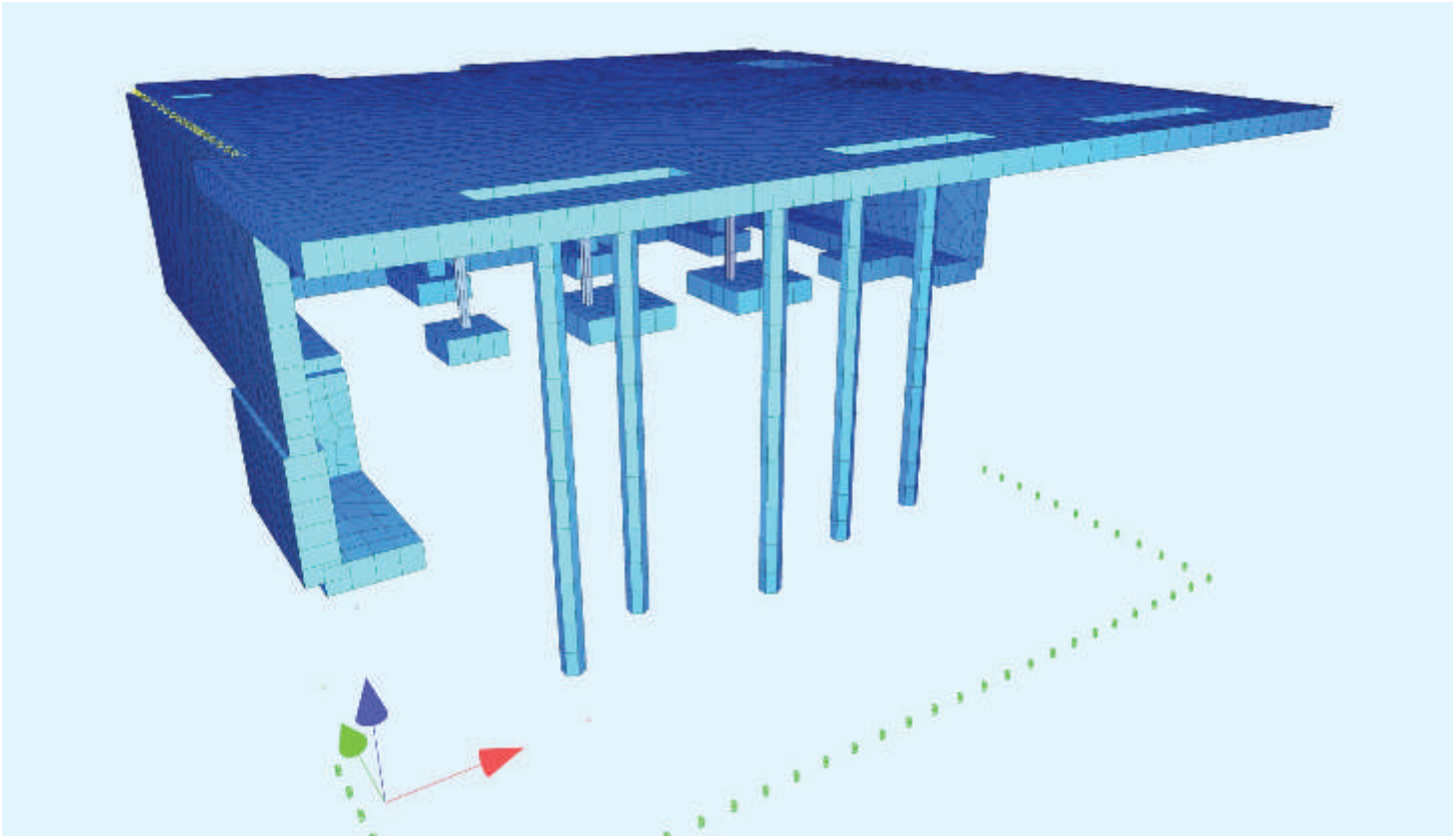
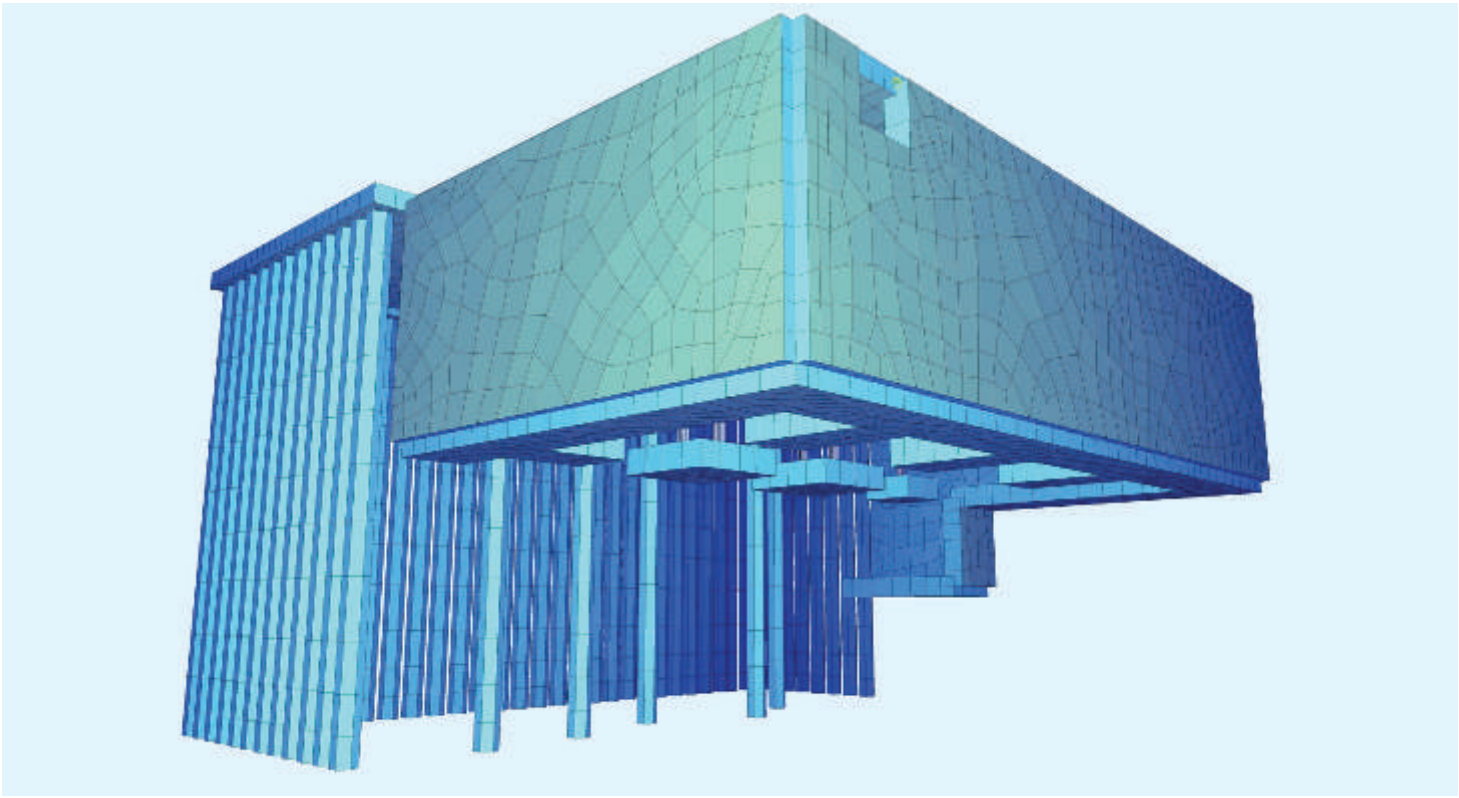
APPENDIX D – ***Temporary Stage FE Model results and Calculations***

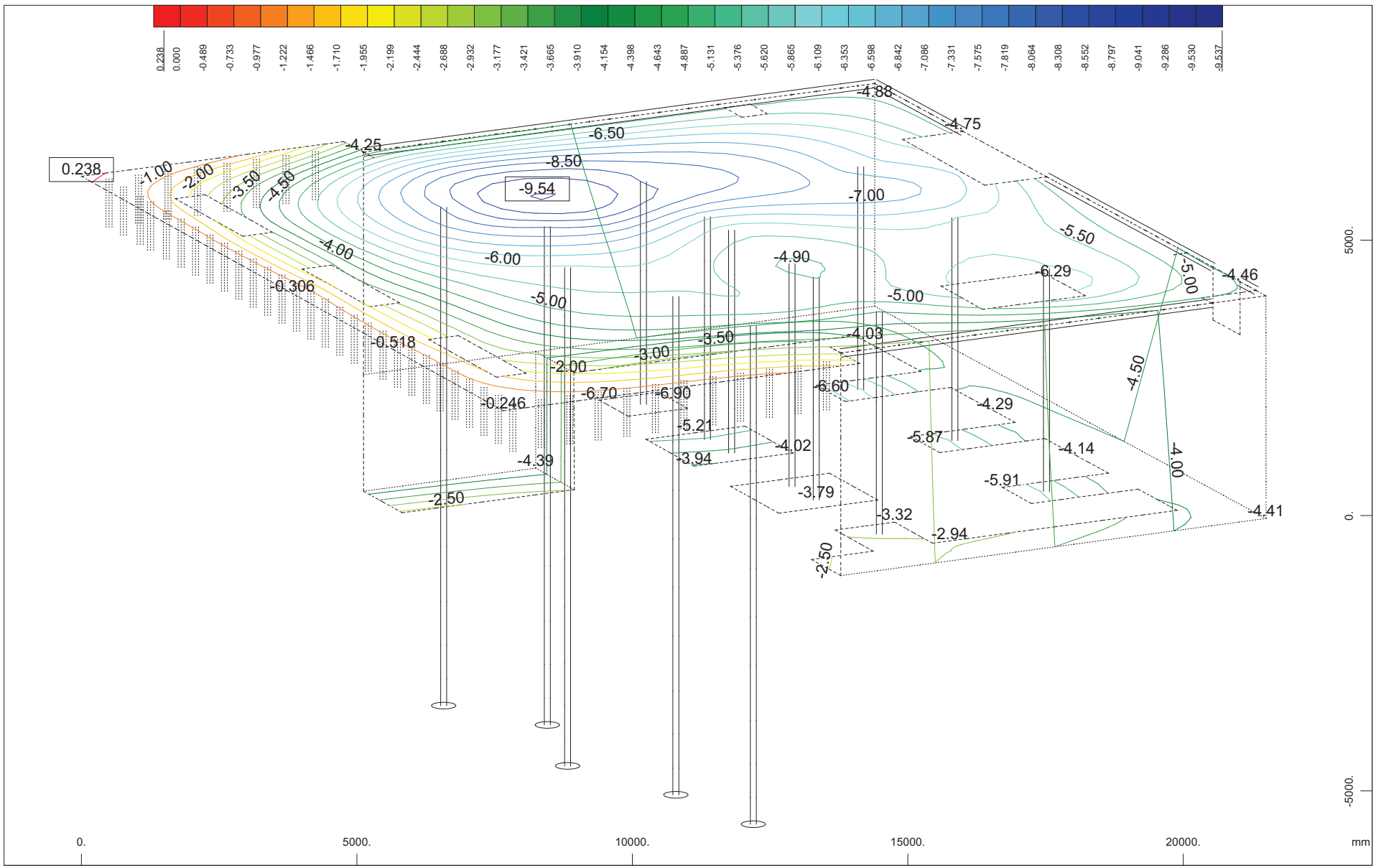
ABBEY PYNFORD

DESIGN CALCULATION SHEET

Project	Designed	Date	Project No:
69 REDINGTON ROAD, LONDON, NW3 7RP	**JO**	**Dec 2014**	**GA19787**
	Checked **MJ**	Date **Dec 2014**	Sheet No. **APP/D -02**







Z
Y
X

Sector of system Group 100 110 120 130 150

Nodal displacement in global Z in Node

↕ , Loadcase 1176 MINR-UZ NODE Nodal Displacements , from -9.54 to 0.238 step 0.500 mm

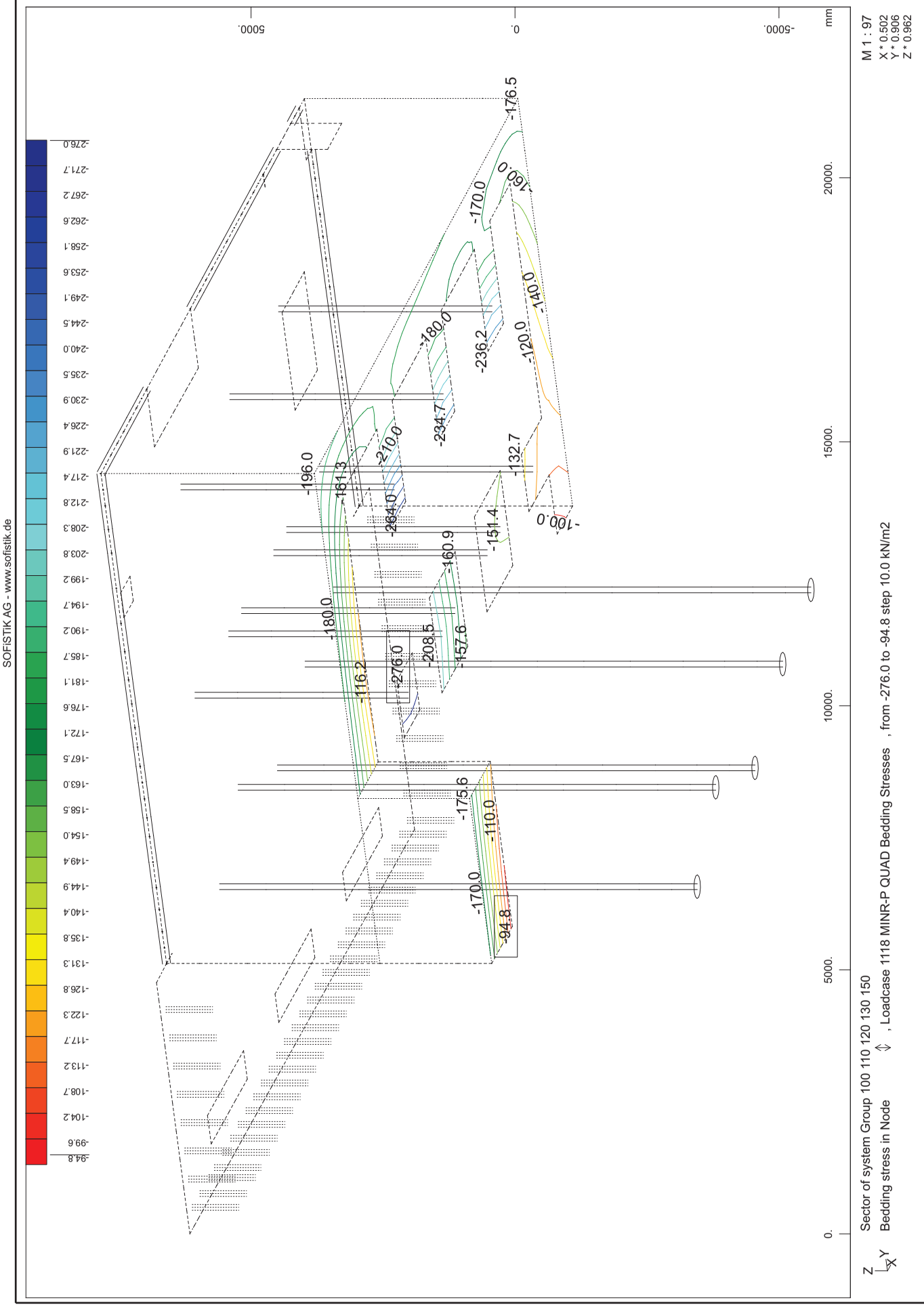
M 1 : 97
X * 0.502
Y * 0.906
Z * 0.962

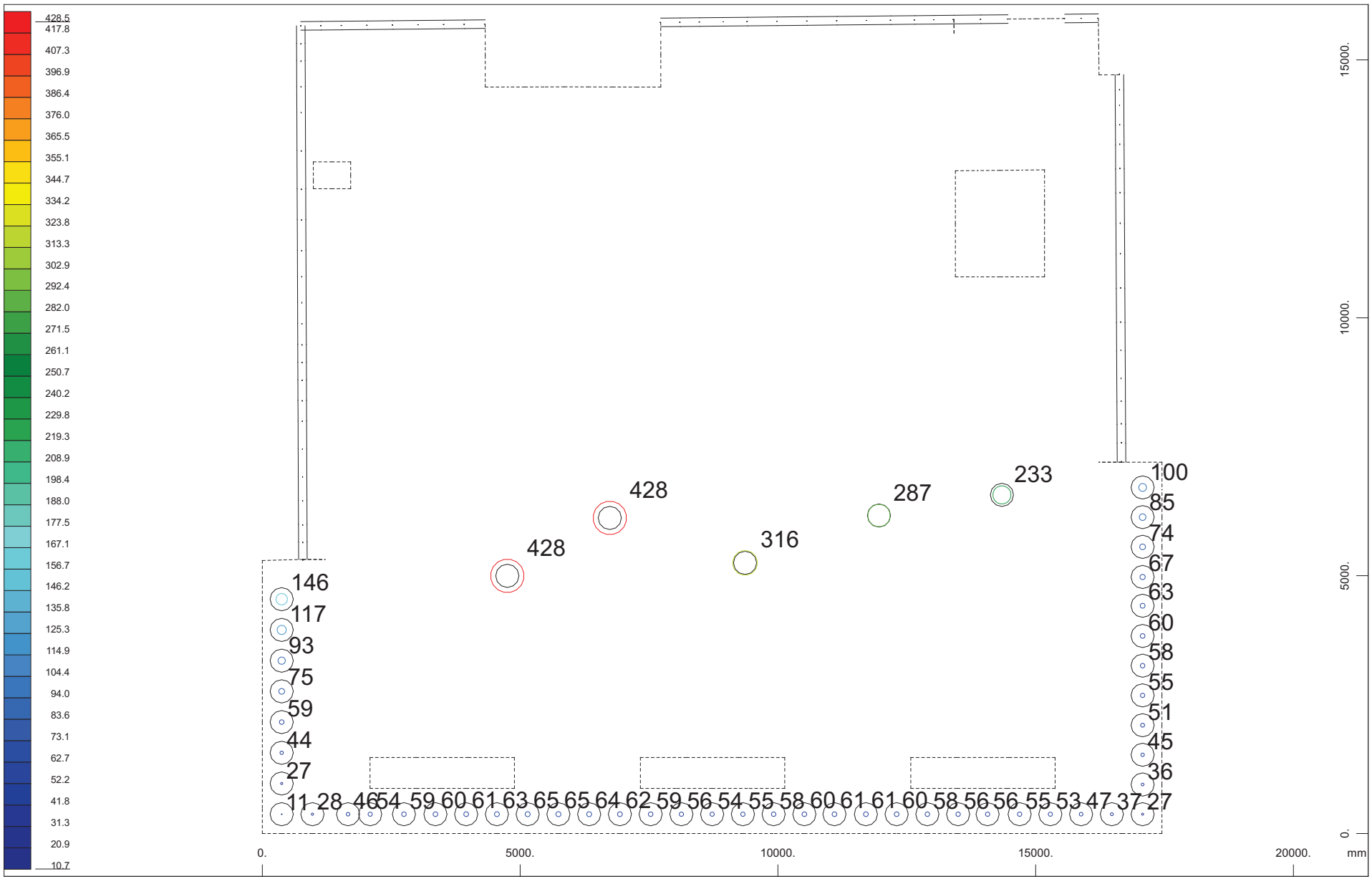
Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)

FE GA19787 TEMP
Interactive Graphic

APP/D - 3

FE GA19787 TEMP
Interactive Graphic





Y
Z—X

Sector of system Group 100 140 150

Nodes , Support force in global Z, Loadcase 1155 MAXR-PZ NODE Supporting Forces i , 1 cm 3D = 500.0 kN

4502.)

(Max=428.5) (total:

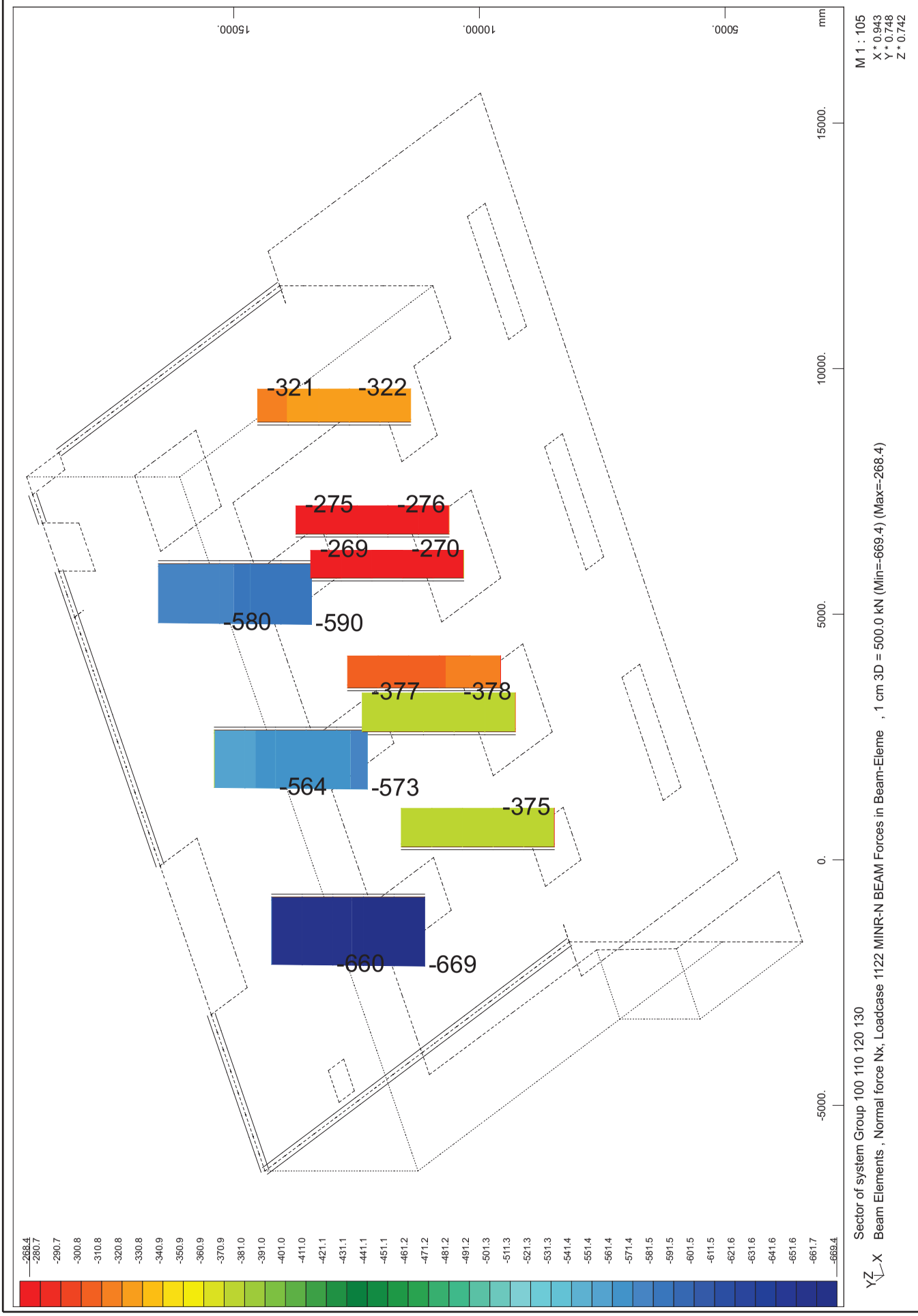
M 1 : 105

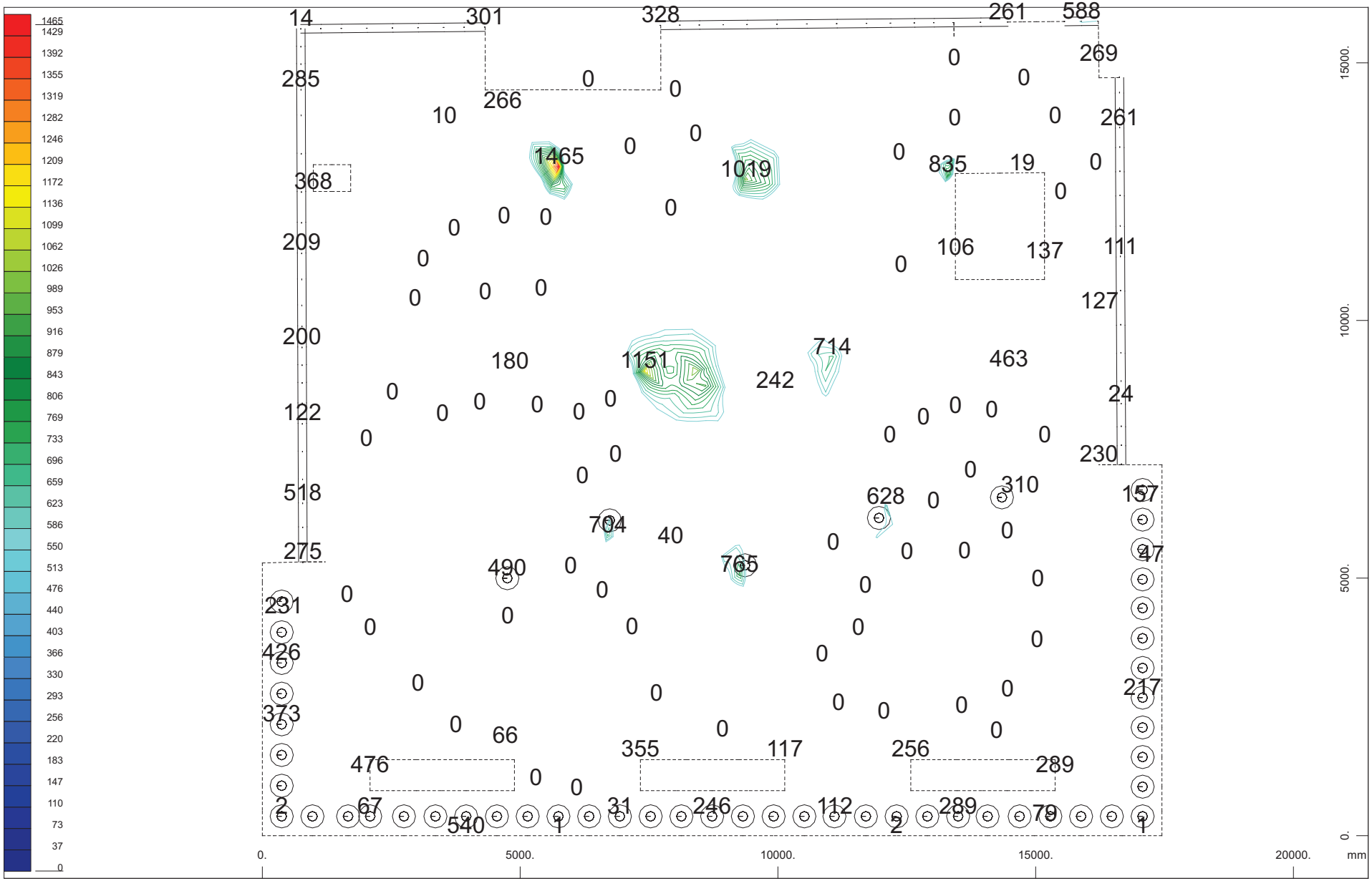
FE GA19787 TEMP
Interactive Graphic

Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)

APP/D - 5

FE GA19787 TEMP
Interactive Graphic





Y
Z—X

Sector of system Group 0 100

Quadrilateral Elements , upper Principal reinforcements (1st layer) in Node

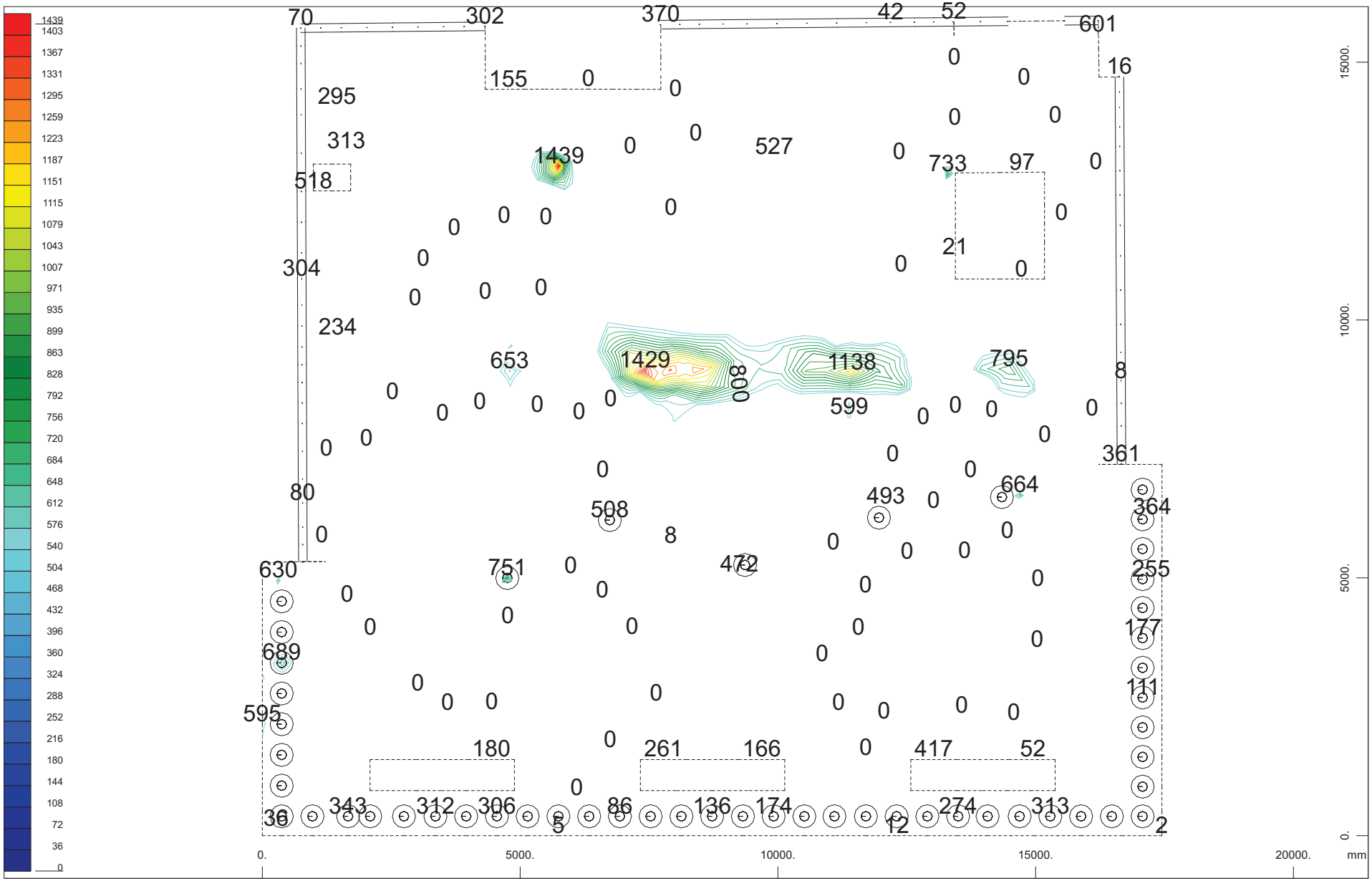
⇌, Design Case 1 , from 565.0 to 1465. step 50.0 mm2/m

M 1 : 105

FE GA19787 TEMP
Interactive Graphic

Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)

APP/D - 7



Y
Z X

Sector of system Group 0 100

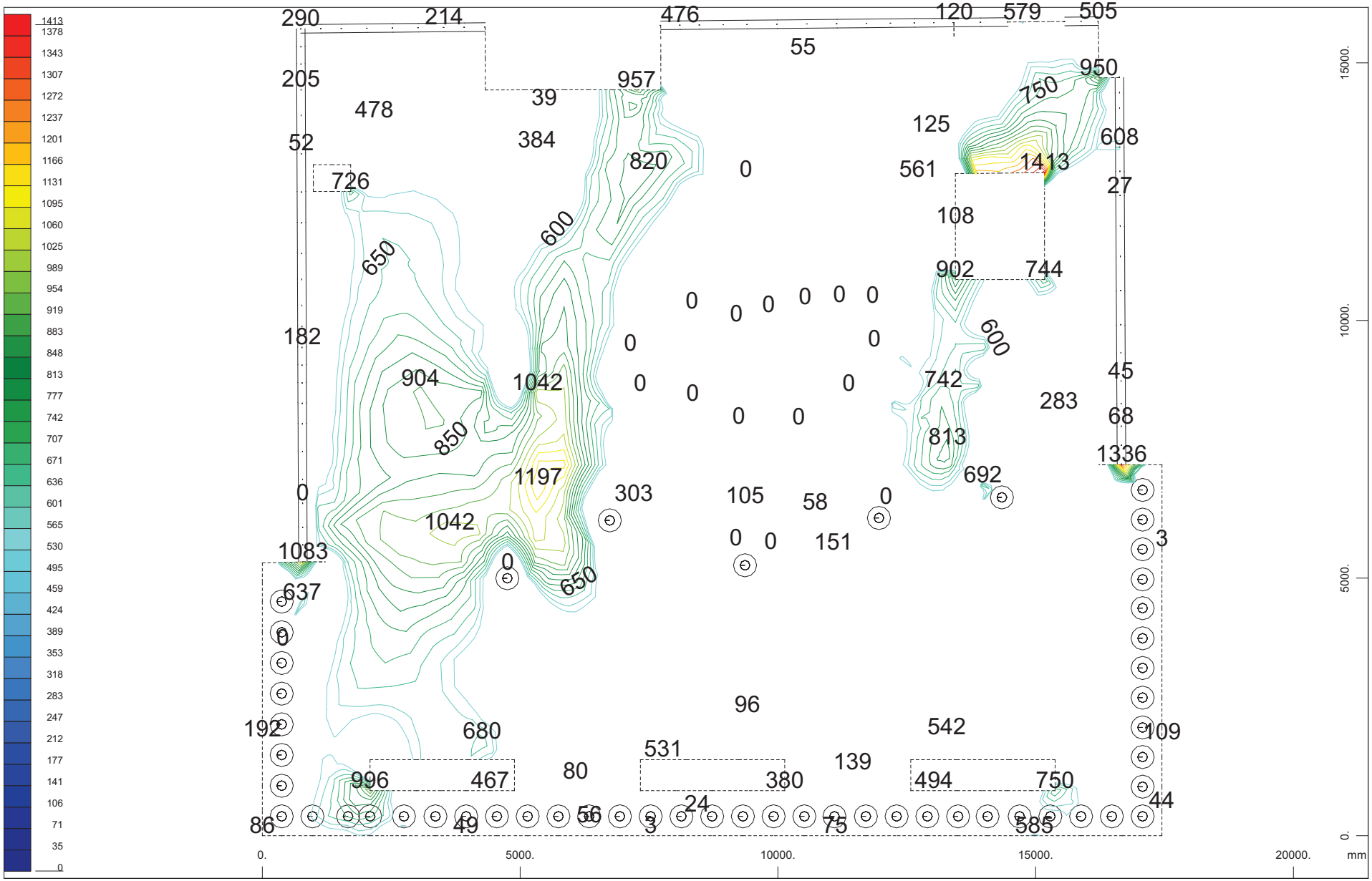
Quadrilateral Elements , upper Cross reinforcements (2nd layer) in Node

Design Case 1 , from 565.0 to 1439. step 50.0 mm2/m

M 1 : 105

FE GA19787 TEMP
Interactive Graphic

Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)



Y
Z—X

Sector of system Group 0 100

Quadrilateral Elements , lower Principal reinforcements (1st layer) in Node

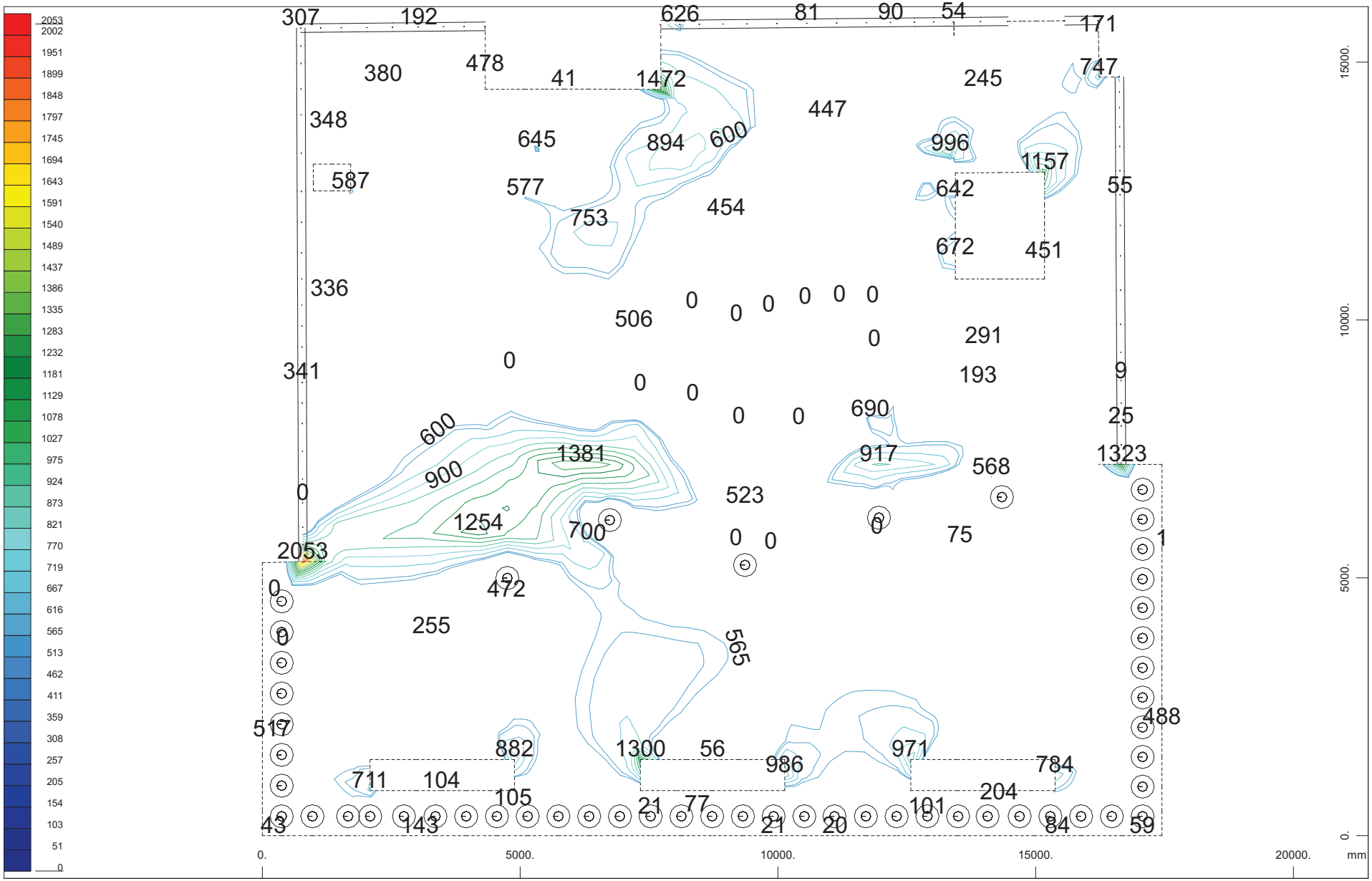
, Design Case 1 , from 565.0 to 1413. step 50.0 mm2/m

M 1 : 105

FE GA19787 TEMP
Interactive Graphic

Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)

APP/D - 9



Y
Z—X

Sector of system Group 0 100

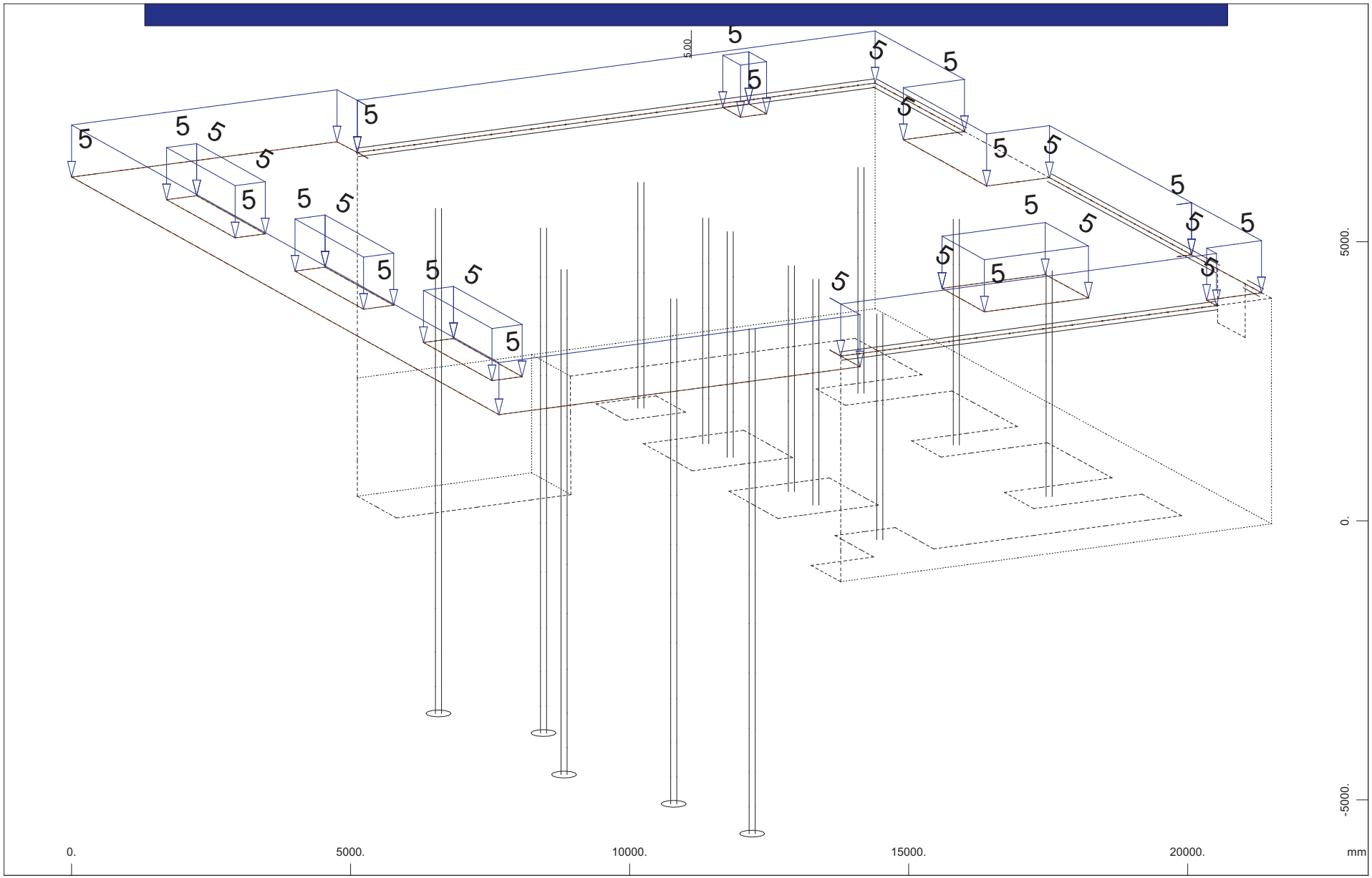
Quadrilateral Elements , lower Cross reinforcements (2nd layer) in Node

Design Case 1 , from 565.0 to 2053. step 100.0 mm2/m

M 1 : 105

FE GA19787 TEMP
Interactive Graphic

Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)



Z
Y
X

Sector of system Group 100 110 120 130 150

All loads, Loadcase 2 CONST. ALLOWANCE , (1 cm 3D = unit) Area element load (force) vector (Unit=5.00 kN/m2

) (Max=5.00)

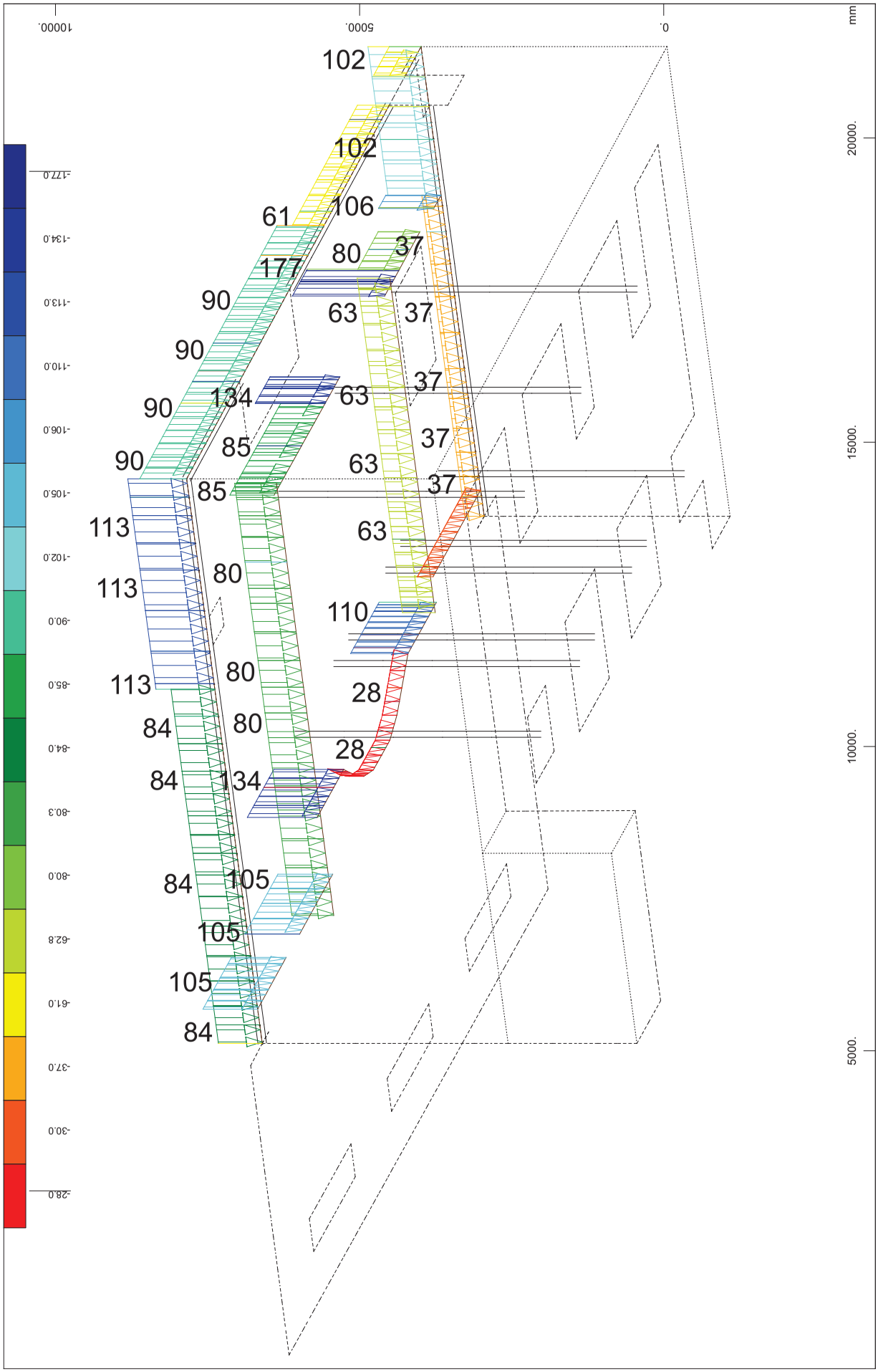
M 1 : 97

X * 0.502
Y * 0.906
Z * 0.962

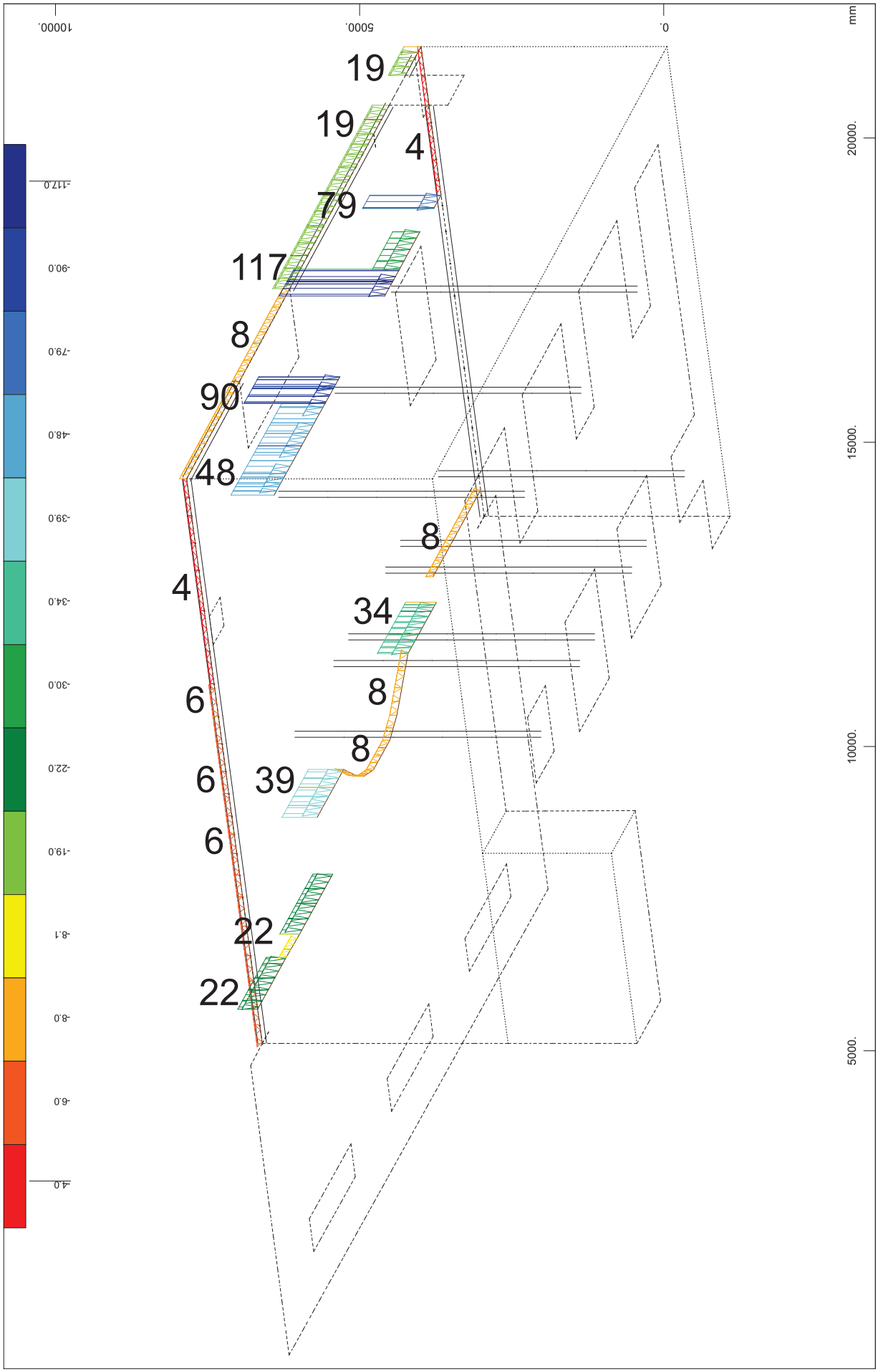
FE GA19787 TEMP
Interactive Graphic

Abbey Pynford PLC Hemel Hempstead, HP2 7DX
WINGRAF - GRAPHICS FOR FINITE ELEMENTS (V 16.17-27)

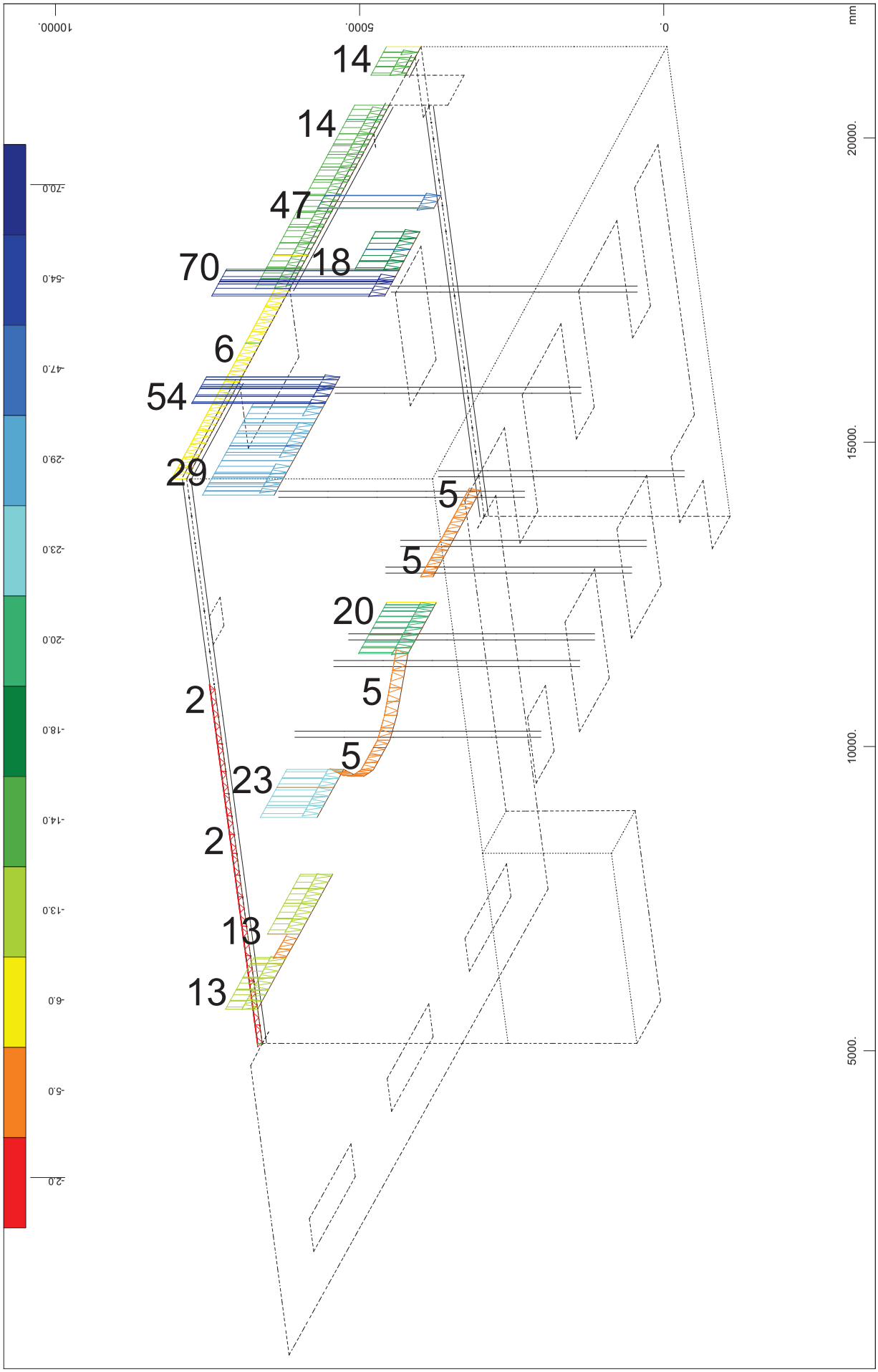
FE GA19787 TEMP
Interactive Graphic



FE GA19787 TEMP
Interactive Graphic



FE GA19787 TEMP
Interactive Graphic



GA19787 - REDINGTON RD
TEMPORARY PADS

1.2×1.2m Pad (347KN)

Program DC-Bearing *** Copyright 1999-2014 DC-Software Doster & Christmann GmbH, D-80997 Muenchen ***

Input file: C:\JO\Abbey Projects\GA19787 69 REDINGTON RD\DCBear TEMP1.dbh

Bearing capacity foll. Brinch Hansen

Foundation type: Rectangular foundation

Foundation dimensions

Width b	:	1.20 m
Width transv. a	:	1.20 m
Bottom edge	:	0.00 m
Height h	:	0.45 m
Unit weight γ	:	24.00 kN/m³

Layer data

		CLAY1	WET Sandy CLAY1	SAND	CLAY2
Layer height Δh	[m]	1.00	1.81	1.00	96.19
Inner friction cal φ'	[°]	0.00	20.00	30.00	0.00
Cohesion c	[kN/m²]	93.00	94.00	0.00	95.00
Unit weight soil γ	[kN/m³]	19.00	19.00	20.00	19.00
Unit weight under buoyancy γ '	[kN/m³]	9.00	9.00	10.00	9.00

Load case Lc
TOT. 1

Loads

Lc		H [kN]	V [kN]	M_y [kNm]	M_x [kNm]	x [m]	z [m]	e_y [m]	γ	ψ
TOT.	G	0.0	347.0	0.0	0.0	0.60	0.45	0.00	1.00	1.00

Partial safety factors

γ -	G	Q	R,v	γ	φ	c	cu	Ea	E0	Ep
Lc 1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lc 2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lc 3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

γ -	Partial safety factor for ...
G	permanent actions
Q	variable actions
R,v	bearing capacity resistance
γ	unit weight
φ	internal friction tan φ
c	cohesion c
cu	cohesion undrained c
Ea	Active earth pressure
E0	Earth pressure at rest
Ep	Passive earth pressure

GA19787 - REDINGTON RD
TEMPORARY PADS

Load case TOT.

Loading		Characteristic	Design values
Imposed load P	=	347.00 kN	347.00 kN
Self weight G	=	15.55 kN	15.55 kN
Total load V	=	362.55 kN	362.55 kN
Horizontal load H	=	0.00 kN	0.00 kN
Inclination of the resultant tan(δ_S) = H/V	=	0.00	

Dimensions		
Bond depth d	=	0.00 m
Equivalent width b'	=	1.20 m
Equivalent width transv. a'	=	1.20 m

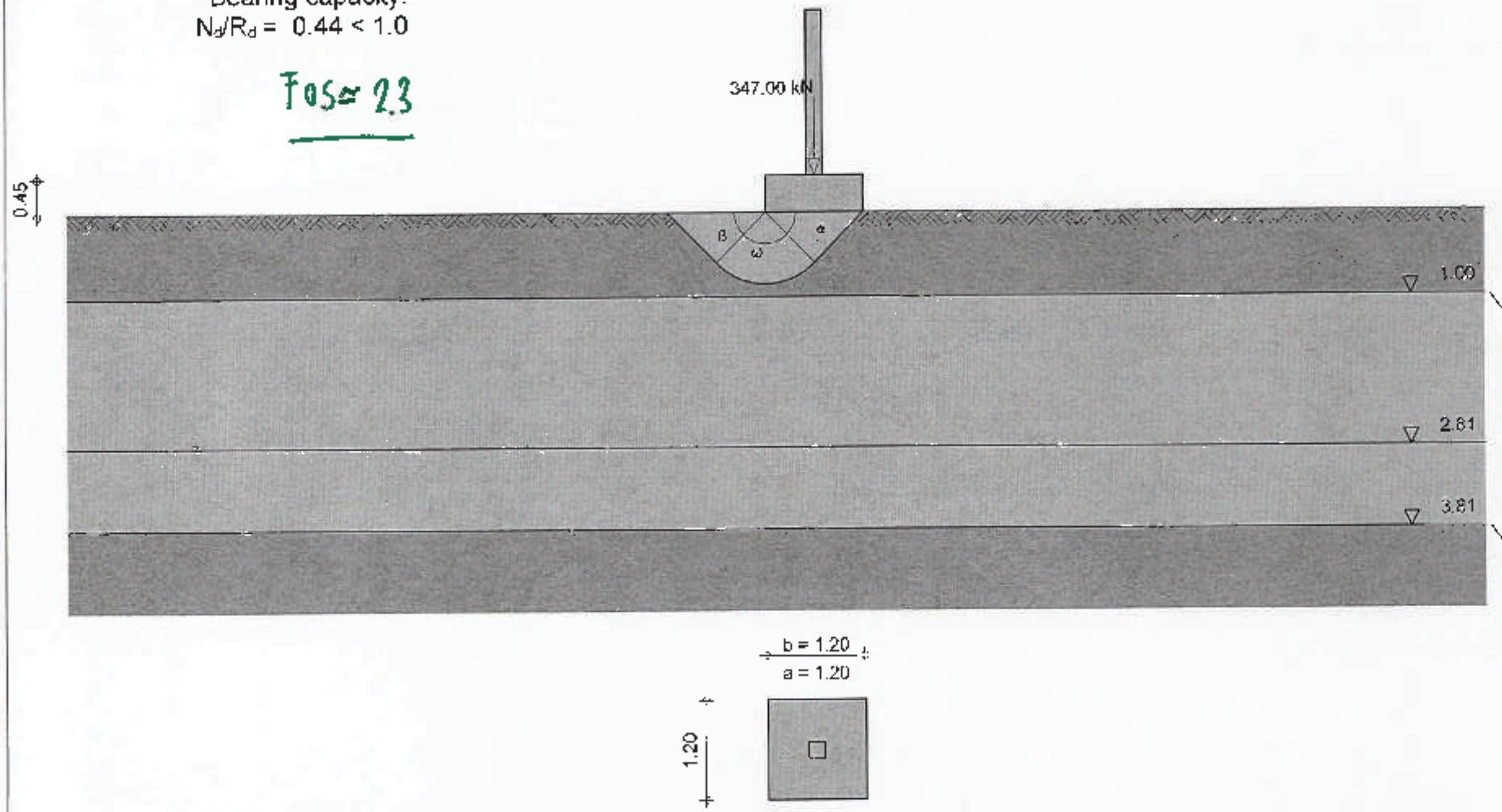
Results					
Width of the failure figure		=		2.40 m	
Depth of the failure figure		=		0.85 m	
Critical soil coefficients:	γ above the foundation base	=		0.00 kN/m³	0.00 kN/m³
	γ below the foundation base	=		19.00 kN/m³	19.00 kN/m³
	Angle of friction φ	=		0.00 °	0.00 °
	Cohesion c	=		93.00 kN/m²	93.00 kN/m²
Inertia coefficients N_c, N_q, N_γ	=	5.14	1.00	0.00	
Load inclination coefficients i_c, i_q, i_γ	=	0.00	1.00	1.00	
Shape coefficients s_c, s_q, s_γ	=	0.20	1.00	0.60	
Depth coefficients d_c, d_q, d_γ	=	0.00	1.00	1.00	

Bearing capacity p_d	=	573.80 kN/m²
Design value bearing capacity resistance R_d	=	826.27 kN
Design value loads N_d	=	362.55 kN
Check: N_d / R_d = 0.44 < 1.0		*** **Check fulfilled** ***

FoS ≈ 2.3

Bearing capacity:
N_d/R_d = 0.44 < 1.0

FOS≈ 2.3



APP/D-14

Page -

GA19787 - REDINGTON RD
TEMPORARY PADS

Scale : 1: 75

DC

GA19787 - REDINGTON RD
TEMPORARY PADS 2x2

Two loads on the pad : (378 kN and 322 kN)

Input file: C:\JO\Abbey Projects\GA19787 69 REDINGTON RD\DCBear TEMP 2x2.dbh

Bearing capacity foll. Brinch Hansen

Foundation type: Rectangular foundation

Foundation dimensions

Width b	:	2.00 m
Width transv. a	:	2.00 m
Bottom edge	:	0.00 m
Height h	:	0.45 m
Unit weight γ	:	24.00 kN/m³

Layer data

		CLAY1	WET Sandy CLAY1	SAND	CLAY2
Layer height Δh	[m]	1.00	1.81	1.00	96.19
inner friction cal φ'	[°]	0.00	0.00	30.00	0.00
Cohesion c	[kN/m²]	93.00	94.00	0.00	95.00
Unit weight soil γ	[kN/m³]	19.00	19.00	20.00	19.00
Unit weight under buoyancy γ'	[kN/m³]	9.00	9.00	10.00	9.00

Load case Lc
TOT. 1

Loads

Lc		H [kN]	V [kN]	M_y [kNm]	M_x [kNm]	x [m]	z [m]	e_y [m]	γ	ψ
TOT.	G	0.0	378.0	0.0	0.0	0.60	0.45	0.00	1.00	1.00
TOT.	G	0.0	322.0	0.0	0.0	1.20	0.45	0.00	1.00	1.00

Partial safety factors

γ -	G	Q	R,v	γ	φ	c	cu	Ea	E0	Ep
Lc 1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lc 2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lc 3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

γ -	Partial safety factor for ...
G	permanent actions
Q	variable actions
R,v	bearing capacity resistance
γ	unit weight
φ	internal friction tan φ
c	cohesion c
cu	cohesion undrained c
Ea	Active earth pressure
E0	Earth pressure at rest
Ep	Passive earth pressure

GA19787 - REDINGTON RD
TEMPORARY PADS 2x2

Load case TOT.

		Characteristic	Design values
Loading			
Imposed load P	=	700.00 kN	700.00 kN
Self weight G	=	43.20 kN	43.20 kN
Total load V	=	743.20 kN	743.20 kN
Horizontal load H	=	0.00 kN	0.00 kN
Moment M	=	86.80 kNm	86.80 kNm
Inclination of the resultant $\tan(\delta_s) = H/V$	=	0.00	
Dimensions			
Bond depth d	=	0.00 m	
Equivalent width b'	=	1.77 m	
Equivalent width transv. a'	=	2.00 m	
Results			
Width of the failure figure	=	3.53 m	
Depth of the failure figure	=	1.25 m	
Critical soil coefficients: γ above the foundation base	=	0.00 kN/m³	0.00 kN/m³
γ below the foundation base	=	19.00 kN/m³	19.00 kN/m³
Angle of friction φ	=	0.00 °	0.00 °
Cohesion c	=	93.36 kN/m²	93.36 kN/m²

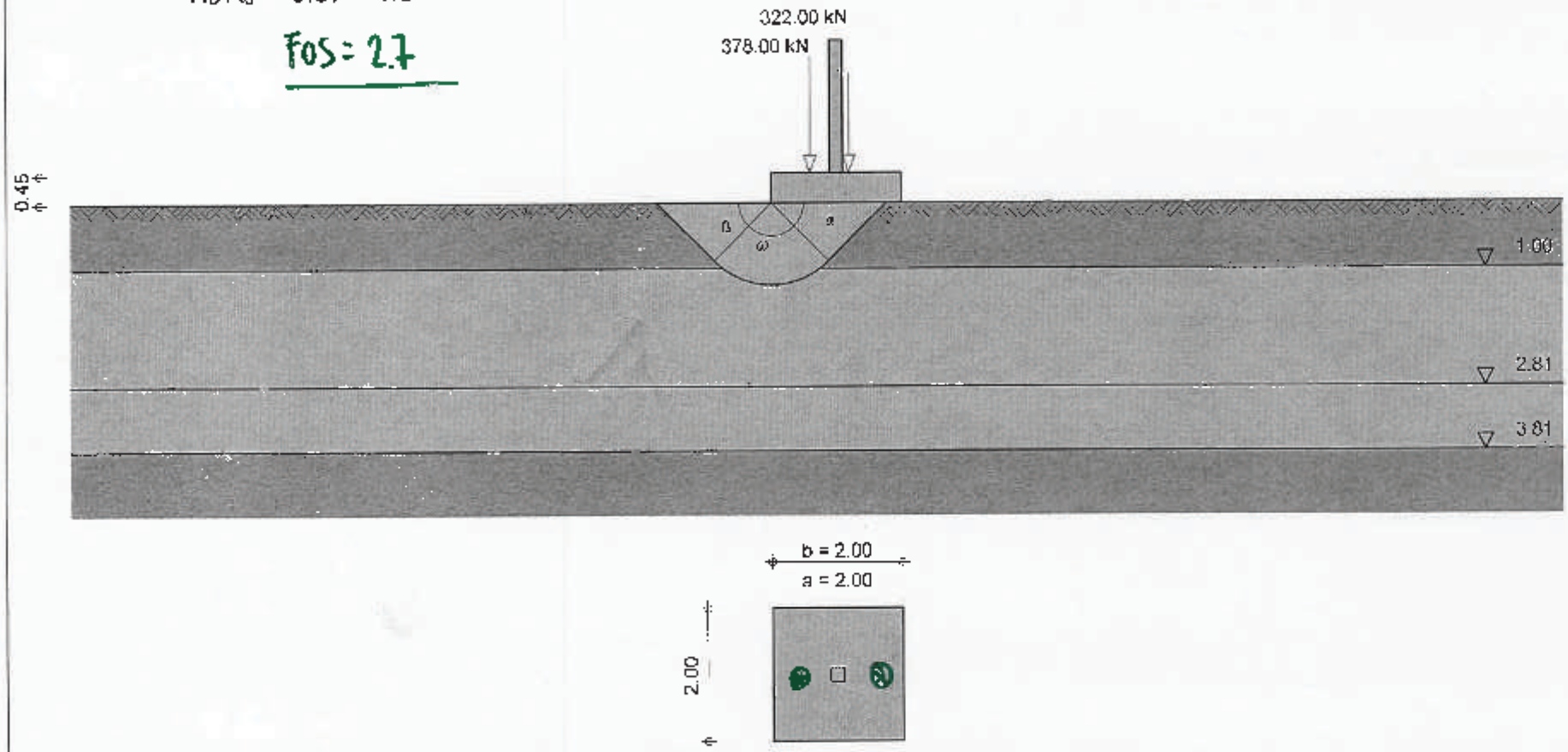
Inertia coefficients N_c, N_q, N_γ	=	5.14	1.00	0.00
Load inclination coefficients i_c, i_q, i_γ	=	0.00	1.00	1.00
Shape coefficients s_c, s_q, s_γ	=	0.18	1.00	0.65
Depth coefficients d_c, d_q, d_γ	=	0.00	1.00	1.00

Bearing capacity p_d	=	564.81 kN/m²
Design value bearing capacity resistance R_d	=	1995.37 kN
Design value loads N_d	=	743.20 kN
Check: $N_d / R_d = 0.37 < 1.0$		***** Check fulfilled *****

FoS = 2.7

Bearing capacity:
N_d/R_d = 0.37 < 1.0

FOS = 2.7



AR/D-20

GA19787 - REDINGTON RD
TEMPORARY PADS 2x2

Page

Scale : 1: 100

DC

GA19787 - REDINGTON RD
TEMPORARY PADS 2x1.6 inserted to toe of underpin.

Two loads on the Pad: (654KN and 94.5KN)

Program DC-Bearing *** Copyright 1999-2014 DC-Software Doster & Christmann GmbH, D-80997 Muenchen ***

Input file: C:\JO\Abbey Projects\GA19787 69 REDINGTON RD\DCBear TEMP1 2x1.6.dbh

Bearing capacity foll. Brinch Hansen

Foundation type: Rectangular foundation

Foundation dimensions

Width b	:	3.20 m
Width transv. a	:	1.60 m
Bottom edge	:	-0.15 m
Height h	:	0.60 m
Unit weight γ	:	24.00 kN/m³

Layer data

		CLAY1	WET Sandy CLAY1	SAND	CLAY2
Layer height Δh	[m]	1.00	1.81	1.00	96.19
Inner friction cal φ '	[°]	0.00	0.00	30.00	0.00
Cohesion c	[kN/m²]	93.00	94.00	0.00	95.00
Unit weight soil γ	[kN/m³]	19.00	19.00	20.00	19.00
Unit weight under buoyancy γ '	[kN/m³]	9.00	9.00	10.00	9.00

Load case	Lc
TOT.	1

Loads

Lc		H [kN]	V [kN]	M_y [kNm]	M_x [kNm]	x [m]	z [m]	e_y [m]	γ	ψ
TOT.	G	0.0	654.0	0.0	0.0	2.60	0.45	0.00	1.00	1.00
TOT.	G	0.0	94.5	0.0	0.0	0.20	0.45	0.00	1.00	1.00

Partial safety factors

γ -	G	Q	R,v	γ	φ	c	cu	Ea	E0	Ep
Lc 1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lc 2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lc 3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

γ -	Partial safety factor for ...
G	permanent actions
Q	variable actions
R,v	bearing capacity resistance
γ	unit weight
φ	internal friction tan φ
c	cohesion c
cu	cohesion undrained c
Ea	Active earth pressure
E0	Earth pressure at rest
Ep	Passive earth pressure

GA19787 - REDINGTON RD
TEMPORARY PADS 2x1.6 connected to be of underpin

Load case TOT.

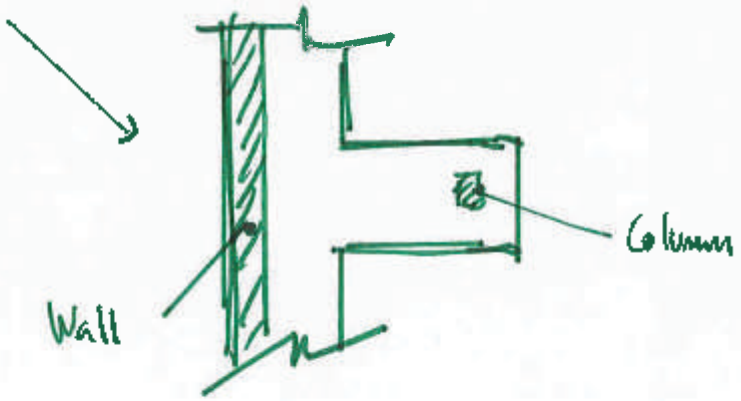
Loading		Characteristic	Design values
Imposed load P	=	748.50 kN	748.50 kN
Self weight G	=	73.73 kN	73.73 kN
Total load V	=	822.23 kN	822.23 kN
Horizontal load H	=	0.00 kN	0.00 kN
Moment M	=	521.70 kNm	521.70 kNm
Inclination of the resultant tan(δ_s) = H/V	=	0.00	

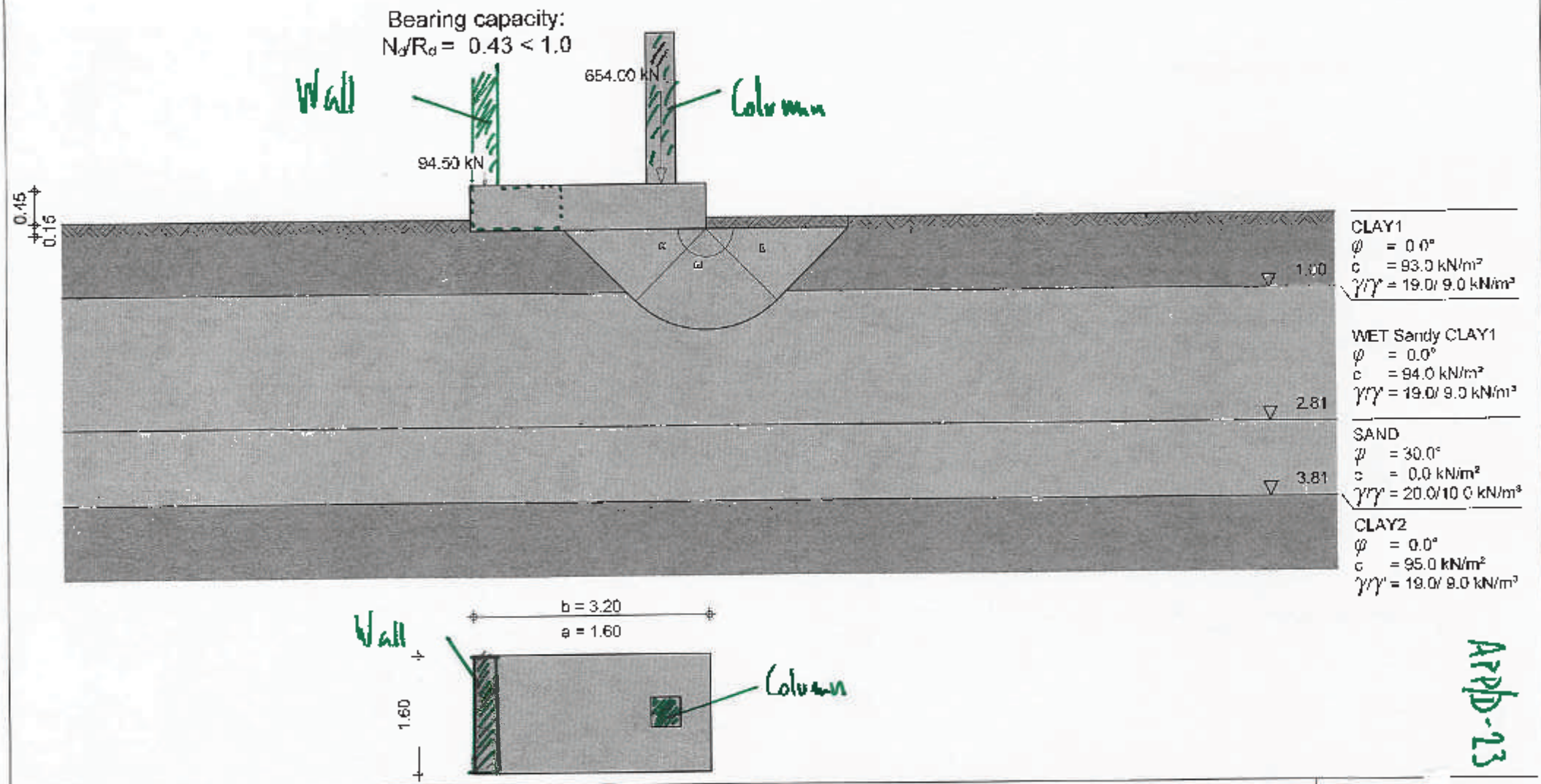
Dimensions		
Bond depth d	=	0.15 m
Equivalent width b'	=	1.93 m
Equivalent width transv. a'	=	1.60 m

Results					
Width of the failure figure		=		3.86 m	
Depth of the failure figure		=		1.37 m	
Critical soil coefficients:	γ above the foundation base	=		19.00 kN/m³	19.00 kN/m³
	γ below the foundation base	=		19.00 kN/m³	19.00 kN/m³
	Angle of friction φ	=		0.00 °	0.00 °
	Cohesion c	=		93.51 kN/m²	93.51 kN/m²
Inertia coefficients N_c, N_q, N_γ		=	5.14	1.00	0.00
Load inclination coefficients i_c, i_q, i_γ		=	0.00	1.00	1.00
Shape coefficients s_c, s_q, s_γ		=	0.24	1.00	0.60
Depth coefficients d_c, d_q, d_γ		=	0.04	1.00	1.00

Bearing capacity p_d	=	617.70 kN/m²
Design value bearing capacity resistance R_c	=	1908.46 kN
Design value loads N_d	=	822.23 kN
Check: N_d / R_d = 0.43 < 1.0 FOS: 2.3		***** Check fulfilled *****

Tip: The foundation width b' is bigger than the depth a':
you should analyze the bearing capacity in transversal direction as well.





APPD-23

GA19787 - REDINGTON RD
TEMPORARY PADS 2x1.6 connected to toe of underpin

Page

Scale : 1: 75

Project Ref:	TEMPORARY PILES			
Project Title:	69 Redington Rd		REV	-
Block/Building:		Floor:		
Column Ref:		Sheet:	1 of 1	

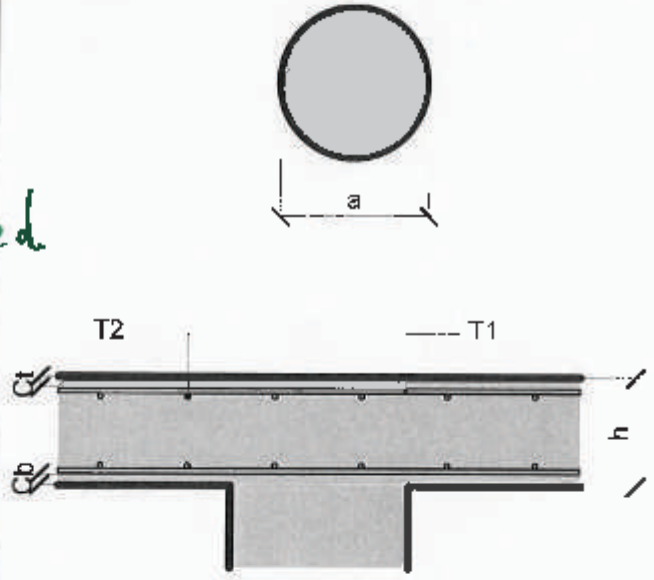
FRANK®

APP/D-24

Telephone:

Design Input

Column type:	Circular internal
Column size (a):	450 mm
Slab depth (h):	350 mm
Top cover (Ct):	35 mm
Bottom cover (Cb):	35 mm
T1 reinforcement:	Ø 12 @ 200 = 565.49 mm²
T2 reinforcement:	Ø 12 @ 200 = 565.49 mm²
Shear load (Vt):	615 kN . Max. factored
fcu:	35 N/mm²
fyv:	500 N/mm²
Load factor:	1.15



Results

d = 350 - 35 - 12/2 - 12/2	=	303.0 mm
Veff = 1.15 x 615	=	707.25 kN
u0 = 450 x pi	=	1413.7 mm
v = 707.25 x 10 ³ / (1413.7 x 303.0)	=	1.651 N/mm ²
0.8 x 35^ ½	=	4.73 N/mm ²
1.65 < 4.73 PASS		
100 x As / (b x d) = (100 x 565.49 / (1000 x 309.0) + 100 x 565.49 / (1000 x 297.0)) /2	=	0.187 (Average)
(400 / d)^ ¼ = (400 / 303.0)^ ¼	=	1.07
vc = [0.79 x (0.187^ 1/3 x 1.07) / 1.25] * (35/25)^1/3	=	0.433 N/mm ²

Perimeter U1

u1 = 450 x 4 + 12.0 x 303.0	=	5436.0 mm
v = (707.25 x 10 ³) / (5436.0 x 303.0)	=	0.429 N/mm ²

v < vc therefore NO PUNCHING SHEAR REINFORCEMENT IS REQUIRED

Project Ref:	TEMPORARY PROPS			
Project Title:	69 Pedington Rd.		REV	-
Block/Building:		Floor:		
Column Ref:		Sheet:	1 of 1	

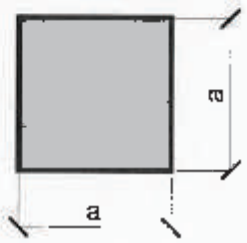
FRANK

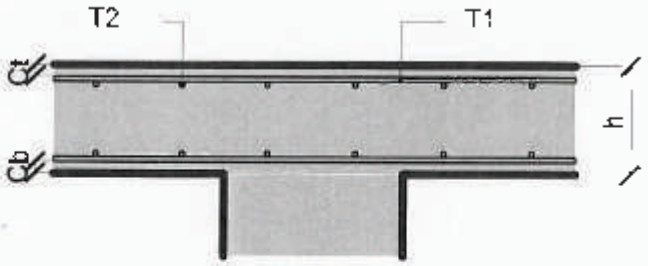
APP/D-25

Telephone:

Design Input

Column type:	Square internal
Column size (a):	300 mm
Slab depth (h):	350 mm
Top cover (Ct):	35 mm
Bottom cover (Cb):	35 mm
T1 reinforcement:	Ø 12 @ 200 = 565.49 mm²
T2 reinforcement:	Ø 12 @ 200 = 565.49 mm²
Shear load (Vt):	541 kN - Max. factored.
fcu:	35 N/mm²
fyv:	500 N/mm²
Load factor:	1.15





Results

d = 350 - 35 - 12/2 - 12/2	=	303.0 mm
Veff = 1.15 x 541	=	622.15 kN
u0 = 4 x 300	=	1200.0 mm
v = 622.15 x 10 ³ / (1200.0 x 303.0)	=	1.711 N/mm ²
0.8 x 35^ ½	=	4.73 N/mm ²
1.71 < 4.73 PASS		
100 x As / (b x d) = (100 x 565.49 / (1000 x 309.0) + 100 x 565.49 / (1000 x 297.0)) /2	=	0.187 (Average)
(400 / d)^ ¼ = (400 / 303.0)^ ¼	=	1.07
vc = [0.79 x (0.187^ 1/3 x 1.07) / 1.25] * (35/25)^1/3	=	0.433 N/mm ²

Perimeter U1

u1 = 4 x 300 + 12.0 x 303.0	=	4836.0 mm
v = (622.15 x 10 ³) / (4836.0 x 303.0)	=	0.425 N/mm ²

v < vc therefore NO PUNCHING SHEAR REINFORCEMENT IS REQUIRED

Designed by	JO	Project Number	GA19787
Checked by	MJ	Project Name	68 Rectington Road
Design Date	Dec-24	Description	Solid Wall
Check date	Dec-24		
Sheet Number	Calc/--		

76.1X155.0

External Diameter	D	76.1	mm	Standard Pressing Size, Good Job
Wall Thickness	t	5.0	mm	
Design Strength	P_s	235	N/mm²	
Height of stool	L	500	mm	
	Spacing	900	mm	

Dead Load	109	kN/m	γ_f=1
Live Load	16.5	kN/m	γ_f=1
Fcm	Brickwork		
f_k for Brickwork	3.4	N/mm²	
γ_m for Masonry	3.1		
Bearing Area calc	0.3 x 0.45	m²	

If bearing Area does not apear in table, insert bearing area calc and bearing area into bottom row of table, then select from drop down menu.

Stooling Type	Single Spoiled
Plate Size	200 x 200mm Plates
Padstone	450 x 450mm Padstone

Table 4 — Characteristic compressive strengths of masonry, f_k in N/mm²

BS 5628-1:2005 Table 4

Partial safety factors for material strength of mortar

	Category of masonry	Construction Control	
		Special	Normal
Compression γ_m	Category 1	2.5	3.1
	Category 2	2.8	3.5
Flexure γ_m	Category 1 & 2	2.5	3

Bearing Area Calc	Bearing Area
0.20 x 0.20	0.04
0.10 x 0.20	0.0204
0.10 x 0.30	0.0306
0.20 x 0.30	0.06
0.43 x 0.45	0.188
0.45 x 0.45	0.2025
0.60 x 0.60	0.36
Bottom Row of Table > 0.3 x 0.45	0.135

Compression γ_m
3.5
3.1
2.8
3
3.5

Therefore Compressor. Check OK

Therefore Bending Check OK

Therefore Combined Load Check OK

Therefore Bearing Check OK

All Checks OK

Bearing Area 0.135

Brickwork

Blockwork

STOOL : CHS 76.1 x 5mm

on stems (concrete)

APP/D-26

ABBEY PYNFORD

Project:	Designed	JO	Date	Dec-14	Project No.	GA19787
69 Redington Road						
	Checked	MJ	Date	Dec-14	Sheet No.	APP/D-27

Stool Design (Solid Wall)

For Section: 76.1CHS5.0 — 275 Hot Finished — Single Stooled

200 x 200mm Plates
450 x 450mm Padstone

Section Properties

D	=	76.1	mm	r_y	=	1.96	cm	
t	=	5.0	mm	L_e	=	500	mm	
A_s	=	11.17	cm^2	p_y	=	275	N/mm^2	
z	=	18.6	cm^3	Spacing	=	0.900	m	

Loading

P_{dead}	=	109.00	kN/m	γ_f=1	P_{imp}	=	14.50	kN/m	γ_f=1

P_{ult} = 0.9m x (1.4 x 109 + 1.6 x 14.5) = 158.2 kN

Compression Check

$\lambda=L_e/r_y$	=	25.51				
p_c	=	270	N/mm^2			(From Strut Curve a Table 24 BS5950)
$P_c=p_c*A_s$	=	301.2	kN	>	158.2 kN	

Therefore Compression Check OK

Bending Check

e	=	0.005	m		
$M_{ult}=P_{ult}*e$	=	0.791	kNm		
$M_b=p_yz$	=	5.115	kNm	>	0.79 kN/m

Therefore Bending Check OK

Combined Bending and Axial Load Check

P_{ult}/P_c	+	M_{ult}/M_b	<	1
0.525	+	0.155	<	1
		0.680	<	1

Therefore Combined Load Check OK

Bearing Stress on Brickwork

Brickwork Quality:	f_k	=	3.4	N/mm^2
Mortar Quality:	γ_m	=	3.1	
Allowable Bearing:	$1.5f_k/\gamma_m$	=	1.65	N/mm^2
Bearing Area:	0.3 x 0.45	=	0.135	m^2

Bearing Stress = 1.17 N/mm^2 < 1.65 N/mm^2

Therefore Bearing Check OK

NOTE: By inspection, brickwork is OK.
Use standard CHS props with 300 x 300 plates at maximum 900mm c/c.

STOOL : CHS 76.1×5mm (on soil)

APP/D - 28

Designed by	JD	Design date	Sep 14	Project Number	8419787
Checked by	NJ	Check date	Sep 14	Project Name	59 Redington Rd
		Sheet Number	C1/2	Description	

76.1CHS5.0

	Select Section	76.1CHS5.0		76.1CHS5.0
External Diameter	D	76.1	mm	Standard Propping Size, Good Ball
Wall Thickness	t	5.0	mm	
Design Strength	p_y	275	N/mm²	
Height of Prop	L_e	600	mm	
	Spacing	600	mm	

Dead Load	80	kN/m	γf 1
Live Load	0	kN/m	γf 1
Prop	Brickwork		
fk for Brickwork	3.4	N/mm²	
γm for Mortar	3.5		
Bearing Area Calc	0.25x0.60	m²	

* If bearing area does not appear in table input bearing area calc and bearing area into bottom row of table then select from drop down menu.

Bearing Area Calc	Bearing Area	Length
0.20 x 0.20	0.04	0.4
0.20 x 0.20	0.0576	0.2
0.20 x 0.30	0.0736	0.3
0.215 x 0.20	0.1645	0.215
0.44 x 0.45	0.198	0.44
0.45 x 0.45	0.2025	0.45
0.60 x 0.60	0.36	0.6
0.25 x 0.60	0.156	0.6

Shoring Type	Single Stacked	
Plate Size	300 x 200mm Plates	ex. dia = 0.3 m
Padstone (Bottom)	600 x 600mm Padstone	Bottom Row of table
Padstone (Top)	600 x 600mm Padstone	

300 x 600mm Padstone

300 x 600mm Padstone

Padstone	0.36	0.0625	m²
Length of Padstone	0.6	m	
Depth	0.12	m	
No. of Padstones	2		

Concrete Grade	35	N/mm²

BS 5628-1:2005 Table 4

Partial safety factors for material strength of mortar

	Category of masonry	Construction Control	
		Special	Normal
Compressive strength	Category 1	2.5	3.1
	Category 2	2.8	3.5
Flexural	Category 1 & 2	2.5	3

Compression Check	Check OK
Bending Check	Check OK
Combined Load Check	Check OK
Bearing Check (Brick)	Check OK

All Checks OK

Sections

48.3CHS3.2

60.3CHS5.0

76.1CHS5.0

193.7x12.5CHS [illegible]

BS 5628-1:2005

Table 2 — Characteristic compressive strength of masonry, f_k, in N/mm²

[illegible]

Table 2 — Characteristic compressive strength of masonry, f_k, in N/mm² (continued)

[illegible]

ABBEY PYNFORD

Project	Designed	JO	Date	Dec-14	Project No.	GA19787
69 Redington Rd						
	Checked	MJ	Date	Dec-14	Sheet No.	APP/D·29

Stool Design ()

For Section: 76.1CHS5.0 275 Hot Finished Single Stooled

300 x 300mm Plates
Top 600 x 600mm Padstone
Bottom 600 x 600mm Padstone

Section Properties

H	=	76.1	mm	$r_{y\,min}$	=	2.52	cm	
				L_e	=	600	mm	
A_g	=	11.2	cm^2	p_y	=	275	N/mm^2	
z_{min}	=	18.6	cm^3	Spacing	=	0.800	m	

Loading

p_{dead}	=	80.00	kN/m	γ_f=1	p_{live}	=	0.00	kN/m γ_f=1
p_{ult}	=	0.8 x (1.4 x 80 + 1.6 x 0)	=	89.6 kN				

Compression Check

$\lambda=L_e/r_y$	=	23.81				
p_c	=	271	N/mm^2			(From Strut Curve a Table 24 BS5950)
$P_c=p_c*A_g$	=	303.2	kN	>	89.6 kN	

Therefore Compression Check OK

Bending Check

e	=	0.025	m			
$M_{ult}=P_{ult}*e$	=	2.240	kNm			
$M_b=p_yz$	=	5.115	kNm	>	2.24 kN/m	

Therefore Bending Check OK

Combined Bending and Axial Load Check

P_{ult}/P_c	+	M_{ult}/M_b	<	1
0.296	+	0.438	<	1
		0.733	<	1

Therefore Combined Load Check OK

Bearing Stress on Brickwork

Brickwork Quality:	f_k	=	3.4 N/mm^2
Mortar Quality:	γ_m	=	3.1
Allowable Bearing:	$1.5f_k/\gamma_m$	=	1.65 N/mm^2
Bearing Area:	0.23 x 0.60	=	0.138 m^2

Bearing Stress = 0.65 N/mm^2 < 1.65 N/mm^2

Therefore Bearing Check OK

Bearing on Soil

Bearing Area	0.6x0.6	=	0.36 m^2
Allowable Bearing :			0.3 N/mm^2

Bearing Stress = 0.22 N/mm^2 < 0.30 N/mm^2

Therefore Bearing Check OK

APP/D - 30

STOOL : UC152x23 (on soil)

[illegible]

	Category of Working	Load Duration Factor	
		Short	Annual
[illegible]	[illegible]	[illegible]	[illegible]
	Category 2	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Compression Check — Check OK

Buckling Check — Check OK

Combined Load Check — Check OK

Bearing Check — Check OK

All Checks OK

[illegible]

ABBEY PYNFORD

Project	Designed	JO	Date	Dec-14	Project No.	GA19787
69 Redington Rd						
	Checked	MJ	Date	Dec-14	Sheet No.	App/D-31

Stool Design ()

For Section: 152x152x23UC 275 Hot Finished Single Stooled

300 x 300mm Plates
Top 600 x 600mm Padstone
Bottom 600x900mm Mass Concrete Pad

Section Properties

H	=	152.0	mm	$r_{y\,min}$	=	3.7	cm
				L_e	=	600	mm
A_g	=	29.2	cm^2	p_y	=	275	N/mm^2
z_{min}	=	53	cm^3	Spacing	=	0.750	m

Loading

p_{dead} = 161.00 kN/m γ_f=1 p_{live} = 0.00 kN/m γ_f=1

p_{ult} = 0.75 x (1.4 x 161 + 1.6 x 0) = 169.1 kN

Compression Check

$\lambda = L_e/r_y$ = 16.22

p_c = 275 N/mm^2 (From Strut Curve a Table 24 BS5950)

$P_c = p_c * A_g$ = 801.6 kN > 169.1 kN

Therefore Compression Check OK

Bending Check

e = 0.025 m

$M_{ult} = P_{ult} * e$ = 4.226 kNm

$M_b = p_y z$ = 14.575 kNm > 4.23 kN/m

Therefore Bending Check OK

Combined Bending and Axial Load Check

$P_{ult}/P_c + M_{ult}/M_b < 1$

0.211 + 0.290 < 1

0.501 < 1

Therefore Combined Load Check OK

Bearing Stress on Brickwork

Brickwork Quality: f_c = 3.4 N/mm^2

Mortar Quality: γ_m = 3.1

Allowable Bearing: $1.5f_k/\gamma_m$ = 1.65 N/mm^2

Bearing Area: 0.23 x 0.60 = 0.138 m^2

Bearing Stress = 1.23 N/mm^2 < 1.65 N/mm^2

Therefore Bearing Check OK

Bearing on Soil

Bearing Area 0.6x0.9 = 0.54 m^2

Allowable Bearing : 0.3 N/mm^2

Bearing Stress = 0.30 N/mm^2 < 0.30 N/mm^2

Therefore Bearing Check OK