85 CAMDEN MEWS, LONDON NW1

TEMPORARY WORKS FOR FAÇADE RETENTION

CALCULATIONS

Read in conjunction with 15005-403/404 TW drawings and all other permanent works drawings and details.
Refer to 15005-TW-403 for Sequence of Works

References and background information:
- British Standards Codes of Practice

Key site notes and constrains:

- Existing front and side walls that are to be retained and restrained at all times as per 15005-TW-403

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AXIOM STRUCTURES

Job	Date	Designer	Job No.	Page
85 Camden Mews	20-Dec-18	KK	15005	

Wind Loading to BS 6399 : Part 2 : 1997

Standard Method (Section 2)

Location: Wind Load on Building

Stage 1:

Height of Building; H	4.8	m	
Building Type Factor; K_b	0.5		(Ref: Table 1)
Dynamic Augmentation Factor; C_r	0.0068		(From Annex C; Equation C.2)

Stage 2: H and Cr are within limits of applicability for section 2

Stage 3: Basic Wind Speed; V_b 20.5 m/s (Ref: Figure 6)

Stage 4:

If topography not considered significant, set Z = 0

Site Altitude; ΔS 47 m

Topography is not significant

Altitude Factor; S_a	1.05
Direction Factor; S_d	1.00
Seasonal Factor; S_s	1.00
Probability Factor; S_p	1.00
Site Wind Speed; V_s	21.46 m/s

If topography is considered significant, then Z > 0

Effective Height of Feature; Z	0	m
Altitude at base of topography; ΔT	0	m
Length of Upwind Slope; L_U	0	m
Length of Downwind Slope; L_D	0	m
Horiz. Distance from Site to Crest; X	0	m
Wind Direction (from N=0, E=90), f	0	°
Set Sd to Unity? (Y/N)	Y	

(See Annex D; Table D1. Unity is conservative)

(From Equation D1) Annual Risk; Q 0.020 [Default value = 0.02]

Stage 5:

Reference Height; H_r	4.8	m	Height of Obstructions; H_o	0.0	m
Effective Height; H_e	4.8	m	Upwind Spacing of Obstructions; X	0.0	m

Stage 6: The Standard Method of Calculating Wind Loads is Adopted

Stage 7:

Town or Country Site Location; **T** or **C**	t		Closest Distance to the Sea	50	km
Diagonal Dimension, a	8.5	m			
Size Effect Factor; C_a	0.95		Set C_a to Unity? (Y/N)	N	
Terrain and Building Factor; S_b	1.38		Set S_b to Unity? (Y/N)	N	
Effective Wind Speed; V_e	29.63	m/s			

Stage 8: Dynamic Pressure; q_s 0.538 kN/m²

Net pressure coefficient for free-standing wall with return corner and reduction factor (L/h<3)
Cp= 2.1 x 0.6= 1.26

Stage 9:

External Pressure Coefficient; C_{pe}	1.26	(Ref: Tables 5,7[walls], & Tables 8 - 11[roofs])
Internal Pressure Coefficient; C_{pi}		(Ref: Tables 16 - 18)
Net Pressure Coefficient; C_p	1.26	(Ref: Tables 13, 14, 20 & 21)

Stage 10:

External Surface Pressure; p_e	0.646	kN/m²
Internal Surface Pressure; p_i	0	kN/m²
Net Surface Pressure; p	0.646	kN/m²
Loaded Area; A	1.00	m²
Net load; P	0.646	kN

NOTES:
General building overall dimensions used.
Wind direction is non-specific - Sd = 1.0.
External and Internal pressure coefficients sum to unity.

AXIOM STRUCTURES

Introduction

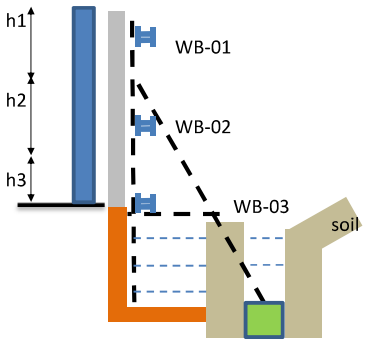
- Rake shores, waling beams and temporary struts are required to retain front façade and existng party wall until permanent structure is constructed.
- Refer to TW-403 / TW-404 for sequence of works and details.

Waling beams design:

Wind load

p = q x Cp = 0.7 kN/m2 See previous page

h1 = 0.4 + 2.4/2= 1.60 m
h2 =2.4/2+1.75/2= 2.08 m
h3=1.75/2= 0.88 m



Pw1 = h1 x p = 1.1 kN/m
Pw2 = h2 x p = 1.5 kN/m
Pw3 = h3 x p = 0.6 kN/m

Check Fixings Waling Beam to Masonry walls: upin

Tensile force along horizontal element of raking = Pw max = 1.45 kN/m

Fixings = use M12 Resin Anchors = Rawl R-Kex , cmin=

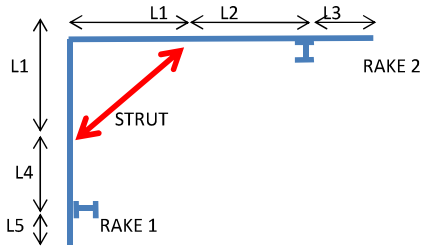
cv > 150 = Edge spacing = s = 200 = 1.0

Tensile capacity for 1 anchor = say 1.9 kN
Minimum spacing required = Pw max / Pt = 1.31 m **Use M12 at 0.6m spacing**

Check Waling Beams: FRONT

Checked for critical WB-02

Pw = 1.5 kN/m
S = Spacing = 2.8 m
F = Force in raking shore at 45 degree = Pw = 5.7 kN

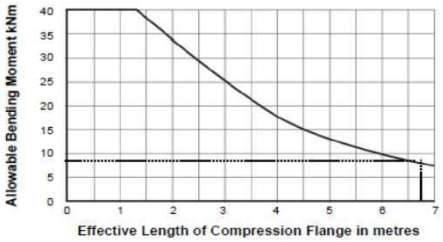


L1= 2.55 m
L2= 2.3 m
L3= 1.35 m
L4= 1.7 m
L5= 1.35 m

Soldier characteristics

Area: Gross	26.06 cm^2
Area: Nett	19.84 cm^2
I xx	1916 cm^4
I yy	658 cm^4
r xx	9.69 cm
r yy	5.70 cm
Z xx	161 cm^3
Z yy	61 cm^3
EI xx	4020 kNm^2
EI yy	300 kNm^2
GAxx	17350 kN
M max x	40 kNm
M max y	6.24 kNm
Max Joint Moment (4 M16 bolts)	12 kNm
Max Joint Moment (6 M16 bolts)	18 kNm
Max Joint Moment (stiffeners see 1.2.43)	20 kNm
Max Joint Tension (4 M16 bolts)	100 kN
Max Joint Tension (6 M16 bolts)	140 kN
Max Joint Tension (4 M16 bolts and stiffeners)	150 kN
Mean compressive yield stress	370 N/mm^2
Mean Self weight for Analysis	0.235 kN/m run*

* Self weight varies depending on makeup / length (see 1.1.1)



AXIOM STRUCTURES

From Robot Analysis:

Msls =	1.4 kNm		**for RMD S.Slim**			
		Mb= sls	(le=Lm)	2.6 m		
				28 kNm	(from graf above)	OK
		Moment at joint = 4M16 bolts =		12 kNm	(from table above)	OK
def=	0.40 mm		L/def =	3375 OK		

use RMD S/Slim Soldiers

Check Fixings Waling Beam to Masonry walls (party wall):

Ra = Shear force along WB-02= Reaction from Robot= 1.60 kN

Fixings = use M12 Resin Anchors = Rawl R-Kex , cmin=

cv > 150 = Edge spacing = s = 200 = 1.0

Shear capacity for 1 anchor = say =Ps= 1.5 kN
L= length of wall= 5.9 m

For M12 resin anchors at 600crs=
N= number of anchors= L/0.6= 10

Shear for one anchor = Ra/L= 0.16 kN/anchor < Ps= 1.50 kN

Reaction from waling beams to rakes (from Robot Analysis):

RAKE 1:		RAKE 2:	
WB-01=	2.7 kN	WB-01=	2.9 kN
WB-02=	3.7 kN	WB-02=	4 kN
WB-03=	1.5 kN	WB-03=	1.6 kN

Check Strut:
Checked for critical TW-02

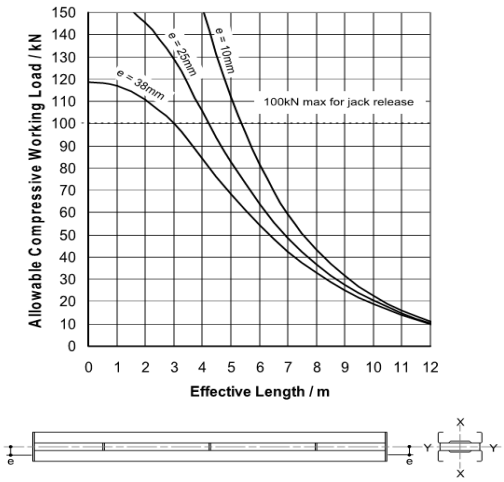
Fsls= from Robot Analysis= 3.7 kN

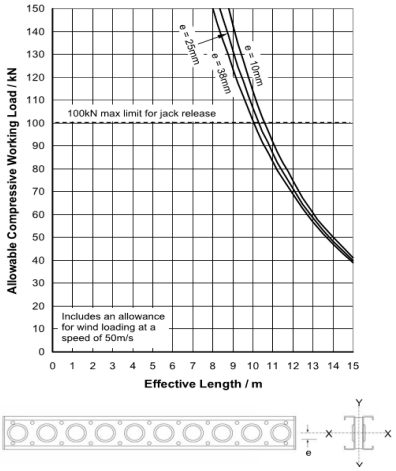
Load to raking strut TW01 at angle = 45 degree
Axial = F sls / cos(90-angle) = **5.2** kN
sideway to face = Fa x Ls x tan(90 - angle) = 3.7 kN

L effective = 3.8 m (max)
Fsls A = 5 kN (max)
Fuls A = 8 kN (γf = 1.5)

AXIOM STRUCTURES

Extract from RMD S/Slim Buckling About the Y Axis





Pcx SWL =	150 kN	for e=25mm, Le=3.8m	> Fsls =	5.2 kN OK	0.03
Pcy SWL =	100 kN	for e=25mm, Le=3.8m	> Fsls =	5.2 kN OK	0.05

Use single RMD S/SLIM Soldier Props

End Pin and R Clip Connectors of RMD = AWL = 100kN > F sls = 5 kN OK

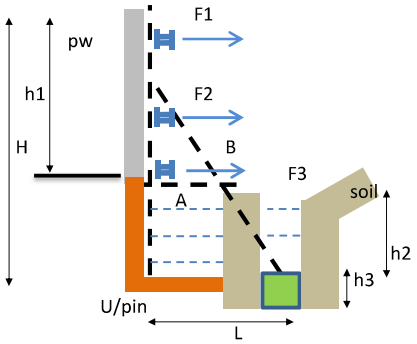
RAKE 1 - support for side wall :

L =	3 m
H =	7.9 m
h1 =	4.7 m
h2 =	2.5 m
h3 =	0.8 m

Vertical setting out of WB- as per TW-404

From previous page:

F1=WB-01=	2.7 kN
F2=WB-02=	3.7 kN
F3=WB-03=	1.5 kN



Foundation Bases Checks

- refer to next pages for analysis input and output
- FOS wind = uls = 1.4

Applied Vertical Tension / Compression =	15 kN
Applied Horizontal =	7.4 kN

Check Bearing under foundation base

height of concrete footing = hb	1.0 m
width of footing =	0.8 m
length of footing =	0.8 m
Footing area = A =	0.6 m2
Bearing pressure from rakes = N / A =	23.4 kN/m2
Allowable bearing pressure = as per ST Consult repor	150 kN/m2

OK subject to review on site of ground conditions

AXIOM STRUCTURES

Check Sliding:
Resistance due to friction to soil from self-weigth of wall and passive pressure

Applied Horizontal =	7.4	kN			
- Passive force resistance =					
Kp x red factor (1.0) =	2.0				
Hp = behind footing	1.0	m			
g =	18	kN/m3			
PP = 0.5 x g x Hp^2 x Kp =	18.4	kN/m/m	= P x width =	14.7	kN
			FOS passive resistance only =	1.98	> 1.5
- Resistance due to friction to soil					
Vertical reaction =	15.0	kN	(critical)		
Base SWT = A x hb x 24kN/m3 =	15.4	kN			
F =	30.4	kN			
f' = 25 Clay					
Base friction = F x tan (2/3*25deg) =	9.1	kN	FOS base friction only =	1.23	< 1.5
			Total resistance =	23.8	kN
Sliding check = Passive res. + friction of base =			Factor of Safety FOS = R / Hb =	3.21	**> 1.5 OK**

Uplift:
Base to be backfilled to prevent uplift

Fup= vertical=	15.0	kN	
Resistance force:			
Swt of base=	15.4	kN	
Swt of backfill=	15.36	kN	(1.5m x 0.8m x 0.8m x 16kN/m2)
F res =	30.7	kN	
			Factor of Safety FOS = F res / Fup = 2.05 **> 1.5 OK**

Rake to base connection check

Performance Data at Standard Embedment Depth

SIZE	CONCRETE, $f_{ck,cube}$ = 30N/mm2 (C20/25)														
	CHARACTERISTIC RESISTANCE (kN)				DESIGN RESISTANCE (Factored) (kN)				RECOMMENDED LOAD (Unfactored) (kN)				CHARACTERISTIC EDGE DISTANCE (mm)		CHARACTERISTIC SPACING
	TENSION (N_{Rk})		SHEAR (V_{Rk})		TENSION (N_{Rd})		SHEAR (V_{Rd})		TENSION (N_{rec})		SHEAR (V_{rec})		TENSION ($C_{cr,N}$)	SHEAR ($C_{cr,V}$)	TENSION & SHEAR ($S_{cr,N}$) ($S_{cr,V}$)
	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade			
M8	15.3	21.5	9.9	15.4	8.1	11.9	7.9	12.3	5.8	8.5	5.7	8.8	100	130	130
M10	22.7	33.8	15.7	24.1	10.8	17.8	12.6	19.3	7.7	12.8	9.0	13.8	130	150	150
M12	34.5	52.9	22.9	35.2	15.7	26.1	18.3	28.2	11.2	18.7	13.1	20.1	150	170	170
M16	63.1	73.4	42.5	65.1	26.3	36.3	34.0	52.1	18.8	26.0	24.3	37.2	170	190	190
M20	100.5	110.2	66.8	106.4	41.9	52.5	53.4	85.1	29.9	37.5	38.2	60.8	220	220	220
M24	128.1	136.1	95.7	152.5	51.2	63.7	76.6	122.0	36.6	45.5	54.7	87.1	260	260	260
M30	178.4	194.0	155.7	248.6	71.4	88.2	124.6	198.8	51.0	63.0	89.0	142.0	340	340	340

Edge Distance (Concrete Only)

EDGE (mm)	TENSILE : EDGE REDUCTION FACTORS							SHEAR : EDGE REDUCTION FACTORS						
	M8	M10	M12	M16	M20	M24	M30	M8	M10	M12	M16	M20	M24	M30
60	0.76							0.50						
70	0.82	0.75						0.58	0.50					
80	0.88	0.80	0.74					0.66	0.57	0.50				
90	0.94	0.85	0.78					0.75	0.64	0.56				
100	1.00	0.90	0.83	0.77				0.83	0.71	0.62	0.52			
110		0.95	0.87	0.81				0.92	0.78	0.69	0.58	0.50		
130		1.00	0.96	0.89	0.77			1.00	0.93	0.81	0.68	0.59	0.50	
150			1.00	0.96	0.83	0.76			1.00	0.94	0.79	0.68	0.57	
170				1.00	0.88	0.81				1.00	0.89	0.77	0.65	0.50
190					0.94	0.86	0.75				1.00	0.86	0.73	0.56
220					1.00	0.93	0.80					1.00	0.85	0.65
260						1.00	0.86						1.00	0.76
300							0.92							0.88
340							1.00							1.00

Spacing (Concrete Only)

SPACING (mm)	TENSILE & SHEAR REDUCTION FACTORS						
	M8	M10	M12	M16	M20	M24	M30
60	0.80						
70	0.83	0.80					
80	0.87	0.83	0.80				
90	0.90	0.86	0.83				
100	0.93	0.89	0.85	0.81			
110	0.97	0.91	0.87	0.83	0.80		
130	1.00	0.97	0.92	0.87	0.84	0.80	
150		1.00	0.97	0.92	0.87	0.83	
170			1.00	0.96	0.91	0.86	0.80
190				1.00	0.95	0.89	0.82
220					1.00	0.94	0.85
260						1.00	0.90
300							0.95
340							1.00

AXIOM STRUCTURES

Use 4M16 Resin Anchors = Rawl R-Kex , cmin=

Shear:

cv = 150 = Edge	0.79	s = 250 =	1	fb_n = C30 =	1

Vrd c = (Vrd-nom=52.1kN)	41.2	kN / anchor		
Vrd s = M16 8.8 =	58.9	kN / anchor		
Shear capacity for 4 anchors=	164.6	kN	> Vuls	10 kN

Tension:

cv = 150 = Edge	0.96	s = 250 =	1	fb_n = C30 =	1

V red t = pull out=	34.8	kN/anchors		
Tnesion capacity for 4 anchors=	139.4	kN	> Tuls	21 kN

Shear + Tension:

Vrd c/Vuls + Vred t/ Tuls=	0.21 < 1.0	hence OK

Use 4M16 at 250crs / per rake

Check members of raking shores

- refer to next pages for analysis input and output
- FOS wind = uls = 1.4

A - Vertical shore check

Compression check

L effective =	3.0	m			
Fsls A =	15	kN			
Fuls A =	21	kN	(gf = 1.4)		

Try 152x152x30UC S275:

Pcy= (Le=8m)=	147	kN	(from Blue Book)	Fuls/Pcy=	0.10 hence OK

Bending check

L effective = 2 x 2.1n	4.2	m
Msls =	5	kNm
Muls =	6.4	kNm

Try 152x152x30UC S275:

Mb= (Le=4.2m)=	48.6	kN	(from Blue Book)	Muls/Mb =	0.09 hence OK

Combined check

Fus/Pcy + Muls/Mb = **0.20** < 1.0 OK

def at top =	3.7	mm
H/top L = 2.1m =	568 > L/180 OK	

Use 152UC30 S275

B - Raking shore check

L effective =	7.0	m			
Fsls =	17	kN			
Fuls =	24	kN	(gf = 1.4)		

Try 152x152x30UC S275:

Pcy = (Le=7m) =	187	kN	(from Blue Book)	Fuls/Pcy=	0.13 hence OK

AXIOM STRUCTURES

Bending check

L effective =	3.8	m
Msls =	0	kNm
Muls =	0.3	kNm

Try 152x152x30UC S275:

Mb= (Le=3.8m)= 52.3 kN (from Blue Book) Muls/Mb = 0.00 hence OK

Combined check

Fus/Pcy + Muls/Mb = **0.13** < 1.0 OK **Use 152UC30 S275**

Uplift of vertical rake resisted by fixing to new RC wall

Vertical uplift force = 15 kN

Use 4M12 at 800crs to as cats RC retaining wall:

cv > 170 = Edge 1 s = 800 = 1 fb_n = C30 = 1

Vrd c = (Vrd-nom=35.2kN) 35.2 kN / anchor

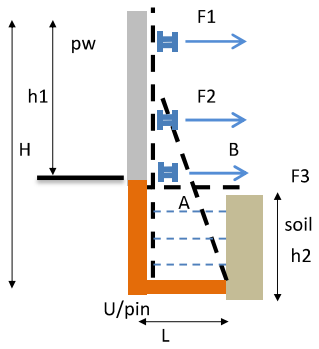
Shear capacity for 4 anchors= 140.8 kN > Vuls 21 kN

Check uplift of the rake
- to be resited by self weight of existing party wall

Ex. Wall = 225thk wall x 4.8m(h) x 1m = 24 kN FOS = 1.6 > 1.5 OK

RAKE 2 - support for front wall :

L =	1.9	m
H =	7.9	m
h1 =	4.7	m
h2 =	3	m



Vertical setting out of WB- as per TW-404

From previous page:

F1=WB-01=	2.9	kN
F2=WB-02=	4	kN
F3=WB-03=	1.6	kN

RC underpining Checks

- refer to next pages for analysis input and output
- FOS wind = uls = 1.4

Applied Vertical Tension / Compression = 24.2 kN
Applied Horizontal = 7.9kN + 0.6kN= 8.5 kN

Check Sliding:

Resistance due to friction to soil from self-weigth of wall and passive pressure

Applied Horizontal = 8.5 kN

- Passive force resistance =

Kp x red factor (1.0) =	2.0			
Hp = behind u/pin=	3.0	m		
g =	18	kN/m3		
PP = 0.5 x g x Hp^2 x Kp =	165.2	kN/m/m	= P x 1m=	165.2 kN
			FOS passive resistance only =	19.44 > 1.5

AXIOM STRUCTURES

Uplift:
Base to be backfilled to prevent uplift

Fup= vertical= 24.2 kN

Resistance force:
Swt of base= 19.0 kN (1m x 2.4m x 3m x 24kN/m2)
Swt of backfill= 33.6 kN (1.0m x 2.1m x 1m x 16kN/m2)
F res = 52.6 kN

Factor of Safety FOS = F res / Fup = 2.17 **> 1.5 OK**

Rake to base connection check

Performance Data at Standard Embedment Depth

SIZE	CONCRETE, $f_{ck,cube}$ = 30N/mm2 (C20/25)														
	CHARACTERISTIC RESISTANCE (kN)				DESIGN RESISTANCE (Factored) (kN)				RECOMMENDED LOAD (Unfactored) (kN)				CHARACTERISTIC EDGE DISTANCE (mm)		CHARACTERISTIC SPACING
	TENSION (N_{Rk})		SHEAR (V_{Rk})		TENSION (N_{Rd})		SHEAR (V_{Rd})		TENSION (N_{rec})		SHEAR (V_{rec})		TENSION ($C_{cr,N}$)	SHEAR ($C_{cr,V}$)	TENSION & SHEAR ($S_{cr,N}$) ($S_{cr,V}$)
	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade	5.8 Grade	8.8 Grade			
M8	15.3	21.5	9.9	15.4	8.1	11.9	7.9	12.3	5.8	8.5	5.7	8.8	100	130	130
M10	22.7	33.8	15.7	24.1	10.8	17.8	12.6	19.3	7.7	12.8	9.0	13.8	130	150	150
M12	34.5	52.9	22.9	35.2	15.7	26.1	18.3	28.2	11.2	18.7	13.1	20.1	150	170	170
M16	63.1	73.4	42.5	65.1	26.3	36.3	34.0	52.1	18.8	26.0	24.3	37.2	170	190	190
M20	100.5	110.2	66.8	106.4	41.9	52.5	53.4	85.1	29.9	37.5	38.2	60.8	220	220	220
M24	128.1	136.1	95.7	152.5	51.2	63.7	76.6	122.0	36.6	45.5	54.7	87.1	260	260	260
M30	178.4	194.0	155.7	248.6	71.4	88.2	124.6	198.8	51.0	63.0	89.0	142.0	340	340	340

Edge Distance (Concrete Only)

EDGE (mm)	TENSILE : EDGE REDUCTION FACTORS							SHEAR : EDGE REDUCTION FACTORS						
	M8	M10	M12	M16	M20	M24	M30	M8	M10	M12	M16	M20	M24	M30
60	0.76							0.50						
70	0.82	0.75						0.58	0.50					
80	0.88	0.80	0.74					0.66	0.57	0.50				
90	0.94	0.85	0.78					0.75	0.64	0.56				
100	1.00	0.90	0.83	0.77				0.83	0.71	0.62	0.52			
110		0.95	0.87	0.81				0.92	0.78	0.69	0.58	0.50		
130		1.00	0.96	0.89	0.77			1.00	0.93	0.81	0.68	0.59	0.50	
150			1.00	0.96	0.83	0.76			1.00	0.94	0.79	0.68	0.57	
170				1.00	0.88	0.81				1.00	0.89	0.77	0.65	0.50
190					0.94	0.86	0.75				1.00	0.86	0.73	0.56
220					1.00	0.93	0.80					1.00	0.85	0.65
260						1.00	0.86						1.00	0.76
300							0.92							0.88
340							1.00							1.00

Spacing (Concrete Only)

SPACING (mm)	TENSILE & SHEAR REDUCTION FACTORS						
	M8	M10	M12	M16	M20	M24	M30
60	0.80						
70	0.83	0.80					
80	0.87	0.83	0.80				
90	0.90	0.86	0.83				
100	0.93	0.89	0.85	0.81			
110	0.97	0.91	0.87	0.83	0.80		
130	1.00	0.97	0.92	0.87	0.84	0.80	
150		1.00	0.97	0.92	0.87	0.83	
170			1.00	0.96	0.91	0.86	0.80
190				1.00	0.95	0.89	0.82
220					1.00	0.94	0.85
260						1.00	0.90
300							0.95
340							1.00

Use 4M16 Resin Anchors = Rawl R-Kex , cmin=

Shear:
cv = 150 = Edge 0.79 s = 250 = 1 fb_n = C30 = 1

Vrd c = (Vrd-nom=52.1kN) 41.2 kN / anchor
Vrd s = M16 8.8 = 58.9 kN / anchor

Shear capacity for 4 anchors= 164.6 kN > Vuls 12 kN

Tension:

cv = 150 = Edge 0.96 s = 250 = 1 fb_n = C30 = 1

V red t = pull out= 34.8 kN/anchors

Tnesion capacity for 4 anchors= 139.4 kN > Tuls 34 kN

Shear + Tension:

Vrd c/Vuls + Vred t/ Tuls= 0.32 < 1.0 hence OK

Use 4M16 at 250crs / per rake

AXIOM STRUCTURES

Check members of raking shores

- refer to next pages for analysis input and output
- FOS wind = uls = 1.4

A - Vertical shore check

Compression check

L effective =	3.1	m				
Fsls A =	24	kN				
Fuls A =	34	kN	(gf = 1.4)			
Try 152x152x30UC S275:						
Pcy= (Le=8m)=	147	kN	(from Blue Book)	Fuls/Pcy=	0.16	hence OK

Bending check

L effective = 2x1.85r	3.7	m				
Msls =	4	kNm				
Muls =	5.9	kNm				
Try 152x152x30UC S275:						
Mb= (Le=3.7m)=	48.8	kN	(from Blue Book)	Muls/Mb =	0.09	hence OK

Combined check

Fus/Pcy + Muls/Mb = **0.25** < 1.0 OK

def at top = 3.2 mm

H/top L =1.85m = 578 > L/180 OK **Use 152UC30 S275**

B - Raking shore check

L effective =	6.5	m				
Fsls =	25	kN				
Fuls =	36	kN	(gf = 1.4)			
Try 152x152x30UC S275:						
Pcy = (Le=6.5m) =	187	kN	(from Blue Book)	Fuls/Pcy=	0.19	hence OK

Bending check

L effective =	3.8	m				
Msls =	1	kNm				
Muls =	1.3	kNm				
Try 152x152x30UC S275:						
Mb= (Le=3.2m)=	52.3	kN	(from Blue Book)	Muls/Mb =	0.02	hence OK

Combined check

Fus/Pcy + Muls/Mb = **0.21** < 1.0 OK **Use 152UC30 S275**

Uplift of vertical rake resisted by fixing to existing wall and new RC wall

Vertical uplift force = 24.2 kN

cv > 170 = Edge 1 s = 800 = 1 fb_n = C30 = 1

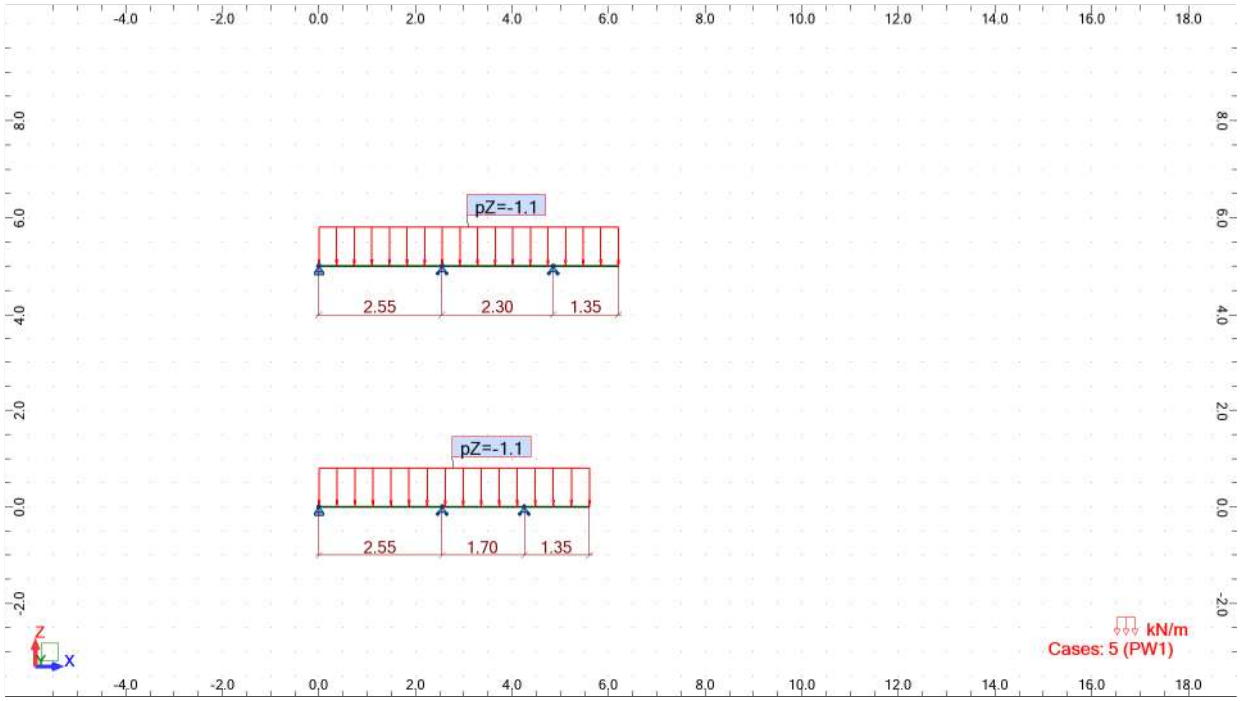
Vrd c = (Vrd-nom=35.2kN) 35.2 kN / anchor

Shear capacity for 4 anchors= 140.8 kN > Vuls 24 kN

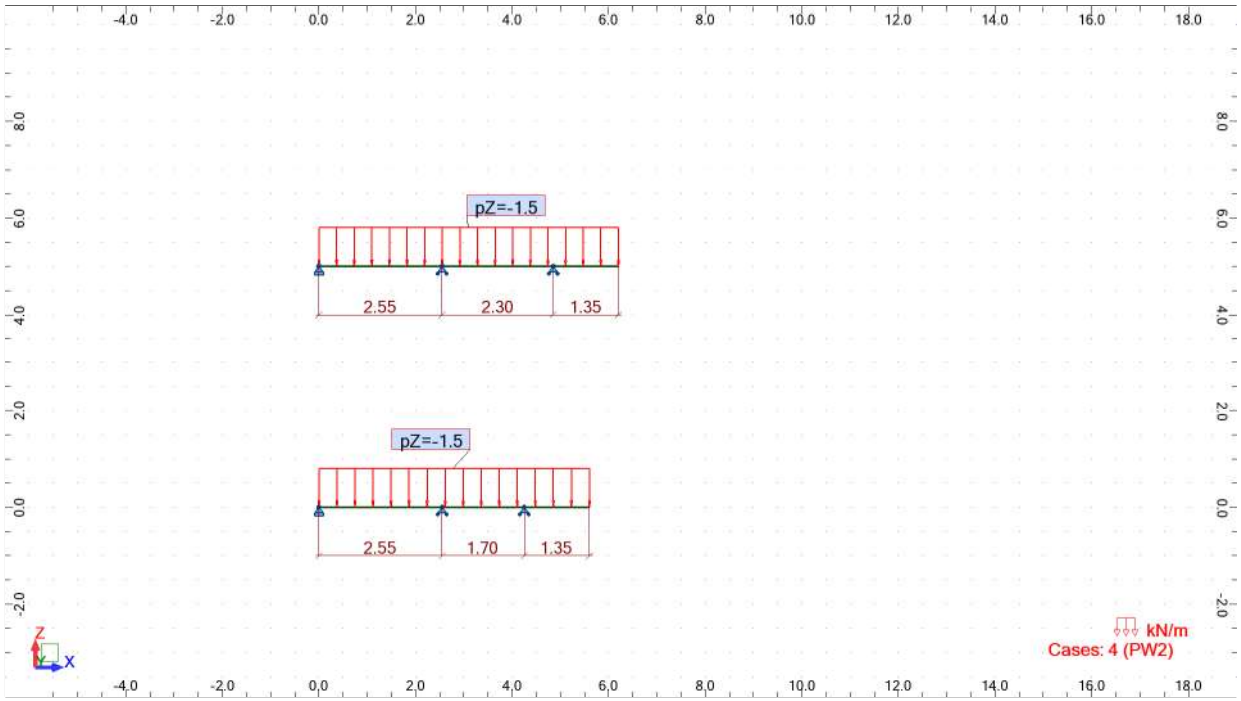
Check uplift of the rake
- to be resited by self weight of existing front façade
- walling beams to be fiixd to front steel frame

Ex. Wall = 225thk wall x2m(h) x (2x1.1m+2x0.8m) = 38 kN FOS = 1.6 > 1.5 OK

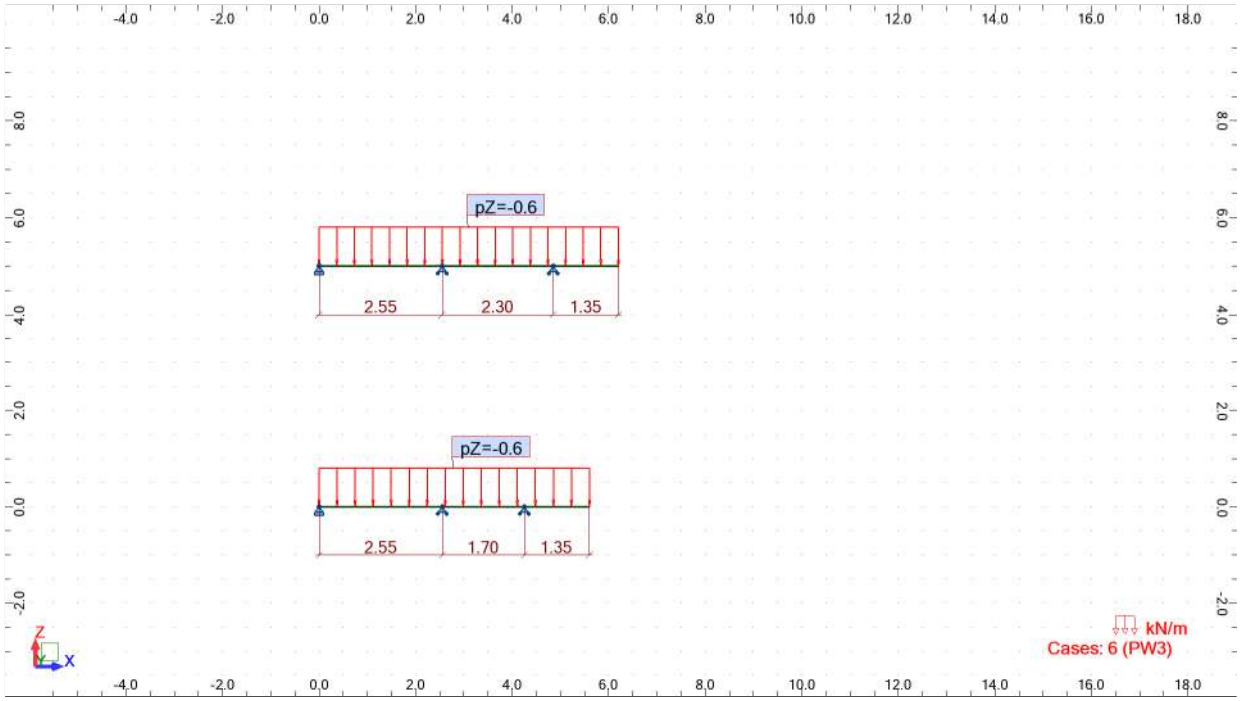
View - Cases: 5 (PW1)



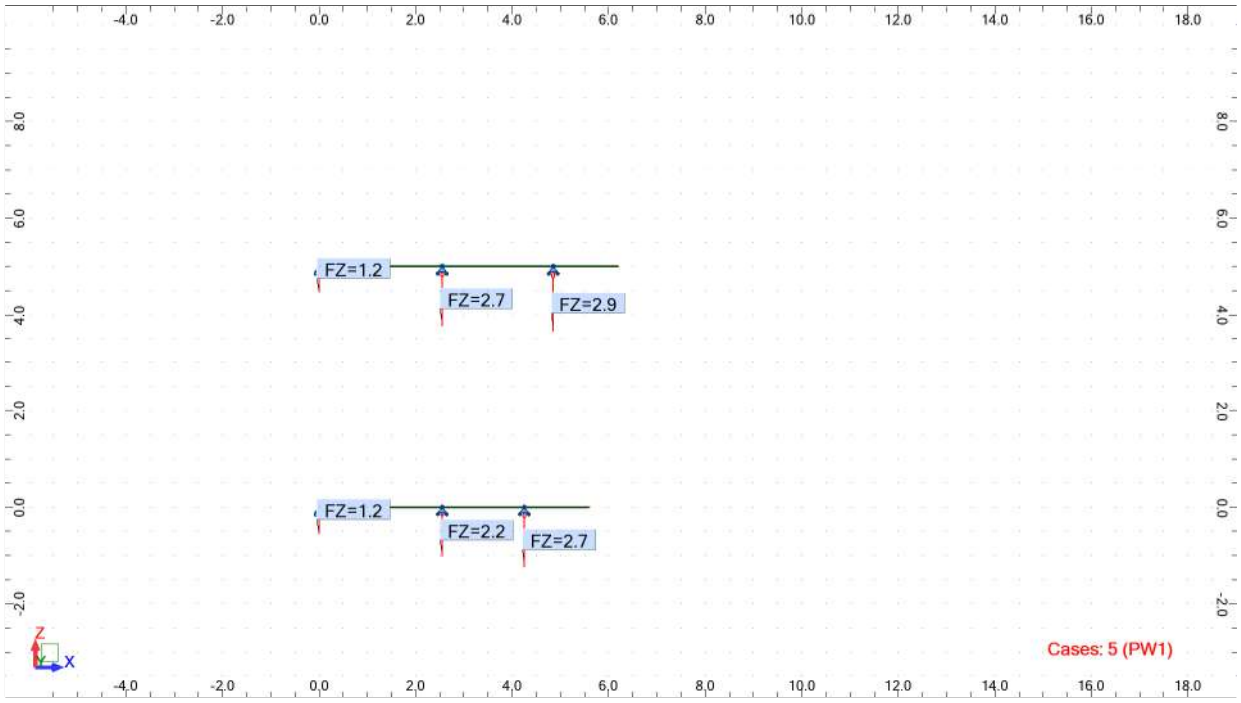
View - Cases: 4 (PW2)



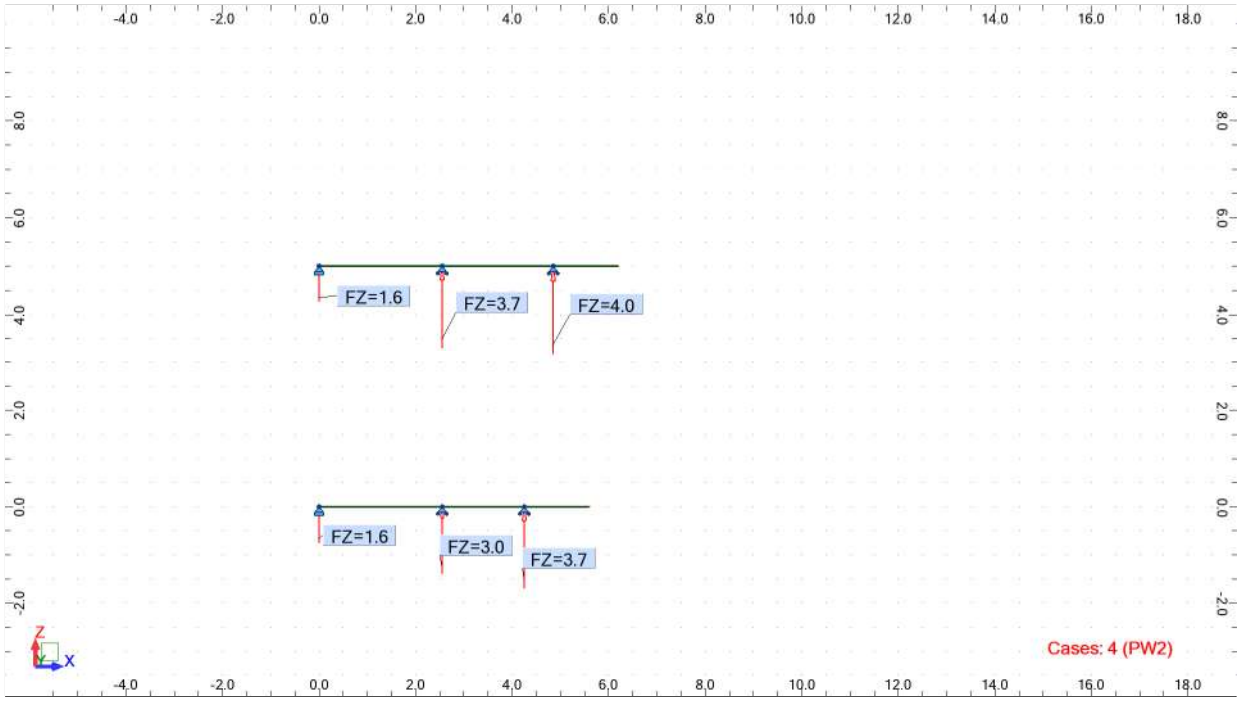
View - Cases: 6 (PW3)



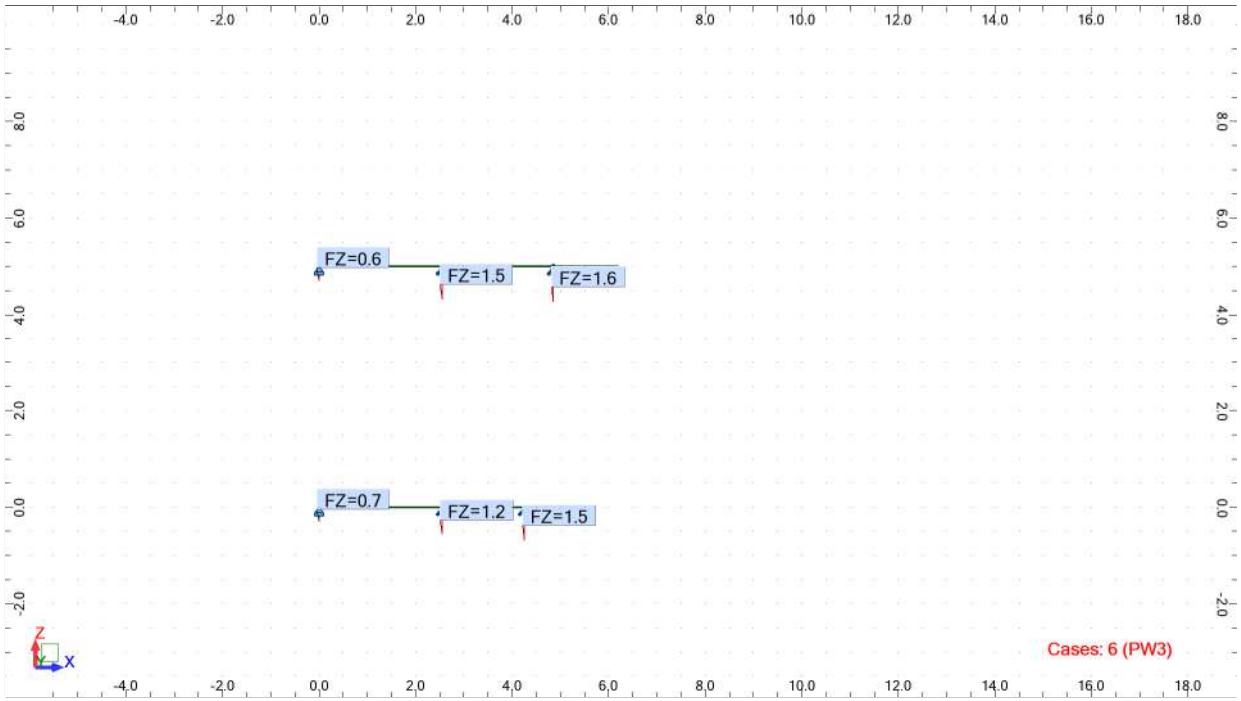
View - Reaction forces(kN), Cases: 5 (PW1)



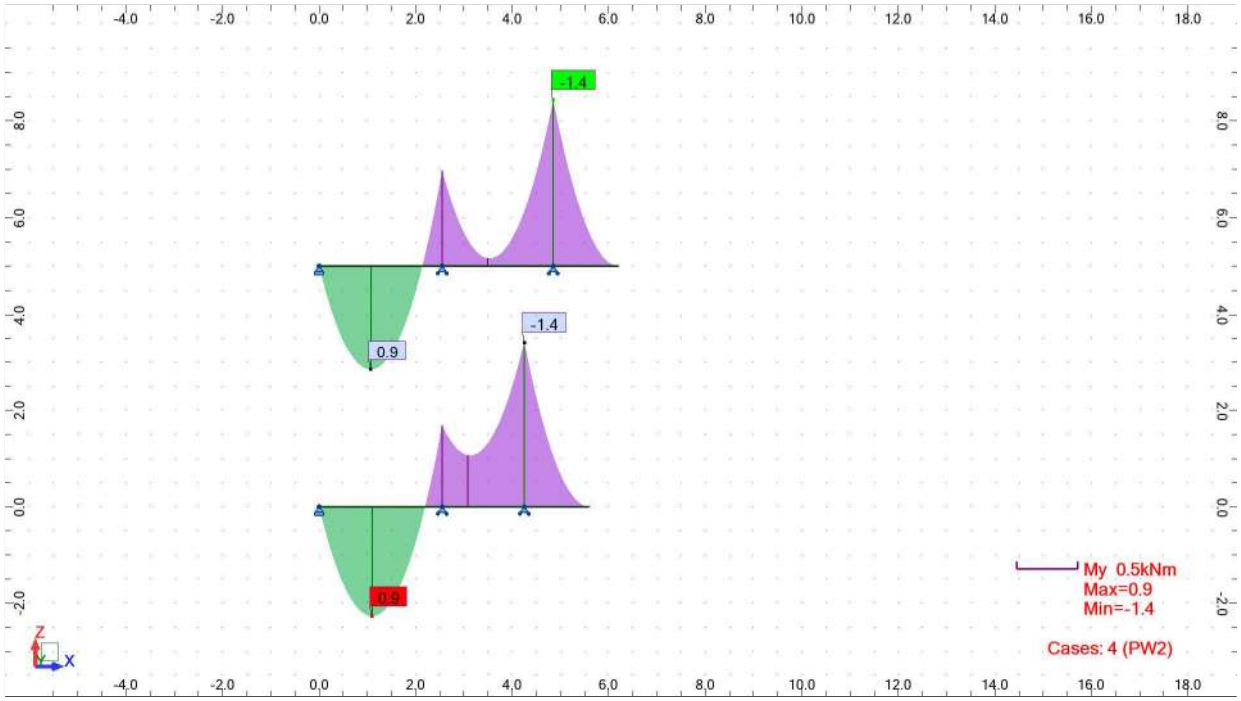
View - Reaction forces(kN), Cases: 4 (PW2)



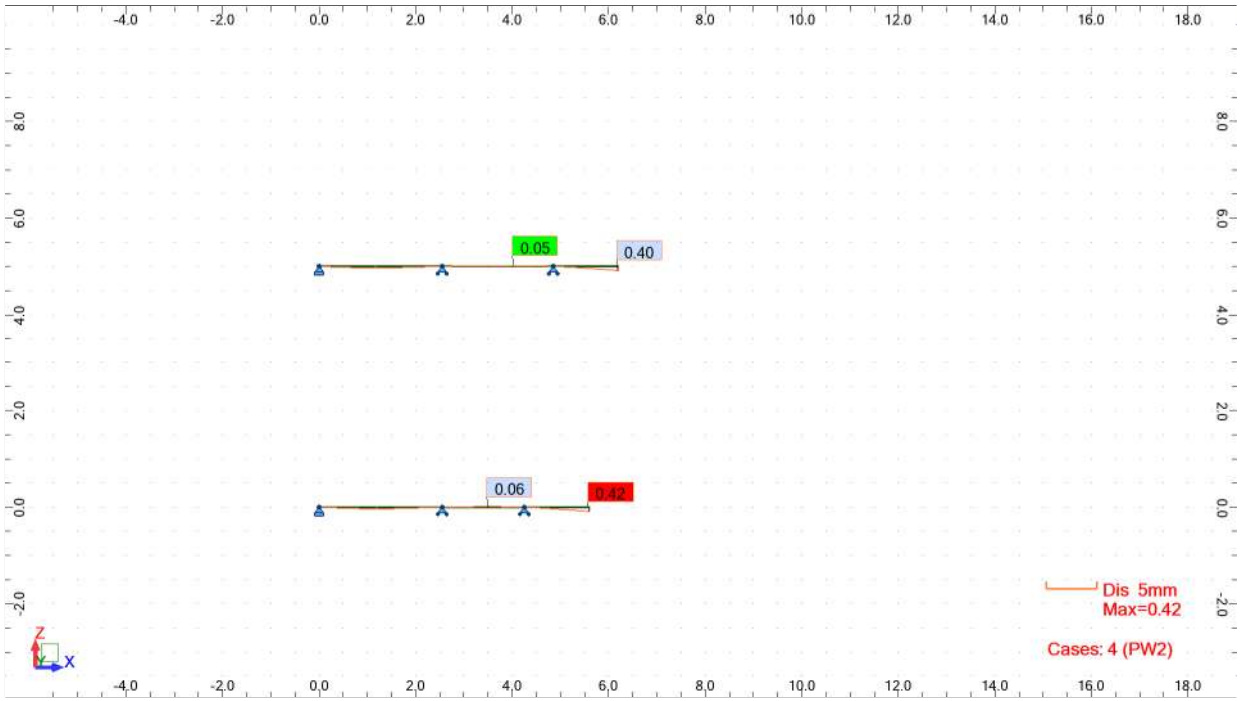
View - Reaction forces(kN), Cases: 6 (PW3)



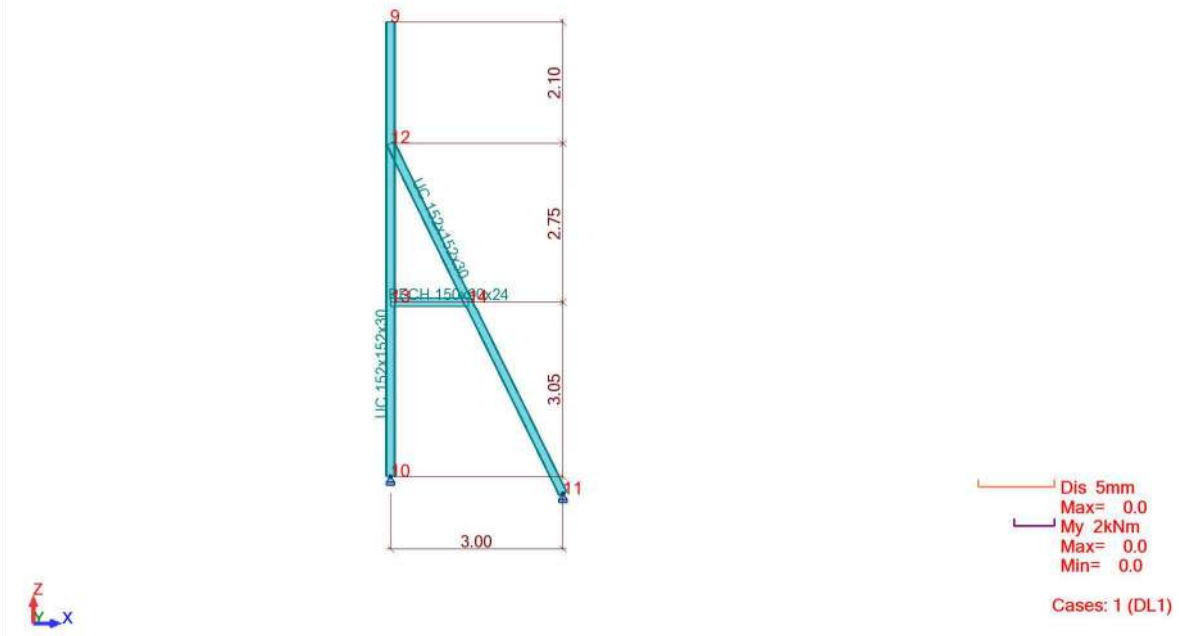
View - MY, Cases: 4 (PW2)



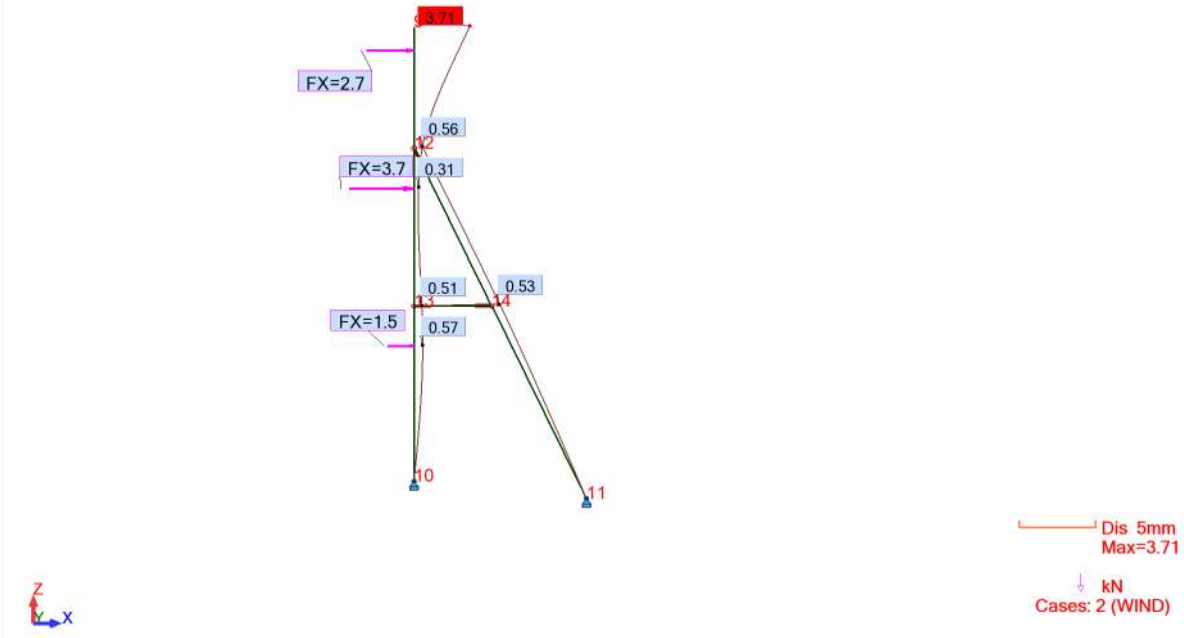
View - Exact deformation(s), Cases: 4 (PW2)



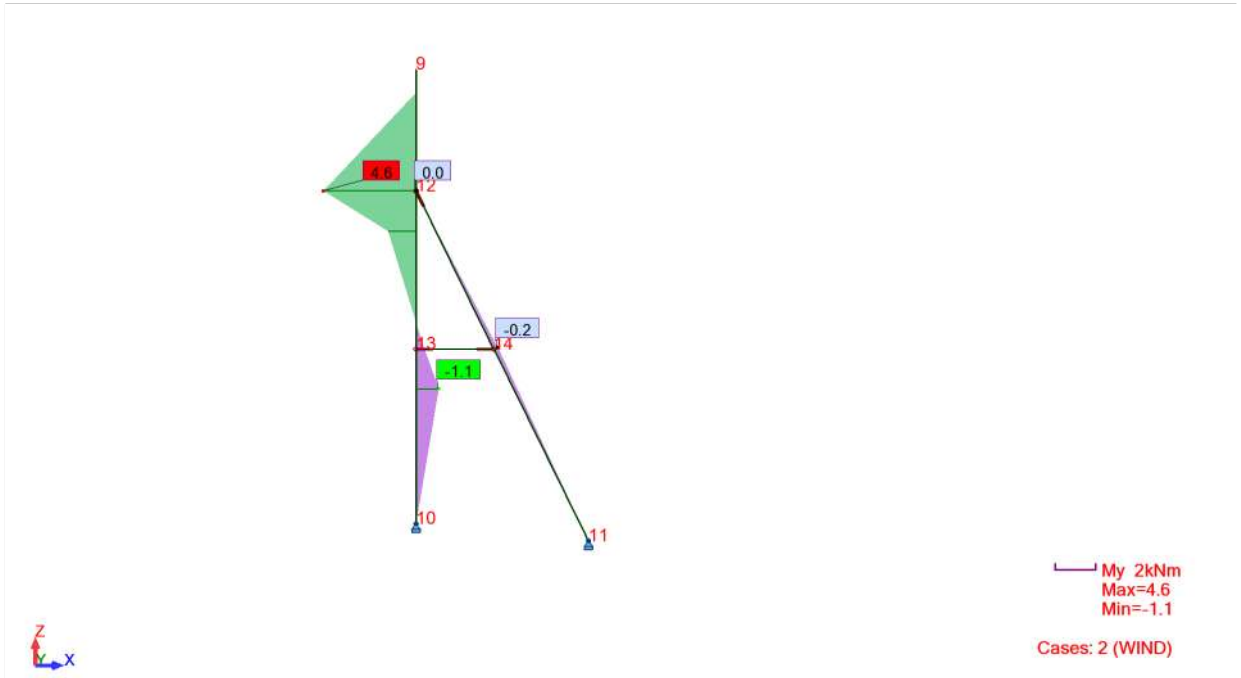
View - MY,Deformation,Reaction forces(kN), Cases: 1 (DL1)



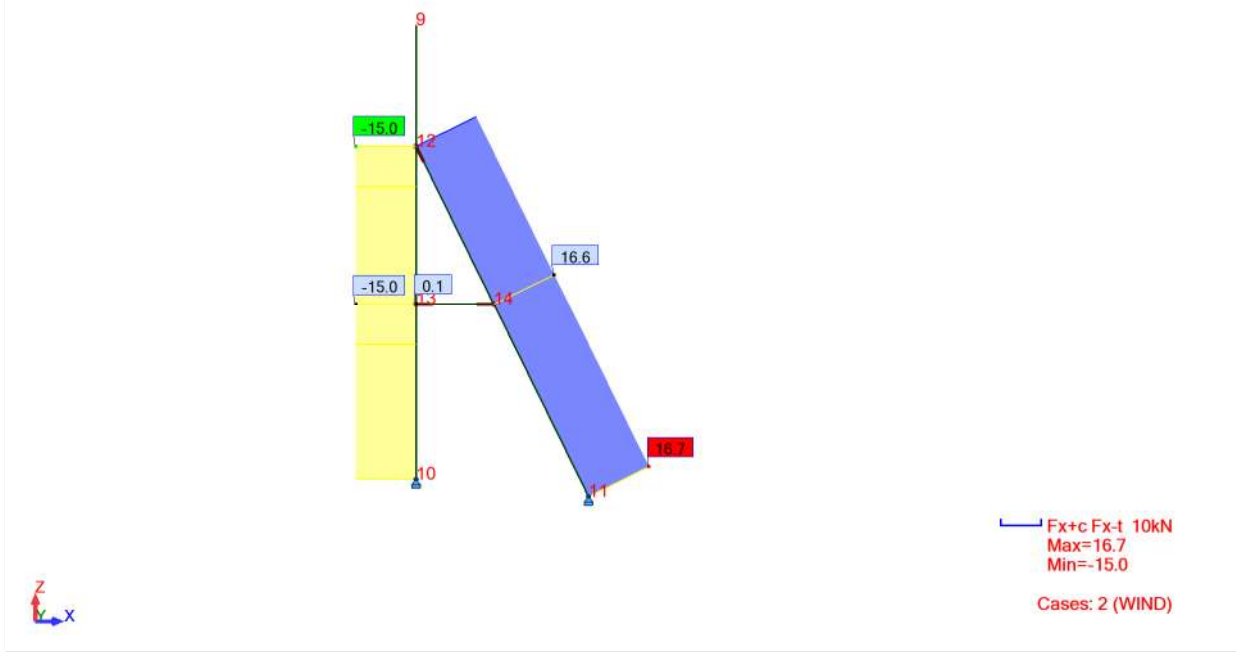
View - Deformation, Cases: 2 (WIND)



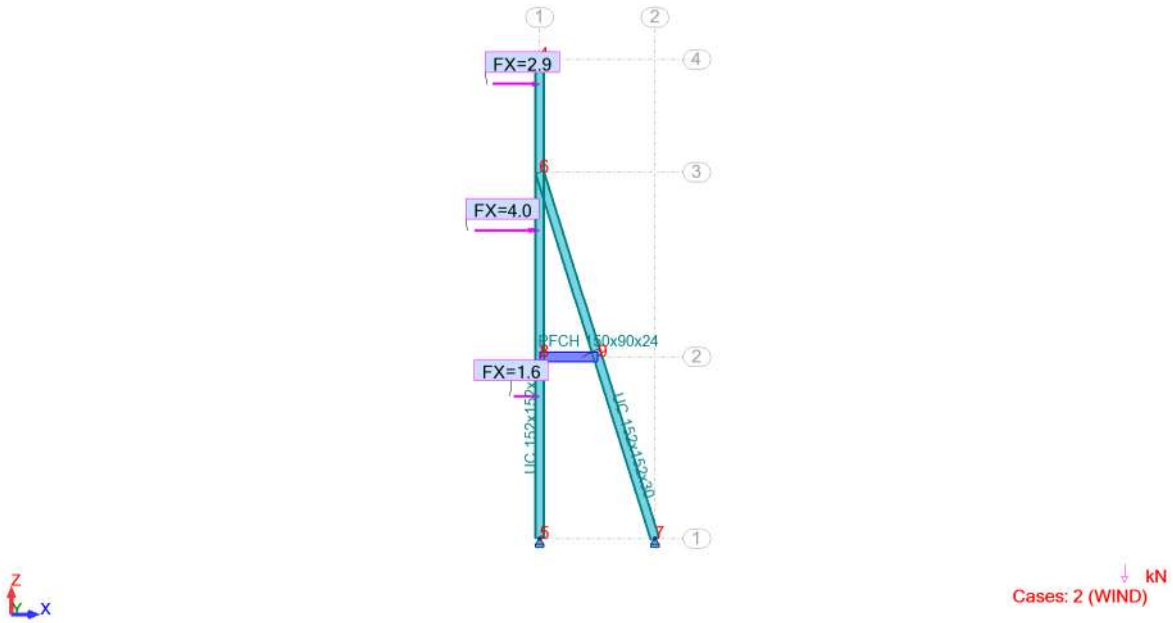
View - MY, Cases: 2 (WIND)



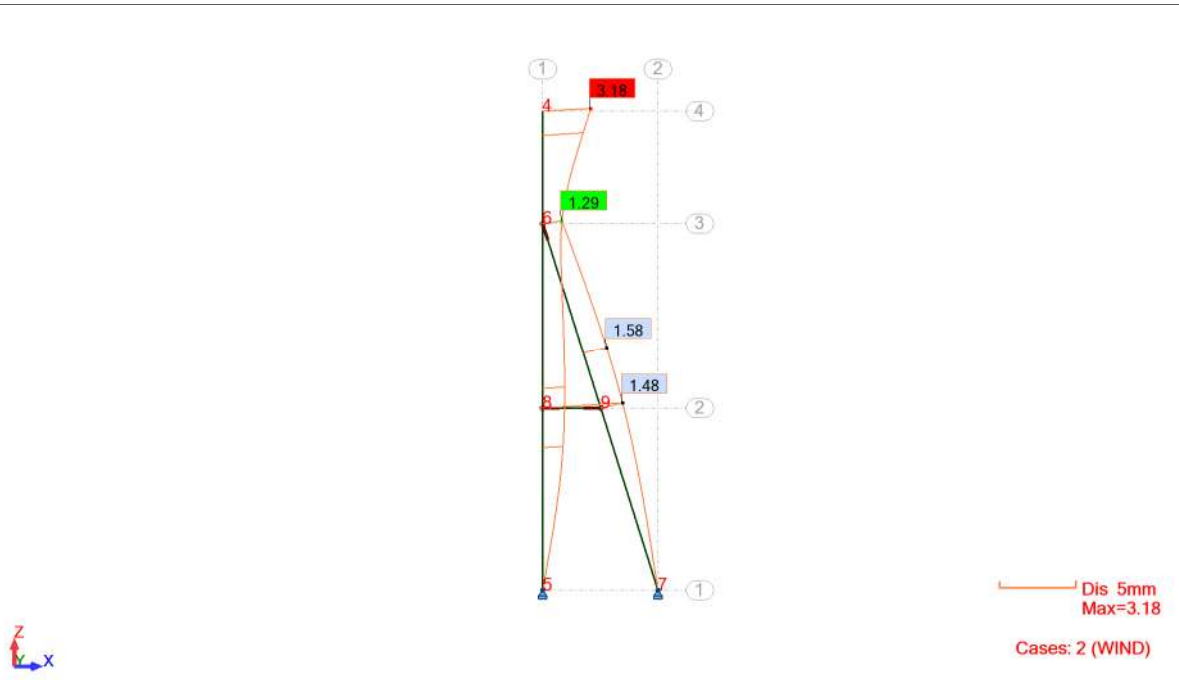
View - FX, Cases: 2 (WIND)



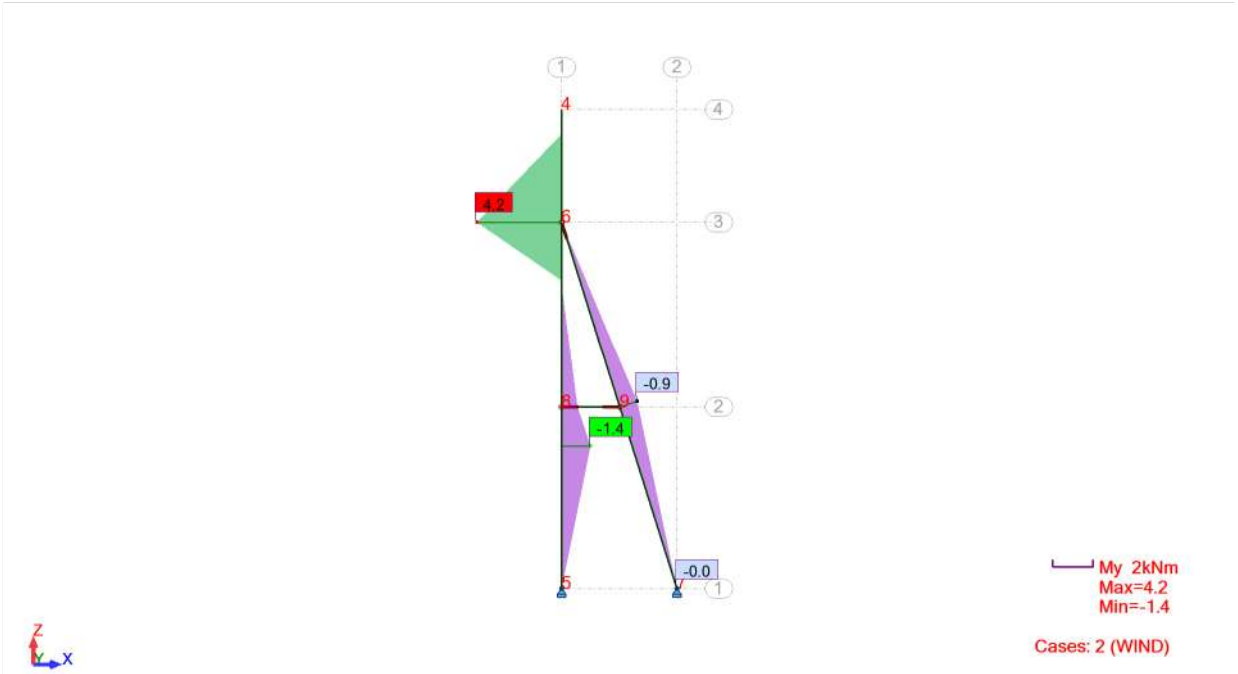
View - Cases: 2 (WIND) 1



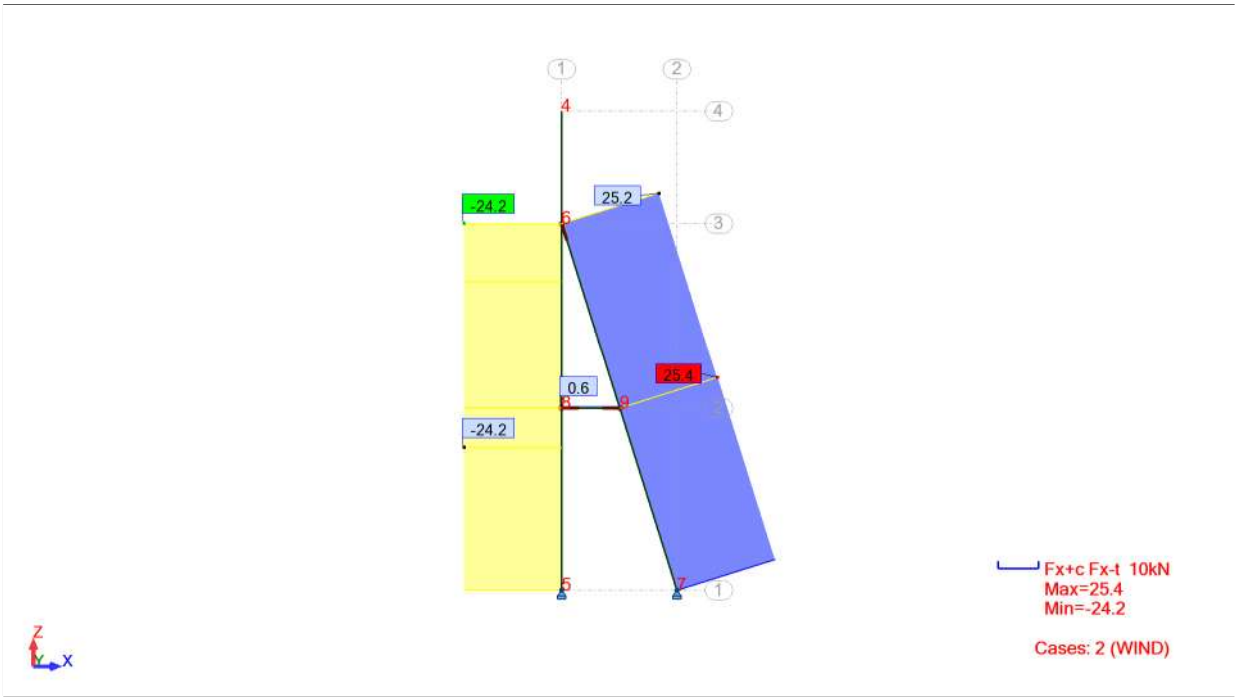
View - Exact deformation(s), Cases: 2 (WIND)



View - MY, Cases: 2 (WIND)



View - FX, Cases: 2 (WIND)



View - Reaction forces(kN), Cases: 2 (WIND) 1