Αντιστήριξη αρχοντικού Χασάν Μπέη

T248_02

Τεύχος Στατικών Υπολογισμών

Περιεχόμενα

Κατάλογος Εικόνων

1. Τεχνική Περιγραφή έργου

Η παρούσα μελέτη αφορά την ανέγερση συστήματος αντιστήριξης του αρχοντικού Χασάν Μπέη στη Μεσαιωνική Πόλη της Ρόδου. Το μνημείο το οποίο βρίσκεται πλησίον της πλατείας Σύμης όπως φαίνεται και στην Εικ. 1 έχει υποστεί εκτεταμένες ζημιές λόγω φθοράς οι οποίες κατέληξαν και σε μερική κατάρρευση στη βορειοανατολική γωνία του όπως φαίνεται στην Εικ. 2. Πέρα από το τμήμα της κατάρρευσης, στο κτίριο εμφανίζονται έντονες ρηγματώσεις και αποδιοργάνωση της τοιχοποιίας όπως φαίνεται στην Εικ. 3 και Εικ. 4.

Εικ. 1 Θέση μνημείου στην πλατεία Σύμης

Εικ. 2 Κατάρρευση τμήματος κτιρίου

Εικ. 3 Αποδιοργάνωση και ρηγματώσεις στην τοιχοποιία

Εικ. 4 Αποδιοργάνωση και ρηγματώσεις στην τοιχοποιία

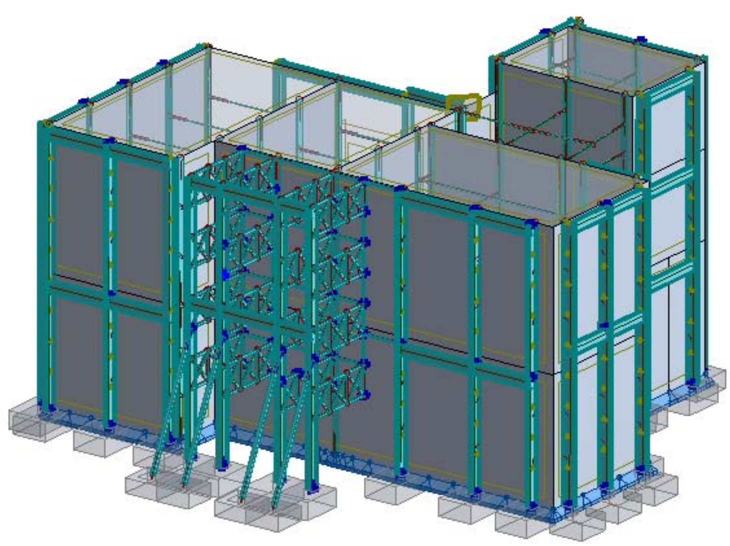
Στην παρούσα φάση έχει εκπονηθεί μελέτη αποκατάστασης του μνημείου. Λόγω της επικινδυνότητάς του όμως, είναι απαραίτητο να αντιστηριχθεί προκειμένου ν αεκτελεστούν απρόσκοπτα και με ασφάλεια οι εργασίες αποκατάστασης.

Σκοπός της παρούσας μελέτης είναι ο σχεδιασμός ενός συστήματος αντιστήριξης του κτιρίου, τόσο εσωτερικά όσο και εσωτερικά ώστε να αποτραπεί περεταίρω κατάρρευσή του. Επιπλέον, θα προταθεί διαμόρφωση συστήματος ικριωμάτων όψεως η γεωμετρία των οποίων θα εξαρτηθεί από το σύστημα αντιστήριξης, καθώς και θα προταθεί υποστύλωση των ορόφων.

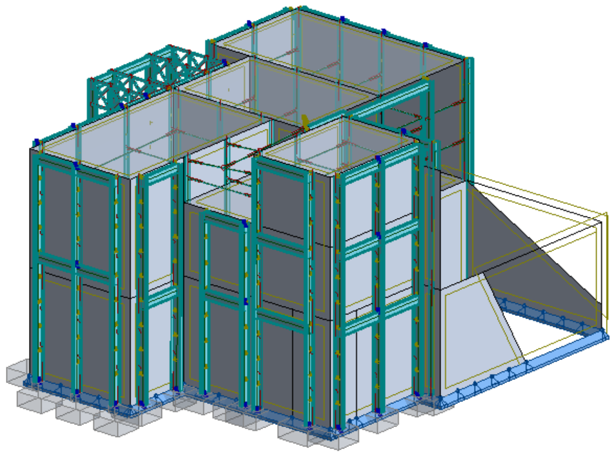
2. Διαμόρφωση συστήματος αντιστήριξης

Δεδομένης της επικινδυνότητας του κτιρίου, η διαμόρφωση του συστήματος αντιστήριξης ουσιαστικά υπαγορεύεται από την ασφάλεια κατά την εκτέλεση των εργασιών. Επιπλέον, ένας άλλος περιοριστικός παράγοντας είναι η ύπαρξη όμορων κτισμάτων και τμήματος του θαλάσσιου τείχους της μεσαιωνικής Πόλης που δημιουργούν προβλήματα χωροθέτησης και θεμελίωσης.

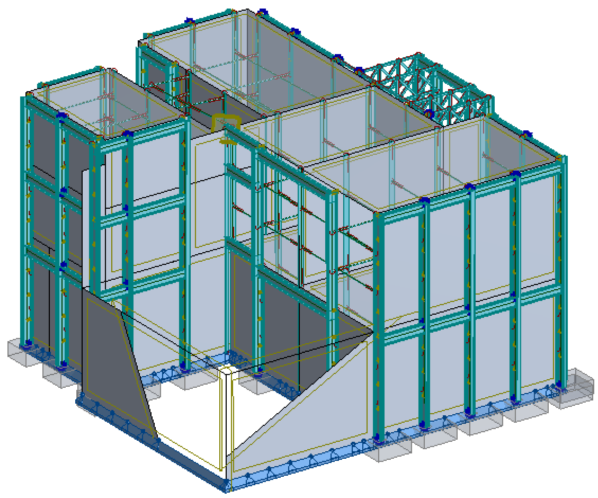
Με δεδομένα τα παραπάνω, επιλέγεται να γίνει ανέγερση μεταλλικών πλαισίων τα οποία θα είναι πακτωμένα στη βάση τους και τα οποία θα αγκαλιάσουν το κτίριο. Τα πλαίσια θα είναι αρκετά πυκνά και μεταξύ τους και της παρειάς της τοιχοποιίας θα παρεμβάλλεται τελάρωμα από σανίδες οικοδομικής ξυλείας και τεμαχίων διογκωμένηςπολυστερίνης (DOW) με σκοπό να μην προκύψουν τοπικές εντάσεις κατά την επαφή της τοιχοποιίας με τα μεταλλικά μέλη. Το σύστημα αντιστήριξης σε 3Δ απεικονίσεις φαίνεται στις ακόλουθες Εικόνες.



Εικ. 5 3Δ Απεικόνιση συστήματος αντιστήριξης



Εικ. 6 3Δ απεικόνιση συστήματος αντιστήριξης



Εικ. 7 3Δ απεικόνιση συστήματος αντιστήριξης

Πέρα από τα μεταλλικά μέλη που θα τοποθετηθούν εξωτερικά του κτιρίου, οι εργασίες αντιστήριξης και υποστύλωσης θα συνεχιστούν και στο εσωτερικό. Ο λόγος είναι ότι υπάρχει κίνδυνος να καταρρεύσουν τοι τοίχοι προς τα μέσα, ενώ πρέπει να υποστυλωθούν και τα δάπεδα τα οποία είναι από άοπλο σκυρόδεμα που υποστηρίζεται από παλιά και διαβρωμένη ξυλεία. Για το λόγο αυτό, στο εσωτερικό του κτιρίου διαμορφώνεται ένα σύστημα από πύργους βαρέως τύπου οι οποίοι από επίπεδο σε επίπεδο έχουν συνέχεια καθ’ ύψος. Επιπλέον του συστήματος αυτού, διαμορφώνονται και οριζόντιοι σωλήνες βαρέως τύπου οι οποίοι ουσιαστικά δημιουργούν περασιές από εξωτερικό υποστύλωμα σε εξωτερικό υποστύλωμα. Με την προσθήκη των εσωτερικών σωλήνων, οι οποίοι συνδέονται με σφιγκτήρες με τους πύργους, ουσιαστικά η οριζόντια μετακίνηση των τοίχων παραλαμβάνεται πλήρως από τα πακτωμένα πλάισια.

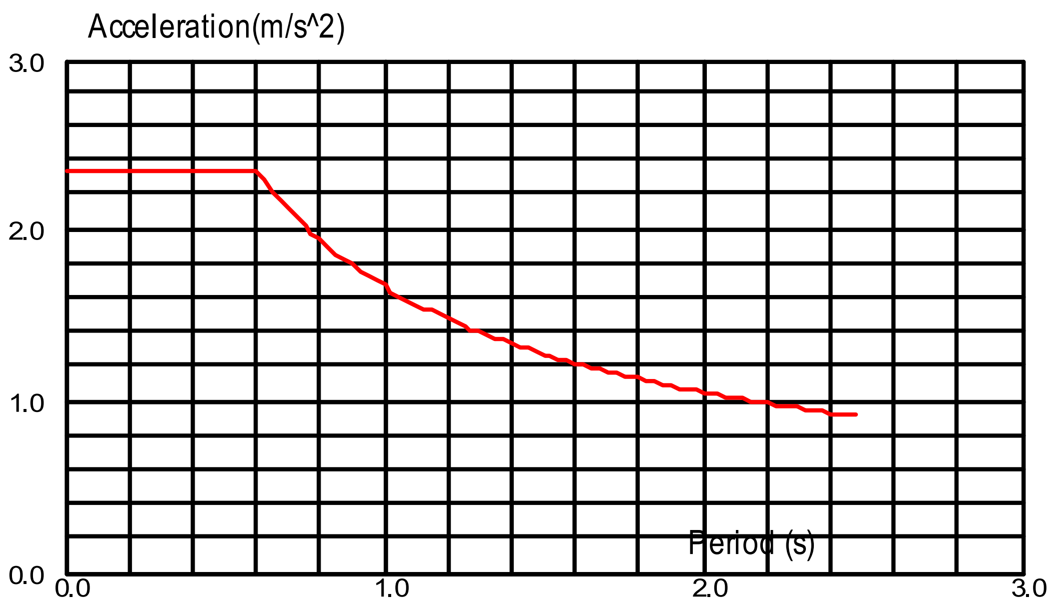
Τα μεταλλικά πλαίσια θεμελιώνονται στο υφιστάμενο έδαφος και διαμορφώνεται έδραση πάκτωσης. Δεδομένης της επικινδυνότητας του κτιρίου και δεδομένου ότι όταν θα εκτελούνται οι εργασίες σκυροδέτησης δεν θα υπάρχει ακόμα αντιστήριξη, η σκυροδέτηση της βάσης και η τοποθέτηση των μεταλλικών υποστυλωμάτων θα πρέπει να γίνουν με χρήση προστατευτικού κουβουκλίου ευθύνη του οποίου θα έχει ο ανάδοχος.

3. Φορτίσεις

Οι φορτίσεις που υλοποιούνται στο προσομοίωμα είναι τα ίδια βάρη του κτιρίου και της κατασκευής αντιστήριξης, και η σεισμική ώθηση. Δεδομένου ότι πρόκειται για προσωρινή αντιστήριξη, η σεισμική ώθηση δεν είναι πλήρης αλλά λαμβάνεται μειωμένη. Συγκεκριμένα, γίνεται η παραδοχή ότι η ανάγκη για την αντιστήριξη θα διαρκέσει 3 έτη, οπότε σύμφωνα με τις διατάξεις του EN1998-2 A2§2, και λαμβάνοντας τιμή για τον συντελεστή K ίση με 0.3, το ποσοστό της σεισμικής επιτάχυνσης σε σχέση με τα 0.24g που ισχύει για την περιοχή είναι ίσο με 0.53. Εν τέλει υιοθετείται ποσοστό 0.60:

Analysis type: Seismic-E.A.K. 2000

Excitation direction:
X = 1.000
Y = 1.000
Z = 0.000



Data:

Zone	:	II
Importance factor	:	S2
Soil category	:	B
Behavior factor	:	1.500
Foundation coefficient	:	0.600
Direction	:	Horizontal
Damping	:	x = 5.00 %

Spectrum parameters:

Damping correction : $\eta = [7/(2+\xi)]^{0,5} =$ 1.000

a = 0.240 g_1 = 1.000

T_1 = 0.150 T_2 = 0.600

Οι φορτίσεις και οι συνδυασμοί είναι οι ακόλουθοι:

Case	Label	Case name	Nature	Analysis type
1	DL1	DL1	Structural	Static - Linear
2	MOD2	Modal Ecc X-		Modal
3	SEI_X3	Seismic E.A.K. 2000 Ecc X- Direction_X	seismic	Seismic-E.A.K. 2000
4	SEI_Y4	Seismic E.A.K. 2000 Ecc X- Direction_Y	seismic	Seismic-E.A.K. 2000
5	SPE_NEW5	1 * X 0.3 * Y	seismic	Linear Combination
6	SPE_NEW6	1 * X -0.3 * Y	seismic	Linear Combination
7	SPE_NEW7	0.3 * X 1 * Y	seismic	Linear Combination
8	SPE_NEW8	0.3 * X -1 * Y	seismic	Linear Combination
9	MOD9	Modal Ecc X+		Modal
10	SEI_X10	Seismic E.A.K. 2000 Ecc X+ Direction_X	seismic	Seismic-E.A.K. 2000
11	SEI_Y11	Seismic E.A.K. 2000 Ecc X+ Direction_Y	seismic	Seismic-E.A.K. 2000
12	SPE_NEW12	1 * X 0.3 * Y	seismic	Linear Combination
13	SPE_NEW13	1 * X -0.3 * Y	seismic	Linear Combination
14	SPE_NEW14	0.3 * X 1 * Y	seismic	Linear Combination
15	SPE_NEW15	0.3 * X -1 * Y	seismic	Linear Combination
16	MOD16	Modal Ecc Y-		Modal
17	SEI_X17	Seismic E.A.K. 2000 Ecc Y- Direction_X	seismic	Seismic-E.A.K. 2000
18	SEI_Y18	Seismic E.A.K. 2000 Ecc Y- Direction_Y	seismic	Seismic-E.A.K. 2000
19	SPE_NEW19	1 * X 0.3 * Y	seismic	Linear Combination
20	SPE_NEW20	1 * X -0.3 * Y	seismic	Linear Combination
21	SPE_NEW21	0.3 * X 1 * Y	seismic	Linear Combination
22	SPE_NEW22	0.3 * X -1 * Y	seismic	Linear Combination
23	MOD23	Modal Ecc Y+		Modal
24	SEI_X24	Seismic E.A.K. 2000 Ecc Y+ Direction_X	seismic	Seismic-E.A.K. 2000
25	SEI_Y25	Seismic E.A.K. 2000 Ecc Y+ Direction_Y	seismic	Seismic-E.A.K. 2000
26	SPE_NEW26	1 * X 0.3 * Y	seismic	Linear Combination
27	SPE_NEW27	1 * X -0.3 * Y	seismic	Linear Combination
28	SPE_NEW28	0.3 * X 1 * Y	seismic	Linear Combination
29	SPE_NEW29	0.3 * X -1 * Y	seismic	Linear Combination

Case	Label	Case name	Nature	Analysis type
30	MOD30	Modal Ecc X-Y-		Modal
31	SEI_X31	Seismic E.A.K. 2000 Ecc X-Y-Direction_X	seismic	Seismic-E.A.K. 2-000
32	SEI_Y32	Seismic E.A.K. 2000 Ecc X-Y-Direction_Y	seismic	Seismic-E.A.K. 2-000
33	SPE_NEW-33	1 * X 0.3 * Y	seismic	Linear Combinat-ion
34	SPE_NEW-34	1 * X -0.3 * Y	seismic	Linear Combinat-ion
35	SPE_NEW-35	0.3 * X 1 * Y	seismic	Linear Combinat-ion
36	SPE_NEW-36	0.3 * X -1 * Y	seismic	Linear Combinat-ion
37	MOD37	Modal Ecc X-Y+		Modal
38	SEI_X38	Seismic E.A.K. 2000 Ecc X-Y+ Direction_X	seismic	Seismic-E.A.K. 2-000
39	SEI_Y39	Seismic E.A.K. 2000 Ecc X-Y+ Direction_Y	seismic	Seismic-E.A.K. 2-000
40	SPE_NEW-40	1 * X 0.3 * Y	seismic	Linear Combinat-ion
41	SPE_NEW-41	1 * X -0.3 * Y	seismic	Linear Combinat-ion
42	SPE_NEW-42	0.3 * X 1 * Y	seismic	Linear Combinat-ion
43	SPE_NEW-43	0.3 * X -1 * Y	seismic	Linear Combinat-ion
44	MOD44	Modal Ecc X+Y-		Modal
45	SEI_X45	Seismic E.A.K. 2000 Ecc X+Y-Direction_X	seismic	Seismic-E.A.K. 2-000
46	SEI_Y46	Seismic E.A.K. 2000 Ecc X+Y-Direction_Y	seismic	Seismic-E.A.K. 2-000
47	SPE_NEW-47	1 * X 0.3 * Y	seismic	Linear Combinat-ion
48	SPE_NEW-48	1 * X -0.3 * Y	seismic	Linear Combinat-ion
49	SPE_NEW-49	0.3 * X 1 * Y	seismic	Linear Combinat-ion
50	SPE_NEW-50	0.3 * X -1 * Y	seismic	Linear Combinat-ion
51	MOD51	Modal Ecc X+Y+		Modal
52	SEI_X52	Seismic E.A.K. 2000 Ecc X+Y+ Direction_X	seismic	Seismic-E.A.K. 2-000
53	SEI_Y53	Seismic E.A.K. 2000 Ecc X+Y+ Direction_Y	seismic	Seismic-E.A.K. 2-000
54	SPE_NEW-54	1 * X 0.3 * Y	seismic	Linear Combinat-ion
55	SPE_NEW-55	1 * X -0.3 * Y	seismic	Linear Combinat-ion
56	SPE_NEW-56	0.3 * X 1 * Y	seismic	Linear Combinat-ion
57	SPE_NEW-57	0.3 * X -1 * Y	seismic	Linear Combinat-ion
58		ULS/1=1*1.35	Structural	Linear Combinat-ion
59		SLS:CHR/1=1*1.00	dead	Linear Combinat-ion
60		ACC:SEI/2=1*1.00 + 3*1.00	dead	Linear Combinat-ion

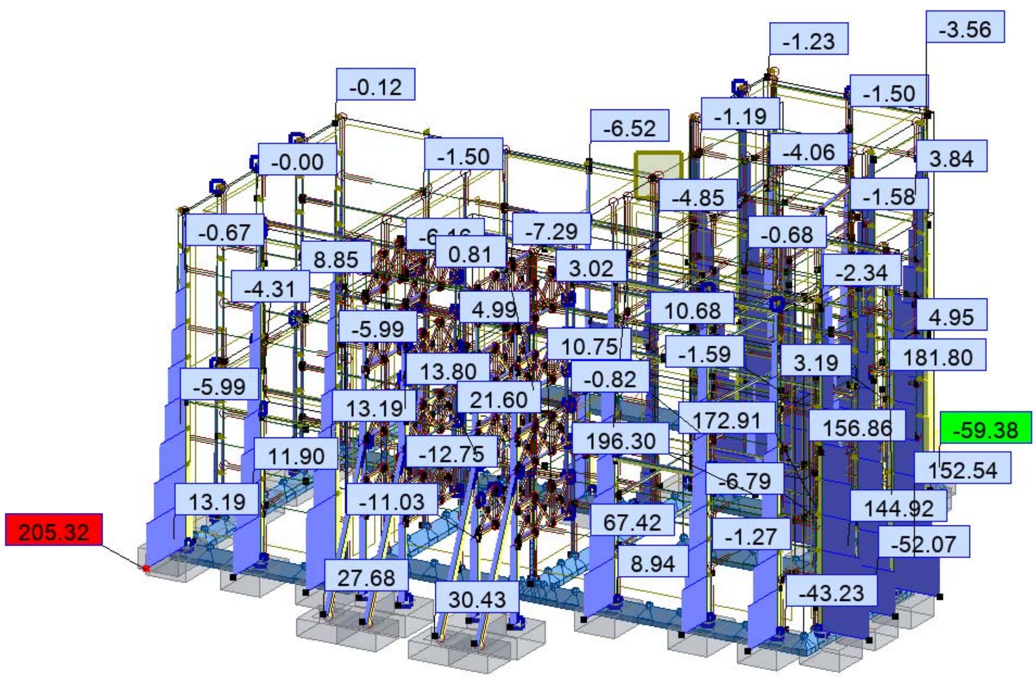
Case	Label	Case name	Nature	Analysis type
61		ACC:SEI/4=1*1.00 + 4*1.00	dead	Linear Combinat-ion
62		ACC:SEI/5=1*1.00 + 5*1.00	dead	Linear Combinat-ion
63		ACC:SEI/6=1*1.00 + 6*1.00	dead	Linear Combinat-ion
64		ACC:SEI/7=1*1.00 + 7*1.00	dead	Linear Combinat-ion
65		ACC:SEI/8=1*1.00 + 8*1.00	dead	Linear Combinat-ion
66		ACC:SEI/9=1*1.00 + 10*1.00	dead	Linear Combinat-ion
67		ACC:SEI/10=1*1.00 + 11*1.00	dead	Linear Combinat-ion
68		ACC:SEI/11=1*1.00 + 12*1.00	dead	Linear Combinat-ion
69		ACC:SEI/12=1*1.00 + 13*1.00	dead	Linear Combinat-ion
70		ACC:SEI/13=1*1.00 + 14*1.00	dead	Linear Combinat-ion
71		ACC:SEI/14=1*1.00 + 15*1.00	dead	Linear Combinat-ion
72		ACC:SEI/15=1*1.00 + 17*1.00	dead	Linear Combinat-ion
73		ACC:SEI/16=1*1.00 + 18*1.00	dead	Linear Combinat-ion
74		ACC:SEI/17=1*1.00 + 19*1.00	dead	Linear Combinat-ion
75		ACC:SEI/18=1*1.00 + 20*1.00	dead	Linear Combinat-ion
76		ACC:SEI/19=1*1.00 + 21*1.00	dead	Linear Combinat-ion
77		ACC:SEI/20=1*1.00 + 22*1.00	dead	Linear Combinat-ion
78		ACC:SEI/21=1*1.00 + 24*1.00	dead	Linear Combinat-ion
79		ACC:SEI/22=1*1.00 + 25*1.00	dead	Linear Combinat-ion
80		ACC:SEI/23=1*1.00 + 26*1.00	dead	Linear Combinat-ion
81		ACC:SEI/24=1*1.00 + 27*1.00	dead	Linear Combinat-ion
82		ACC:SEI/25=1*1.00 + 28*1.00	dead	Linear Combinat-ion
83		ACC:SEI/26=1*1.00 + 29*1.00	dead	Linear Combinat-ion
84		ACC:SEI/27=1*1.00 + 31*1.00	dead	Linear Combinat-ion
85		ACC:SEI/28=1*1.00 + 32*1.00	dead	Linear Combinat-ion
86		ACC:SEI/29=1*1.00 + 33*1.00	dead	Linear Combinat-ion
87		ACC:SEI/30=1*1.00 + 34*1.00	dead	Linear Combinat-ion
88		ACC:SEI/31=1*1.00 + 35*1.00	dead	Linear Combinat-ion
89		ACC:SEI/32=1*1.00 + 36*1.00	dead	Linear Combinat-ion

Case	Label	Case name	Nature	Analysis type
90		ACC:SEI/33=1*1.00 + 38*1.00	dead	Linear Combinat-ion
91		ACC:SEI/34=1*1.00 + 39*1.00	dead	Linear Combinat-ion
92		ACC:SEI/35=1*1.00 + 40*1.00	dead	Linear Combinat-ion
93		ACC:SEI/36=1*1.00 + 41*1.00	dead	Linear Combinat-ion
94		ACC:SEI/37=1*1.00 + 42*1.00	dead	Linear Combinat-ion
95		ACC:SEI/38=1*1.00 + 43*1.00	dead	Linear Combinat-ion
96		ACC:SEI/39=1*1.00 + 45*1.00	dead	Linear Combinat-ion
97		ACC:SEI/40=1*1.00 + 46*1.00	dead	Linear Combinat-ion
98		ACC:SEI/41=1*1.00 + 47*1.00	dead	Linear Combinat-ion
99		ACC:SEI/42=1*1.00 + 48*1.00	dead	Linear Combinat-ion
100		ACC:SEI/43=1*1.00 + 49*1.00	dead	Linear Combinat-ion
101		ACC:SEI/44=1*1.00 + 50*1.00	dead	Linear Combinat-ion
102		ACC:SEI/45=1*1.00 + 52*1.00	dead	Linear Combinat-ion
103		ACC:SEI/46=1*1.00 + 53*1.00	dead	Linear Combinat-ion
104		ACC:SEI/47=1*1.00 + 54*1.00	dead	Linear Combinat-ion
105		ACC:SEI/48=1*1.00 + 55*1.00	dead	Linear Combinat-ion
106		ACC:SEI/49=1*1.00 + 56*1.00	dead	Linear Combinat-ion
107		ACC:SEI/50=1*1.00 + 57*1.00	dead	Linear Combinat-ion
108		ACC:SEI/51=1*1.00 + 3*-1.00	dead	Linear Combinat-ion
109		ACC:SEI/52=1*1.00 + 4*-1.00	dead	Linear Combinat-ion
110		ACC:SEI/53=1*1.00 + 5*-1.00	dead	Linear Combinat-ion
111		ACC:SEI/54=1*1.00 + 6*-1.00	dead	Linear Combinat-ion
112		ACC:SEI/55=1*1.00 + 7*-1.00	dead	Linear Combinat-ion
113		ACC:SEI/56=1*1.00 + 8*-1.00	dead	Linear Combinat-ion
114		ACC:SEI/57=1*1.00 + 10*-1.00	dead	Linear Combinat-ion
115		ACC:SEI/58=1*1.00 + 11*-1.00	dead	Linear Combinat-ion
116		ACC:SEI/59=1*1.00 + 12*-1.00	dead	Linear Combinat-ion
117		ACC:SEI/60=1*1.00 + 13*-1.00	dead	Linear Combinat-ion
118		ACC:SEI/61=1*1.00 + 14*-1.00	dead	Linear Combinat-ion

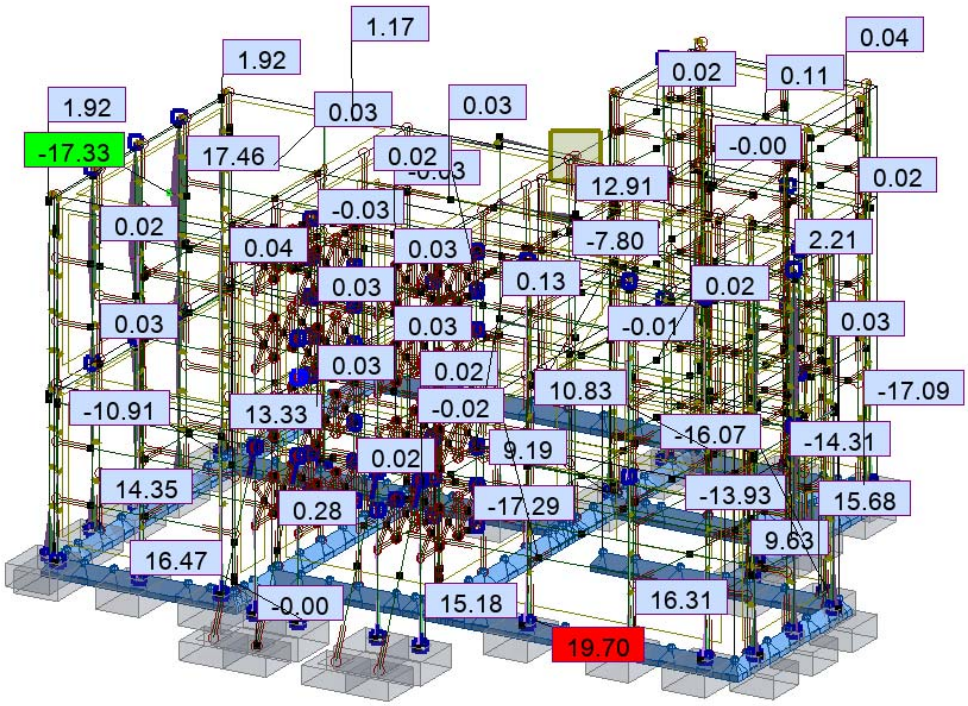
Case	Label	Case name	Nature	Analysis type
119		ACC:SEI/62=1*1.00 + 15*-1.00	dead	Linear Combinat-ion
120		ACC:SEI/63=1*1.00 + 17*-1.00	dead	Linear Combinat-ion
121		ACC:SEI/64=1*1.00 + 18*-1.00	dead	Linear Combinat-ion
122		ACC:SEI/65=1*1.00 + 19*-1.00	dead	Linear Combinat-ion
123		ACC:SEI/66=1*1.00 + 20*-1.00	dead	Linear Combinat-ion
124		ACC:SEI/67=1*1.00 + 21*-1.00	dead	Linear Combinat-ion
125		ACC:SEI/68=1*1.00 + 22*-1.00	dead	Linear Combinat-ion
126		ACC:SEI/69=1*1.00 + 24*-1.00	dead	Linear Combinat-ion
127		ACC:SEI/70=1*1.00 + 25*-1.00	dead	Linear Combinat-ion
128		ACC:SEI/71=1*1.00 + 26*-1.00	dead	Linear Combinat-ion
129		ACC:SEI/72=1*1.00 + 27*-1.00	dead	Linear Combinat-ion
130		ACC:SEI/73=1*1.00 + 28*-1.00	dead	Linear Combinat-ion
131		ACC:SEI/74=1*1.00 + 29*-1.00	dead	Linear Combinat-ion
132		ACC:SEI/75=1*1.00 + 31*-1.00	dead	Linear Combinat-ion
133		ACC:SEI/76=1*1.00 + 32*-1.00	dead	Linear Combinat-ion
134		ACC:SEI/77=1*1.00 + 33*-1.00	dead	Linear Combinat-ion
135		ACC:SEI/78=1*1.00 + 34*-1.00	dead	Linear Combinat-ion
136		ACC:SEI/79=1*1.00 + 35*-1.00	dead	Linear Combinat-ion
137		ACC:SEI/80=1*1.00 + 36*-1.00	dead	Linear Combinat-ion
138		ACC:SEI/81=1*1.00 + 38*-1.00	dead	Linear Combinat-ion
139		ACC:SEI/82=1*1.00 + 39*-1.00	dead	Linear Combinat-ion
140		ACC:SEI/83=1*1.00 + 40*-1.00	dead	Linear Combinat-ion
141		ACC:SEI/84=1*1.00 + 41*-1.00	dead	Linear Combinat-ion
142		ACC:SEI/85=1*1.00 + 42*-1.00	dead	Linear Combinat-ion
143		ACC:SEI/86=1*1.00 + 43*-1.00	dead	Linear Combinat-ion
144		ACC:SEI/87=1*1.00 + 45*-1.00	dead	Linear Combinat-ion
145		ACC:SEI/88=1*1.00 + 46*-1.00	dead	Linear Combinat-ion
146		ACC:SEI/89=1*1.00 + 47*-1.00	dead	Linear Combinat-ion
147		ACC:SEI/90=1*1.00 + 48*-1.00	dead	Linear Combinat-ion

Case	Label	Case name	Nature	Analysis type
148		ACC:SEI/91=1*1.00 + 49*-1.00	dead	Linear Combinat-ion
149		ACC:SEI/92=1*1.00 + 50*-1.00	dead	Linear Combinat-ion
150		ACC:SEI/93=1*1.00 + 52*-1.00	dead	Linear Combinat-ion
151		ACC:SEI/94=1*1.00 + 53*-1.00	dead	Linear Combinat-ion
152		ACC:SEI/95=1*1.00 + 54*-1.00	dead	Linear Combinat-ion
153		ACC:SEI/96=1*1.00 + 55*-1.00	dead	Linear Combinat-ion
154		ACC:SEI/97=1*1.00 + 56*-1.00	dead	Linear Combinat-ion
155		ACC:SEI/98=1*1.00 + 57*-1.00	dead	Linear Combinat-ion

Η περιβάλλουσα των αξονικών δυνάμεων και των καμπτικών ροπών έχουν ως εξής:



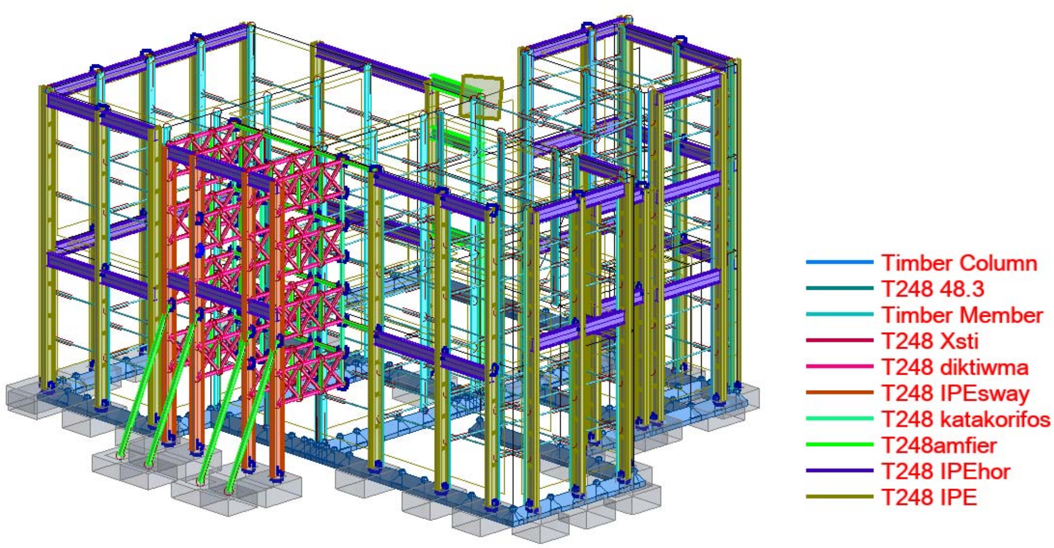
Εικ. 8 Αξονικές δυνάμεις



Εικ. 9 Καμπτικές ροπές

4. Έλεγχος μελών

Οι ομάδες σχεδιασμού των μελών ανά τύπο φαίνονται στην Εικ. 10



Εικ. 10 Ομάδες σχεδιασμού μελών

Έλεγχος μεταλλικών μελών

Ο έλεγχος των μεταλλικών μελών έχει ως εξής:

Member	Section	Material	Lay	Laz	Ratio	Case	Ratio(uy)	Case (uy)	Ratio(uz)	Case (uz)	Ratio(vx)	Case (vx)	Ratio(vy)	Case (vy)
21	IPE 400	S275	5.59	117.09	**0.17**	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
38 Column_38	IPE 400	S275	5.59	117.09	**0.24**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
43	IPE 400	S275	5.59	117.09	**0.11**	92 ACC:SEI/35=1*1.00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
69 T248 48.3_69	48.3	S235	71.34	71.34	**0.09**	70 ACC:SEI/13=1*1.00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.22	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
70 T248 48.3_70	48.3	S235	71.34	71.34	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.22	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
71 T248 48.3_71	48.3	S235	71.34	71.34	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.21	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
72 T248 48.3_72	48.3	S235	71.34	71.34	**0.07**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.21	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
73 T248 48.3_73	48.3	S235	71.41	71.41	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
74 T248 48.3_74	48.3	S235	71.41	71.41	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
75 T248 48.3_75	48.3	S235	71.41	71.41	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
76 T248 48.3_76	48.3	S235	71.41	71.41	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
77	IPE 400	S275	5.59	117.09	**0.17**	92 ACC:SEI/35=1*1.00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
78 T248 48.3_78	48.3	S235	97.59	97.59	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
79 T248	48.3	S235	97.59	97.59	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

48.3_79										00		1*1.00		
80 T248 48.3_80	48.3	S235	97.59	97.59	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
81 T248 48.3_81	48.3	S235	97.59	97.59	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
82 T248 48.3_82	48.3	S235	97.59	97.59	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
83 T248 48.3_83	48.3	S235	97.59	97.59	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
84 T248 48.3_84	48.3	S235	97.59	97.59	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
85 T248 48.3_85	48.3	S235	97.59	97.59	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
88 T248 48.3_88	48.3	S235	97.59	97.59	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
89 T248 48.3_89	48.3	S235	97.59	97.59	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
92 T248 48.3_92	48.3	S235	97.59	97.59	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
93 T248 48.3_93	48.3	S235	97.59	97.59	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
96 T248 IPEhor_96	IPE 400	S275	5.74	24.05	**0.02**	106 ACC:SEI/49=1*1.00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
97 T248 48.3_97	48.3	S235	65.85	65.85	**0.17**	70 ACC:SEI/13=1*1.00 + 14*1.00	0.01	59 SLS:CHR/1=1*1.00	0.34	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
98 T248 48.3_98	48.3	S235	50.75	50.75	**0.03**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.07	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
105 T248 48.3_105	48.3	S235	71.32	71.32	**0.05**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.05	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
106	IPE 400	S275	5.59	117.09	**0.17**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
107 T248 48.3_107	48.3	S235	71.32	71.32	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.05	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
108 T248	48.3	S235	65.71	65.71	**0.09**	104 ACC:SEI/47=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.16	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

48.3_10 8						00 + 54*1.00				00		1*1.00		
109 T248 48.3_10 9	48.3	S235	71.3 4	71.34	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
110 T248 48.3_11 0	48.3	S235	71.3 4	71.34	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
111 T248 48.3_11 1	48.3	S235	71.3 4	71.34	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
112 T248 48.3_11 2	48.3	S235	71.3 4	71.34	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
113 T248 48.3_11 3	48.3	S235	65.8 8	65.88	**0.20**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.01	59 SLS:CHR/1=1*1.00	0.24	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
115 T248 48.3_11 5	48.3	S235	42.2 9	42.29	**0.02**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.04	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
116 T248 IPEhor_ 116	IPE 400	S275	5.74	24.05	**0.01**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
117 T248 IPEhor_ 117	IPE 400	S275	5.74	24.05	**0.02**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
118 T248 IPEhor_ 118	IPE 400	S275	6.04	25.32	**0.01**	80 ACC:SEI/23=1*1. 00 + 26*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
119 T248 IPEhor_ 119	IPE 400	S275	6.04	25.32	**0.01**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
121 T248 IPEhor_ 121	IPE 400	S275	6.04	25.32	**0.01**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
123 T248 IPEhor_ 123	IPE 400	S275	6.04	25.32	**0.02**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
124 T248 IPEhor_ 124	IPE 400	S275	7.86	32.91	**0.00**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00

135	IPE 400	S275	5.59	117.09	**0.12**	74 ACC:SEI/17=1*1.00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
164	IPE 400	S275	5.59	117.09	**0.11**	74 ACC:SEI/17=1*1.00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
205	IPE 400	S275	5.59	117.09	**0.27**	92 ACC:SEI/35=1*1.00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
234	IPE 400	S275	5.59	117.09	**0.22**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
263	IPE 400	S275	5.59	117.09	**0.22**	64 ACC:SEI/7=1*1.00 + 7*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
315	80x5	S235	26.40	87.99	**0.06**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
317	80x5	S235	26.40	87.99	**0.08**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
319	80x5	S235	26.40	87.99	**0.06**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
321	80x5	S235	26.40	87.99	**0.11**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
323	80x5	S235	26.40	87.99	**0.06**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
325	80x5	S235	26.40	87.99	**0.08**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
327	80x5	S235	26.40	87.99	**0.05**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
329	80x5	S235	26.40	87.99	**0.08**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
461 T248amfier_461	80x5	S235	32.59	32.59	**0.02**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
462 T248amfier_462	80x5	S235	32.59	32.59	**0.02**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
465 T248amfier_465	80x5	S235	32.59	32.59	**0.01**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
466 T248amfier_466	80x5	S235	32.59	32.59	**0.01**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
469 T248amfier_469	80x5	S235	32.59	32.59	**0.00**	122 ACC:SEI/65=1*1.00 + 19*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00

470 T248amfier_470	80x5	S235	32.59	32.59	**0.00**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
473 T248amfier_473	80x5	S235	32.59	32.59	**0.01**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
474 T248amfier_474	80x5	S235	32.59	32.59	**0.01**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
477 T248 Xsti_477	80x5	S235	21.92	21.92	**0.07**	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
478 T248 Xsti_478	80x5	S235	21.92	21.92	**0.05**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
481 T248 Xsti_481	80x5	S235	21.92	21.92	**0.06**	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
482 T248 Xsti_482	80x5	S235	21.92	21.92	**0.06**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
485 T248 Xsti_485	80x5	S235	21.92	21.92	**0.04**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
486 T248 Xsti_486	80x5	S235	21.92	21.92	**0.03**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
489 T248 Xsti_489	80x5	S235	21.92	21.92	**0.05**	74 ACC:SEI/17=1*1.00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
490 T248 Xsti_490	80x5	S235	21.92	21.92	**0.09**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
493 T248 Xsti_493	80x5	S235	21.92	21.92	**0.06**	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
494 T248 Xsti_494	80x5	S235	21.92	21.92	**0.04**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
497 T248 Xsti_497	80x5	S235	21.92	21.92	**0.04**	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
498 T248 Xsti_498	80x5	S235	21.92	21.92	**0.03**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
501 T248 Xsti_501	80x5	S235	21.92	21.92	**0.03**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
502 T248 Xsti_502	80x5	S235	21.92	21.92	**0.03**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
505 T248 Xsti_505	80x5	S235	21.92	21.92	**0.03**	64 ACC:SEI/7=1*1.00 + 7*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00

506 T248 Xsti_506	80x5	S235	21.92	21.92	0.01	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
509 T248 Xsti_509	80x5	S235	21.92	21.92	0.08	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
510 T248 Xsti_510	80x5	S235	21.92	21.92	0.07	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
513 T248 Xsti_513	80x5	S235	21.92	21.92	0.08	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
514 T248 Xsti_514	80x5	S235	21.92	21.92	0.07	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
517 T248 Xsti_517	80x5	S235	21.92	21.92	0.08	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
518 T248 Xsti_518	80x5	S235	21.92	21.92	0.08	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
521 T248 Xsti_521	80x5	S235	21.92	21.92	0.09	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
522 T248 Xsti_522	80x5	S235	21.92	21.92	0.09	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
696 T248 katakorifos_696	80x5	S235	22.81	34.22	0.10	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
699	IPE 400	S275	5.59	117.09	0.25	106 ACC:SEI/49=1*1.00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
728	IPE 400	S275	5.59	117.09	0.23	70 ACC:SEI/13=1*1.00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
757	IPE 400	S275	5.59	117.09	0.26	106 ACC:SEI/49=1*1.00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
786	IPE 400	S275	5.59	117.09	0.21	74 ACC:SEI/17=1*1.00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
815	IPE 400	S275	5.59	117.09	0.21	74 ACC:SEI/17=1*1.00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
845	IPE 400	S275	5.59	117.09	0.19	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
847	IPE 400	S275	5.59	117.09	0.25	106 ACC:SEI/49=1*1.00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
848	IPE 400	S275	5.59	117.09	0.19	106 ACC:SEI/49=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

						00 + 56*1.00				00		1*1.00		
849 T248 IPEhor_ 849	IPE 400	S275	5.74	24.05	**0.01**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
852 Column _852	IPE 400	S275	4.47	93.67	**0.17**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
853 Column _853	IPE 400	S275	4.47	93.67	**0.20**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
854 Column _854	IPE 400	S275	6.19	129.7 5	**0.33**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
855 Column _855	IPE 400	S275	6.19	129.7 5	**0.31**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
857 Column _857	IPE 400	S275	6.19	129.7 5	**0.35**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
858 Column _858	IPE 400	S275	6.19	129.7 5	**0.30**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
860 Column _860	IPE 400	S275	6.19	129.7 5	**0.29**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
861 Column _861	IPE 400	S275	6.19	129.7 5	**0.37**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
862 Column _862	IPE 400	S275	6.19	129.7 5	**0.29**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
863 Column _863	IPE 400	S275	6.19	129.7 5	**0.25**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
866 T248am fier_866	TCAR 120x5	S235	100. 22	100.2 2	**0.09**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
867 T248am fier_867	TCAR 120x5	S235	100. 22	100.2 2	**0.09**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
868 T248 IPEsway _868	IPE 400	S275	5.59	117.0 9	**0.17**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
869 T248am fier_869	80x5	S235	32.5 9	32.59	**0.02**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
870 T248am fier_870	80x5	S235	32.5 9	32.59	**0.02**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
871 T248am fier_871	80x5	S235	32.5 9	32.59	**0.01**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00

872 T248amfier_872	80x5	S235	32.59	32.59	0.01	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
873 T248 diktiwma_873	80x5	S235	26.40	87.99	0.06	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
874 T248 diktiwma_874	80x5	S235	26.40	87.99	0.07	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
875 T248 diktiwma_875	80x5	S235	26.40	87.99	0.06	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
876 T248 diktiwma_876	80x5	S235	26.40	87.99	0.11	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
877 T248 diktiwma_877	80x5	S235	26.40	87.99	0.06	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
878 T248 diktiwma_878	80x5	S235	26.40	87.99	0.08	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
879 T248 diktiwma_879	80x5	S235	26.40	87.99	0.04	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
880 T248 diktiwma_880	80x5	S235	26.40	87.99	0.08	64 ACC:SEI/7=1*1.00 + 7*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
881 T248amfier_881	80x5	S235	32.59	32.59	0.00	122 ACC:SEI/65=1*1.00 + 19*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
882 T248amfier_882	80x5	S235	32.59	32.59	0.00	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
883 T248amfier_883	80x5	S235	32.59	32.59	0.01	154 ACC:SEI/97=1*1.00 + 56*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
884 T248amfier_884	80x5	S235	32.59	32.59	0.01	154 ACC:SEI/97=1*1.00 + 56*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
885 T248 Xsti_885	80x5	S235	21.92	21.92	0.07	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
886 T248 Xsti_886	80x5	S235	21.92	21.92	0.05	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
887	80x5	S235	21.9	21.92	0.06	74	0.00	59 SLS:CHR/1=1*1.00	0.00	59	0.00	59	0.01	59

T248 Xsti_887			2			ACC:SEI/17=1*1.00 + 19*1.00				SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00
888 T248 Xsti_888	80x5	S235	21.92	21.92	0.06	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
889 T248 Xsti_889	80x5	S235	21.92	21.92	0.04	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
890 T248 Xsti_890	80x5	S235	21.92	21.92	0.03	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
891 T248 Xsti_891	80x5	S235	21.92	21.92	0.05	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
892 T248 Xsti_892	80x5	S235	21.92	21.92	0.09	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
893 T248 Xsti_893	80x5	S235	21.92	21.92	0.06	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
894 T248 Xsti_894	80x5	S235	21.92	21.92	0.04	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
895 T248 Xsti_895	80x5	S235	21.92	21.92	0.03	74 ACC:SEI/17=1*1.00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
896 T248 Xsti_896	80x5	S235	21.92	21.92	0.03	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
897 T248 Xsti_897	80x5	S235	21.92	21.92	0.03	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
898 T248 Xsti_898	80x5	S235	21.92	21.92	0.03	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
899 T248 Xsti_899	80x5	S235	21.92	21.92	0.02	100 ACC:SEI/43=1*1.00 + 49*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
900 T248 Xsti_900	80x5	S235	21.92	21.92	0.01	154 ACC:SEI/97=1*1.00 + 56*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
901 T248 Xsti_901	80x5	S235	21.92	21.92	0.08	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
902 T248 Xsti_902	80x5	S235	21.92	21.92	0.07	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
903 T248 Xsti_903	80x5	S235	21.92	21.92	0.08	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
904 T248 Xsti_904	80x5	S235	21.92	21.92	0.07	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
905	80x5	S235	21.9	21.92	0.08	98	0.00	59 SLS:CHR/1=1*1.00	0.00	59	0.00	59	0.01	59

T248 Xsti_905			2			ACC:SEI/41=1*1.00 + 47*1.00				SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00
906 T248 Xsti_906	80x5	S235	21.92	21.92	**0.07**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
907 T248 Xsti_907	80x5	S235	21.92	21.92	**0.09**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
908 T248 Xsti_908	80x5	S235	21.92	21.92	**0.09**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
909 T248 katakorifos_909	80x5	S235	22.81	34.22	**0.10**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
910 T248amfier_910	TCAR 120x5	S235	100.22	100.22	**0.10**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
911 T248 IPEsway_911	IPE 400	S275	5.59	117.09	**0.18**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
912 T248amfier_912	80x5	S235	32.59	32.59	**0.02**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
913 T248amfier_913	80x5	S235	32.59	32.59	**0.02**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
914 T248amfier_914	80x5	S235	32.59	32.59	**0.01**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
915 T248amfier_915	80x5	S235	32.59	32.59	**0.01**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
916 T248 diktiwma_916	80x5	S235	26.40	87.99	**0.06**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
917 T248 diktiwma_917	80x5	S235	26.40	87.99	**0.07**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
918 T248 diktiwma_918	80x5	S235	26.40	87.99	**0.06**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
919 T248 diktiwma_919	80x5	S235	26.40	87.99	**0.11**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
920 T248 diktiwma_920	80x5	S235	26.40	87.99	**0.07**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00

921 T248 diktiwma _921	80x5	S235	26.40	87.99	**0.09**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
922 T248 diktiwma _922	80x5	S235	26.40	87.99	**0.06**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
923 T248 diktiwma _923	80x5	S235	26.40	87.99	**0.08**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
924 T248amfier_924	80x5	S235	32.59	32.59	**0.00**	122 ACC:SEI/65=1*1.00 + 19*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
925 T248amfier_925	80x5	S235	32.59	32.59	**0.00**	122 ACC:SEI/65=1*1.00 + 19*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
926 T248amfier_926	80x5	S235	32.59	32.59	**0.01**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
927 T248amfier_927	80x5	S235	32.59	32.59	**0.01**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00
928 T248 Xsti_928	80x5	S235	21.92	21.92	**0.08**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
929 T248 Xsti_929	80x5	S235	21.92	21.92	**0.05**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
930 T248 Xsti_930	80x5	S235	21.92	21.92	**0.07**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
931 T248 Xsti_931	80x5	S235	21.92	21.92	**0.06**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
932 T248 Xsti_932	80x5	S235	21.92	21.92	**0.05**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
933 T248 Xsti_933	80x5	S235	21.92	21.92	**0.03**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
934 T248 Xsti_934	80x5	S235	21.92	21.92	**0.05**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
935 T248 Xsti_935	80x5	S235	21.92	21.92	**0.09**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
936 T248 Xsti_936	80x5	S235	21.92	21.92	**0.06**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
937 T248 Xsti_937	80x5	S235	21.92	21.92	**0.04**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00

938 T248 Xsti_938	80x5	S235	21.92	21.92	**0.04**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
939 T248 Xsti_939	80x5	S235	21.92	21.92	**0.04**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
940 T248 Xsti_940	80x5	S235	21.92	21.92	**0.04**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
941 T248 Xsti_941	80x5	S235	21.92	21.92	**0.03**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
942 T248 Xsti_942	80x5	S235	21.92	21.92	**0.03**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
943 T248 Xsti_943	80x5	S235	21.92	21.92	**0.02**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
944 T248 Xsti_944	80x5	S235	21.92	21.92	**0.08**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
945 T248 Xsti_945	80x5	S235	21.92	21.92	**0.07**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
946 T248 Xsti_946	80x5	S235	21.92	21.92	**0.08**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
947 T248 Xsti_947	80x5	S235	21.92	21.92	**0.07**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
948 T248 Xsti_948	80x5	S235	21.92	21.92	**0.08**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
949 T248 Xsti_949	80x5	S235	21.92	21.92	**0.07**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
950 T248 Xsti_950	80x5	S235	21.92	21.92	**0.09**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
951 T248 Xsti_951	80x5	S235	21.92	21.92	**0.08**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
952 T248 katakorifos_952	80x5	S235	22.81	34.22	**0.10**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
953 T248amfier_953	TCAR 120x5	S235	100.22	100.22	**0.10**	82 ACC:SEI/25=1*1.00 + 28*1.00	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
954 T248 IPEsway_954	IPE 400	S275	5.59	117.09	**0.17**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
955	80x5	S235	32.5	32.59	**0.02**	146	0.00	59 SLS:CHR/1=1*1.00	0.00	59	0.00	59	0.01	59

T248amfier_955			9			ACC:SEI/89=1*1.00 + 47*-1.00				SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00
956 T248amfier_956	80x5	S235	32.59	32.59	**0.02**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
957 T248amfier_957	80x5	S235	32.59	32.59	**0.01**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
958 T248amfier_958	80x5	S235	32.59	32.59	**0.01**	146 ACC:SEI/89=1*1.00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
959 T248diktiwma_959	80x5	S235	26.40	87.99	**0.06**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
960 T248diktiwma_960	80x5	S235	26.40	87.99	**0.08**	100 ACC:SEI/43=1*1.00 + 49*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
961 T248diktiwma_961	80x5	S235	26.40	87.99	**0.06**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
962 T248diktiwma_962	80x5	S235	26.40	87.99	**0.11**	100 ACC:SEI/43=1*1.00 + 49*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
963 T248diktiwma_963	80x5	S235	26.40	87.99	**0.07**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
964 T248diktiwma_964	80x5	S235	26.40	87.99	**0.09**	88 ACC:SEI/31=1*1.00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
965 T248diktiwma_965	80x5	S235	26.40	87.99	**0.05**	76 ACC:SEI/19=1*1.00 + 21*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
966 T248diktiwma_966	80x5	S235	26.40	87.99	**0.07**	82 ACC:SEI/25=1*1.00 + 28*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
967 T248amfier_967	80x5	S235	32.59	32.59	**0.00**	122 ACC:SEI/65=1*1.00 + 19*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
968 T248amfier_968	80x5	S235	32.59	32.59	**0.00**	122 ACC:SEI/65=1*1.00 + 19*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
969 T248amfier_969	80x5	S235	32.59	32.59	**0.01**	142 ACC:SEI/85=1*1.00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1.00
970 T248am	80x5	S235	32.59	32.59	**0.01**	142 ACC:SEI/85=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.01	59 SLS:CHR/1=1*1.00

fier_970						00 + 42*-1.00				00		1*1.00		
971 T248 Xsti_971	80x5	S235	21.9 2	21.92	**0.07**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
972 T248 Xsti_972	80x5	S235	21.9 2	21.92	**0.05**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
973 T248 Xsti_973	80x5	S235	21.9 2	21.92	**0.06**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
974 T248 Xsti_974	80x5	S235	21.9 2	21.92	**0.06**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
975 T248 Xsti_975	80x5	S235	21.9 2	21.92	**0.04**	88 ACC:SEI/31=1*1. 00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
976 T248 Xsti_976	80x5	S235	21.9 2	21.92	**0.03**	142 ACC:SEI/85=1*1. 00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
977 T248 Xsti_977	80x5	S235	21.9 2	21.92	**0.05**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
978 T248 Xsti_978	80x5	S235	21.9 2	21.92	**0.09**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
979 T248 Xsti_979	80x5	S235	21.9 2	21.92	**0.06**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
980 T248 Xsti_980	80x5	S235	21.9 2	21.92	**0.04**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
981 T248 Xsti_981	80x5	S235	21.9 2	21.92	**0.04**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
982 T248 Xsti_982	80x5	S235	21.9 2	21.92	**0.03**	142 ACC:SEI/85=1*1. 00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
983 T248 Xsti_983	80x5	S235	21.9 2	21.92	**0.03**	88 ACC:SEI/31=1*1. 00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
984 T248 Xsti_984	80x5	S235	21.9 2	21.92	**0.03**	142 ACC:SEI/85=1*1. 00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
985 T248 Xsti_985	80x5	S235	21.9 2	21.92	**0.03**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.01	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
986 T248 Xsti_986	80x5	S235	21.9 2	21.92	**0.02**	142 ACC:SEI/85=1*1. 00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
987 T248 Xsti_987	80x5	S235	21.9 2	21.92	**0.08**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
988 T248	80x5	S235	21.9 2	21.92	**0.07**	98 ACC:SEI/41=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

Xsti_988						00 + 47*1.00				00		1*1.00		
989 T248 Xsti_989	80x5	S235	21.9 2	21.92	**0.08**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
990 T248 Xsti_990	80x5	S235	21.9 2	21.92	**0.07**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
991 T248 Xsti_991	80x5	S235	21.9 2	21.92	**0.08**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
992 T248 Xsti_992	80x5	S235	21.9 2	21.92	**0.08**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
993 T248 Xsti_993	80x5	S235	21.9 2	21.92	**0.09**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.01	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
994 T248 Xsti_994	80x5	S235	21.9 2	21.92	**0.09**	146 ACC:SEI/89=1*1. 00 + 47*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
995 T248 katakorif os_995	80x5	S235	22.8 1	34.22	**0.10**	82 ACC:SEI/25=1*1. 00 + 28*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1024 T248 48.3_10 24	48.3	S235	92.9 0	92.90	**0.05**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1025 T248 48.3_10 25	48.3	S235	92.9 0	92.90	**0.05**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1026 T248 48.3_10 26	48.3	S235	92.9 0	92.90	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1027 T248 48.3_10 27	48.3	S235	92.9 0	92.90	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1028 T248 48.3_10 28	48.3	S235	84.4 5	84.45	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1029 T248 48.3_10 29	48.3	S235	84.4 5	84.45	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.02	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1030 T248 48.3_10 30	48.3	S235	84.4 5	84.45	**0.05**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1031 T248 48.3_10	48.3	S235	84.4 5	84.45	**0.09**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.05	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00

31														
1032 T248 48.3_1032	48.3	S235	92.90	92.90	**0.15**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.54	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1033 T248 48.3_1033	48.3	S235	92.90	92.90	**0.15**	92 ACC:SEI/35=1*1.00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.55	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1034 T248 48.3_1034	48.3	S235	92.90	92.90	**0.14**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.50	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1035 T248 48.3_1035	48.3	S235	92.90	92.90	**0.15**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.50	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1036 T248 48.3_1036	48.3	S235	84.45	84.45	**0.10**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.39	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1037 T248 48.3_1037	48.3	S235	84.45	84.45	**0.09**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.39	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1038 T248 48.3_1038	48.3	S235	84.45	84.45	**0.17**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.43	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1039 T248 48.3_1039	48.3	S235	84.45	84.45	**0.19**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.43	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1040 T248 48.3_1040	48.3	S235	92.90	92.90	**0.21**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.69	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1041 T248 48.3_1041	48.3	S235	92.90	92.90	**0.21**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.69	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1042 T248 48.3_1042	48.3	S235	92.90	92.90	**0.18**	86 ACC:SEI/29=1*1.00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.68	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1043 T248 48.3_1043	48.3	S235	92.90	92.90	**0.19**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.68	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1044 T248 48.3_1044	48.3	S235	84.45	84.45	**0.10**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.42	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1045	48.3	S235	84.4	84.45	**0.10**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.42	59	0.00	59	0.00	59

T248 48.3_10 45			5							SLS:CHR/1=1*1. 00		SLS:CHR/1= 1*1.00		SLS:CHR/1=1*1.00
1046 T248 48.3_10 46	48.3	S235	84.4 5	84.45	**0.10**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.43	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1047 T248 48.3_10 47	48.3	S235	84.4 5	84.45	**0.10**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.43	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1048 T248 48.3_10 48	48.3	S235	92.9 0	92.90	**0.13**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.51	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1049 T248 48.3_10 49	48.3	S235	92.9 0	92.90	**0.13**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.51	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1050 T248 48.3_10 50	48.3	S235	92.9 0	92.90	**0.12**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.50	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1051 T248 48.3_10 51	48.3	S235	92.9 0	92.90	**0.12**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.50	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1052 T248 48.3_10 52	48.3	S235	84.4 5	84.45	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1053 T248 48.3_10 53	48.3	S235	84.4 5	84.45	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1054 T248 48.3_10 54	48.3	S235	84.4 5	84.45	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1055 T248 48.3_10 55	48.3	S235	84.4 5	84.45	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.06	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1056 T248 48.3_10 56	48.3	S235	92.9 0	92.90	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1057 T248 48.3_10 57	48.3	S235	92.9 0	92.90	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1058 T248 48.3_10	48.3	S235	92.9 0	92.90	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00

58														
1059 T248 48.3_10 59	48.3	S235	92.9 0	92.90	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1064 T248 48.3_10 64	48.3	S235	163. 27	163.2 7	**0.13**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.40	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1065 T248 48.3_10 65	48.3	S235	163. 27	163.2 7	**0.14**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.40	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1066 T248 48.3_10 66	48.3	S235	159. 52	159.5 2	**0.07**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.40	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1067 T248 48.3_10 67	48.3	S235	159. 52	159.5 2	**0.07**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.40	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1068 T248 48.3_10 68	48.3	S235	127. 62	127.6 2	**0.06**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.32	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1069 T248 48.3_10 69	48.3	S235	127. 62	127.6 2	**0.06**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.32	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1070 T248 48.3_10 70	48.3	S235	123. 86	123.8 6	**0.06**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.31	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1071 T248 48.3_10 71	48.3	S235	123. 86	123.8 6	**0.06**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.31	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1084 T248 48.3_10 84	48.3	S235	156. 71	156.7 1	**0.14**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.17	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1085 T248 48.3_10 85	48.3	S235	156. 71	156.7 1	**0.11**	104 ACC:SEI/47=1*1. 00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.17	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1086 T248 48.3_10 86	48.3	S235	156. 71	156.7 1	**0.11**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.18	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1087 T248 48.3_10 87	48.3	S235	156. 71	156.7 1	**0.12**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.18	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1088	48.3	S235	156.	156.7	**0.24**	104	0.00	59 SLS:CHR/1=1*1.00	0.43	59	0.00	59	0.00	59

T248 48.3_1088			73	3		ACC:SEI/47=1*1.00 + 54*1.00				SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00		SLS:CHR/1=1*1.00
1089 T248 48.3_1089	48.3	S235	156.73	156.73	**0.23**	104 ACC:SEI/47=1*1.00 + 54*1.00	0.00	59 SLS:CHR/1=1*1.00	0.43	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1090 T248 48.3_1090	48.3	S235	156.73	156.73	**0.14**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.46	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1091 T248 48.3_1091	48.3	S235	156.73	156.73	**0.15**	98 ACC:SEI/41=1*1.00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.46	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1092 T248 48.3_1092	48.3	S235	156.82	156.82	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1093 T248 48.3_1093	48.3	S235	156.82	156.82	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1094 T248 48.3_1094	48.3	S235	156.82	156.82	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1095 T248 48.3_1095	48.3	S235	156.82	156.82	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.12	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1109 Column_1109	IPE 400	S275	5.59	117.09	**0.18**	94 ACC:SEI/37=1*1.00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1114 T248 48.3_1114	48.3	S235	93.91	93.91	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.17	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1115 T248 48.3_1115	48.3	S235	93.91	93.91	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.17	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1116 T248 48.3_1116	48.3	S235	93.91	93.91	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.18	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1117 T248 48.3_1117	48.3	S235	93.91	93.91	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.18	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00
1118 T248 48.3_1118	48.3	S235	94.03	94.03	**0.15**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.64	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.00

1119 T248 48.3_11 19	48.3	S235	94.0 3	94.03	**0.15**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.64	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1120 T248 48.3_11 20	48.3	S235	94.0 3	94.03	**0.17**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.62	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1121 T248 48.3_11 21	48.3	S235	94.0 3	94.03	**0.17**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.62	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1122 T248 48.3_11 22	48.3	S235	93.8 4	93.84	**0.18**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.61	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1123 T248 48.3_11 23	48.3	S235	93.8 4	93.84	**0.14**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.61	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1124 T248 48.3_11 24	48.3	S235	93.8 4	93.84	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1125 T248 48.3_11 25	48.3	S235	93.8 4	93.84	**0.08**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1126 T248 48.3_11 26	48.3	S235	93.8 4	93.84	**0.19**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.68	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1127 T248 48.3_11 27	48.3	S235	93.8 4	93.84	**0.20**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.68	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1135 T248 48.3_11 35	48.3	S235	65.6 9	65.69	**0.03**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1136 T248 48.3_11 36	48.3	S235	65.6 9	65.69	**0.05**	62 ACC:SEI/5=1*1.0 0 + 5*1.00	0.00	59 SLS:CHR/1=1*1.00	0.16	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1137 T248 48.3_11 37	48.3	S235	65.6 9	65.69	**0.06**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.16	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1138 T248 48.3_11 38	48.3	S235	65.6 9	65.69	**0.05**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.16	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1139 T248	48.3	S235	65.6 9	65.69	**0.11**	106 ACC:SEI/49=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.16	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

48.3_11 39						00 + 56*1.00				00		1*1.00		
1140 T248 48.3_11 40	48.3	S235	65.6 9	65.69	**0.11**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.16	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1147 T248 48.3_11 47	48.3	S235	71.4 1	71.41	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1148 T248 48.3_11 48	48.3	S235	71.4 1	71.41	**0.04**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.03	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1151 T248 48.3_11 51	48.3	S235	71.3 4	71.34	**0.08**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.22	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1152 T248 48.3_11 52	48.3	S235	71.3 4	71.34	**0.08**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.22	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1153 T248 IPEhor_ 1153	IPE 400	S275	7.86	32.91	**0.01**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1155 T248 IPEhor_ 1155	IPE 400	S275	6.95	29.11	**0.00**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1156 T248 IPEhor_ 1156	IPE 400	S275	6.95	29.11	**0.01**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1157 T248 IPEhor_ 1157	IPE 400	S275	6.95	29.11	**0.01**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1158 T248 IPEhor_ 1158	IPE 400	S275	6.95	29.11	**0.01**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1159 T248 IPEhor_ 1159	IPE 400	S275	6.95	29.11	**0.01**	80 ACC:SEI/23=1*1. 00 + 26*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1160 T248 IPEhor_ 1160	IPE 400	S275	6.95	29.11	**0.01**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1161 T248 IPEhor_ 1161	IPE 400	S275	7.86	32.91	**0.01**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00

1163 T248 IPEhor_ 1163	IPE 400	S275	4.53	18.99	**0.02**	140 ACC:SEI/83=1*1. 00 + 40*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.01	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1164 T248 IPEhor_ 1164	IPE 400	S275	7.86	32.91	**0.00**	64 ACC:SEI/7=1*1.0 0 + 7*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1165 T248 IPEhor_ 1165	IPE 400	S275	4.53	18.99	**0.01**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1166 T248 IPEhor_ 1166	IPE 400	S275	7.86	32.91	**0.01**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1167 T248 IPEhor_ 1167	IPE 400	S275	4.53	18.99	**0.04**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1168 T248 IPEhor_ 1168	IPE 400	S275	7.86	32.91	**0.02**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1170 T248 IPEhor_ 1170	IPE 400	S275	14.7 3	61.71	**0.03**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1171 T248 IPEhor_ 1171	IPE 400	S275	14.7 3	61.71	**0.02**	58 ULS/1=1*1.35	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1172 T248 IPEhor_ 1172	IPE 400	S275	6.27	26.27	**0.01**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1173 T248 IPEhor_ 1173	IPE 400	S275	6.27	26.27	**0.00**	64 ACC:SEI/7=1*1.0 0 + 7*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1174 T248 IPEhor_ 1174	IPE 400	S275	6.27	26.27	**0.00**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1175 T248 IPEhor_ 1175	IPE 400	S275	6.27	26.27	**0.01**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1176 T248 IPEhor_ 1176	IPE 400	S275	6.27	26.27	**0.02**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1177 T248	IPE 400	S275	6.27	26.27	**0.01**	94 ACC:SEI/37=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

IPEhor_ 1177						00 + 42*1.00				00		1*1.00		
1178 T248 IPEhor_ 1178	IPE 400	S275	6.27	26.27	**0.01**	88 ACC:SEI/31=1*1. 00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1179 T248 IPEhor_ 1179	IPE 400	S275	6.27	26.27	**0.02**	88 ACC:SEI/31=1*1. 00 + 35*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1180 T248 IPEhor_ 1180	IPE 400	S275	6.87	28.80	**0.01**	94 ACC:SEI/37=1*1. 00 + 42*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1181 T248 IPEhor_ 1181	IPE 400	S275	6.87	28.80	**0.01**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1182 T248 IPEhor_ 1182	IPE 400	S275	6.87	28.80	**0.01**	74 ACC:SEI/17=1*1. 00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1183 T248 IPEhor_ 1183	IPE 400	S275	6.87	28.80	**0.01**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1184 T248 IPEhor_ 1184	IPE 400	S275	3.63	15.19	**0.01**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1185 T248 IPEhor_ 1185	IPE 400	S275	6.65	27.85	**0.01**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1186 T248 IPEhor_ 1186	IPE 400	S275	3.63	15.19	**0.01**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1187 T248 IPEhor_ 1187	IPE 400	S275	3.63	15.19	**0.02**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1188 T248 IPEhor_ 1188	IPE 400	S275	6.65	27.85	**0.01**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1189 T248 IPEhor_ 1189	IPE 400	S275	3.63	15.19	**0.02**	98 ACC:SEI/41=1*1. 00 + 47*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1190 T248 IPEhor_ 1190	IPE 400	S275	8.54	35.76	**0.01**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00

1191 T248 IPEhor_ 1191	IPE 400	S275	6.42	26.90	**0.01**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1193 T248 IPEhor_ 1193	IPE 400	S275	6.42	26.90	**0.01**	70 ACC:SEI/13=1*1. 00 + 14*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1194 T248 IPEhor_ 1194	IPE 400	S275	8.54	35.76	**0.01**	68 ACC:SEI/11=1*1. 00 + 12*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1199 T248am fier_119 9	80x5	S235	71.6 9	71.69	**0.01**	100 ACC:SEI/43=1*1. 00 + 49*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1202 T248am fier_120 2	80x5	S235	71.6 9	71.69	**0.01**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1205 T248am fier_120 5	80x5	S235	71.6 9	71.69	**0.01**	134 ACC:SEI/77=1*1. 00 + 33*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1208 T248am fier_120 8	80x5	S235	71.6 9	71.69	**0.01**	116 ACC:SEI/59=1*1. 00 + 12*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.01	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1210 T248am fier_121 0	80x5	S235	39.1 1	39.11	**0.01**	100 ACC:SEI/43=1*1. 00 + 49*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1211 T248am fier_121 1	80x5	S235	39.1 1	39.11	**0.01**	116 ACC:SEI/59=1*1. 00 + 12*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1212 T248am fier_121 2	80x5	S235	39.1 1	39.11	**0.01**	106 ACC:SEI/49=1*1. 00 + 56*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1213 T248am fier_121 3	80x5	S235	39.1 1	39.11	**0.01**	74 ACC:SEI/17=1*1. 00 + 19*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1214 T248am fier_121 4	80x5	S235	39.1 1	39.11	**0.00**	154 ACC:SEI/97=1*1. 00 + 56*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1215 T248am fier_121 5	80x5	S235	39.1 1	39.11	**0.01**	86 ACC:SEI/29=1*1. 00 + 33*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1216 T248am	80x5	S235	39.1 1	39.11	**0.01**	118 ACC:SEI/61=1*1.	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1.	0.00	59 SLS:CHR/1=	0.00	59 SLS:CHR/1=1*1.00

fier_121 6						00 + 14*-1.00				00		1*1.00		
1217 T248am fier_121 7	80x5	S235	39.1 1	39.11	**0.01**	142 ACC:SEI/85=1*1. 00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1218 T248am fier_121 8	IPE 400	S275	13.2 9	55.70	**0.04**	140 ACC:SEI/83=1*1. 00 + 40*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1223 T248am fier_122 3	IPE 400	S275	12.6 9	53.17	**0.03**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.01	59 SLS:CHR/1=1*1.00
1224 T248 katakorif os_1224	TCAR 120x5	S235	19.7 4	29.60	**0.28**	140 ACC:SEI/83=1*1. 00 + 40*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1225 T248am fier_122 5	80x5	S235	45.6 2	45.62	**0.01**	142 ACC:SEI/85=1*1. 00 + 42*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1226 T248am fier_122 6	80x5	S235	45.6 2	45.62	**0.01**	118 ACC:SEI/61=1*1. 00 + 14*-1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00
1227 T248am fier_122 7	IPE 400	S275	12.6 9	53.17	**0.03**	92 ACC:SEI/35=1*1. 00 + 40*1.00	0.00	59 SLS:CHR/1=1*1.00	0.00	59 SLS:CHR/1=1*1. 00	0.00	59 SLS:CHR/1= 1*1.00	0.00	59 SLS:CHR/1=1*1.00

Έλεγχος συνδέσεων

	Autodesk Robot Structural Analysis Professional 2022 **Fixed column base design** Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete	Ratio **0.99**

General

Connection no.: 1

Connection name: Fixed column base

Structure node: 1497

Structure members: 857

Geometry

Column

Section: IPE 400

Member no.: 857

L_c =	10.25	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	400	[mm]	Height of column section
b_{fc} =	180	[mm]	Width of column section

L_c = 10.25 [m] Column length

t_{wc} = 9 [mm] Thickness of the web of column section

t_{fc} = 14 [mm] Thickness of the flange of column section

r_c = 21 [mm] Radius of column section fillet

A_c = 84.46 [cm^2] Cross-sectional area of a column

I_{yc} = 23128.40 [cm^4] Moment of inertia of the column section

Material: S275

f_{yc} = 275.00 [MPa] Resistance

f_{uc} = 430.00 [MPa] Yield strength of a material

Column base

l_{pd} = 600 [mm] Length

b_{pd} = 380 [mm] Width

t_{pd} = 25 [mm] Thickness

Material: S235

f_{ypd} = 235.00 [MPa] Resistance

f_{upd} = 360.00 [MPa] Yield strength of a material

Anchorage

The shear plane passes through the UNTHREADED portion of the bolt.

Class = 8.8 Anchor class

f_{yb} = 640.00 [MPa] Yield strength of the anchor material

f_{ub} = 800.00 [MPa] Tensile strength of the anchor material

d = 16 [mm] Bolt diameter

A_s = 1.57 [cm^2] Effective section area of a bolt

A_v = 2.01 [cm^2] Area of bolt section

n_H = 3 Number of bolt columns

n_V = 3 Number of bolt rows

Horizontal spacing e_{Hi} = 240 [mm]

Vertical spacing e_{Vi} = 150 [mm]

Anchor dimensions

L_1 = 60 [mm]

L_2 = 560 [mm]

Washer

l_{wd} =	60	[mm]	Length
b_{wd} =	60	[mm]	Width
t_{wd} =	10	[mm]	Thickness

Stiffener

l_s =	600	[mm]	Length
w_s =	380	[mm]	Width
h_s =	120	[mm]	Height
t_s =	10	[mm]	Thickness
d_1 =	20	[mm]	Cut
d_2 =	20	[mm]	Cut

Material factors

γ_{M0} =	1.00		Partial safety factor
γ_{M2} =	1.25		Partial safety factor
γ_C =	1.50		Partial safety factor

Spread footing

L =	1200	[mm]	Spread footing length
B =	2000	[mm]	Spread footing width
H =	600	[mm]	Spread footing height

Concrete

Class			C25/30
f_{ck} =	25.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

Welds

a_p =	5	[mm]	Footing plate of the column base
a_s =	4	[mm]	Stiffeners

Loads

Case: 29: 0.3 * X -1 * Y 24*0.30+25*-1.00

$N_{j,Ed}$ =	59.38	[kN]	Axial force
$V_{j,Ed,y}$ =	-0.12	[kN]	Shear force
$V_{j,Ed,z}$ =	-12.12	[kN]	Shear force
$M_{j,Ed,y}$ =	-11.17	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	-0.08	[kN*m]	Bending moment

Results

Tension zone

STEEL FAILURE

A_b =	1.57	[cm^2]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	76.87	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	83.73	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = min(F_{t,Rd,s1},F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	76.87	[kN]	Anchor resistance to steel failure

PULL-OUT FAILURE

f_{ck} =	25.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]

$f_{ctd} = 0.7*0.3*f_{ck}^{2/3}/\gamma_C$

f_{ctd} =	1.20	[MPa]	Design tensile resistance	EN 1992-1:[8.4.2.(2)]
η_1 =	1.00		Coeff. related to the quality of the bond conditions and concreting conditions	EN 1992-1:[8.4.2.(2)]
η_2 =	1.00		Coeff. related to the bar diameter	EN 1992-1:[8.4.2.(2)]

$f_{bd} = 2.25*\eta_1*\eta_2*f_{ctd}$

f_{bd} =	2.69	[MPa]	Design value of the ultimate bond stress	EN 1992-1:[8.4.2.(2)]
h_{ef} =	530	[mm]	Effective anchorage depth	EN 1992-1:[8.4.2.(2)]

$F_{t,Rd,p} = \pi*d*h_{ef}*f_{bd}$

$F_{t,Rd,p}$ = 71.75 [kN] Design uplift capacity EN 1992-1:[8.4.2.(2)]

CONCRETE CONE FAILURE

h_{ef} = 530 [mm] Effective anchorage depth CEB [9.2.4]

$N_{Rk,c}^0 = 7.5[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ = 457.56 [kN] Characteristic resistance of an anchor CEB [9.2.4]

$s_{cr,N}$ = 1590 [mm] Critical width of the concrete cone CEB [9.2.4]

$c_{cr,N}$ = 795 [mm] Critical edge distance CEB [9.2.4]

$A_{c,N0}$ = 25281.00 [cm^2] Maximum area of concrete cone CEB [9.2.4]

$A_{c,N}$ = 2835.00 [cm^2] Actual area of concrete cone CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ = 0.11 Factor related to anchor spacing and edge distance CEB [9.2.4]

c = 360 [mm] Minimum edge distance from an anchor CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ = 0.84 Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete CEB [9.2.4]

$\psi_{ec,N}$ = 1.00 Factor related to distribution of tensile forces acting on anchors CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ = 1.00 Shell spalling factor CEB [9.2.4]

$\psi_{ucr,N}$ = 1.40 Factor taking into account whether the anchorage is in cracked or non-cracked concrete CEB [9.2.4]

γ_{Mc} = 2.16 Partial safety factor CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^0*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ = 27.80 [kN] Design anchor resistance to concrete cone failure EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} = 530 [mm] Effective anchorage depth CEB [9.2.5]

$N_{Rk,c}^0 = 7.5[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ = 457.56 [kN] Design uplift capacity CEB [9.2.5]

$s_{cr,N}$ = 1060 [mm] Critical width of the concrete cone CEB [9.2.5]

$c_{cr,N}$ = 530 [mm] Critical edge distance CEB [9.2.5]

$A_{c,N0}$ = 11236.00 [cm^2] Maximum area of concrete cone CEB [9.2.5]

$A_{c,N}$ = 2040.00 [cm^2] Actual area of concrete cone CEB [9.2.5]

$N_{Rk,c}^0$ = 457.56 [kN] Design uplift capacity CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ = 0.18 Factor related to anchor spacing and edge distance CEB [9.2.5]

c = 360 [mm] Minimum edge distance from an anchor CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ = 0.90 Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete CEB [9.2.5]

$\psi_{ec,N}$ = 1.00 Factor related to distribution of tensile forces acting on anchors CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ = 1.00 Shell spalling factor CEB [9.2.5]

$\psi_{ucr,N}$ = 1.40 Factor taking into account whether the anchorage is in cracked or non-cracked concrete CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \leq 1.2$

$\psi_{h,N}$ = 0.68 Coeff. related to the foundation height CEB [9.2.5]

$\gamma_{M,sp}$ = 2.16 Partial safety factor CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}^0*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}*\psi_{h,N}/\gamma_{M,sp}$

$F_{t,Rd,sp}$ = 33.30 [kN] Design anchor resistance to splitting of concrete CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s}, F_{t,Rd,p}, F_{t,Rd,c}, F_{t,Rd,sp})$

$F_{t,Rd}$ = 27.80 [kN] Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ = 337 [mm] Effective length for a single bolt row for mode 1 [6.2.6.5]

$l_{eff,2}$ = 337 [mm] Effective length for a single bolt row for mode 2 [6.2.6.5]

m = 84 [mm] Distance of a bolt from the stiffening edge [6.2.6.5]

$M_{pl,1,Rd}$ = 12.39 [kN*m] Plastic resistance of a plate for mode 1 [6.2.4]

$M_{pl,2,Rd}$ = 12.39 [kN*m] Plastic resistance of a plate for mode 2 [6.2.4]

$F_{T,1,Rd}$ = 587.50 [kN] Resistance of a plate for mode 1 [6.2.4]

$F_{T,2,Rd}$ = 176.88 [kN] Resistance of a plate for mode 2 [6.2.4]

$F_{T,3,Rd}$ = 83.39 [kN] Resistance of a plate for mode 3 [6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ = 83.39 [kN] Tension resistance of a plate [6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	32	[mm]	Effective length for a single bolt row for mode 1	[6.2.6.5]
$l_{eff,2}$ =	32	[mm]	Effective length for a single bolt row for mode 2	[6.2.6.5]
m =	8	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	1.18	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	1.18	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	587.50	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	176.88	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	83.39	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ = 83.39 [kN] Tension resistance of a plate [6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$N_{j,Rd}$ = 222.38 [kN] Resistance of a spread footing for axial tension [6.2.8.3]

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ = 83.39 [kN] Resistance of a column base in the tension zone [6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ = 83.39 [kN] Resistance of a column base in the tension zone [6.2.8.3]

Connection capacity check

$N_{j,Ed} / N_{j,Rd} \le 1,0$ (6.24)	0.27 < 1.00	verified	(0.27)

e_y =	188	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	211	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	240	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	17.59	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \le 1,0$ (6.23)	0.64 < 1.00	verified	(0.64)

e_z =	1	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	105	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	150	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	0.22	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \le 1,0$ (6.23)	0.36 < 1.00	verified	(0.36)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \le 1,0$	0.99 < 1.00	verified	(0.99)

Shear

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y} = 0.74$		Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,y} = 0.74$		Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,y} = 2.50$		Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y} = 213.33$	[kN]	Resistance of an anchor bolt for bearing pressure onto the base plate	[6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z} = 1.11$		Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,z} = 1.00$		Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,z} = 2.50$		Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z}*\alpha_{b,z}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,z} = 288.00$	[kN]	Resistance of an anchor bolt for bearing pressure onto the base plate	[6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

$\alpha_b =$	0.25		Coeff. for resistance calculation $F_{2,vb,Rd}$	[6.2.2.(7)]
$A_{vb} =$	2.01	[cm^2]	Area of bolt section	[6.2.2.(7)]
$f_{ub} =$	800.00	[MPa]	Tensile strength of the anchor material	[6.2.2.(7)]
$\gamma_{M2} =$	1.25		Partial safety factor	[6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd} =$	31.91	[kN]	Shear resistance of a bolt - without lever arm	[6.2.2.(7)]
$\alpha_M =$	2.00		Factor related to the fastening of an anchor in the foundation	CEB [9.3.2.2]
$M_{Rk,s} =$	0.29	[kN*m]	Characteristic bending resistance of an anchor	CEB [9.3.2.2]
$l_{sm} =$	50	[mm]	Lever arm length	CEB [9.3.2.2]
$\gamma_{Ms} =$	1.20		Partial safety factor	CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm} =$	9.66	[kN]	Shear resistance of a bolt - with lever arm	CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c} =$	60.04	[kN]	Design uplift capacity	CEB [9.2.4]
$k_3 =$	2.00		Factor related to the anchor length	CEB [9.3.3]
$\gamma_{Mc} =$	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3 * N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp} =$ 55.60	[kN]	Concrete resistance for pry-out failure	CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}{}^0 =$	573.28	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y} =$	0.13		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,y} =$	1.29		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y} =$	0.78		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y} =$	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y} =$	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y} =$	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
$\gamma_{Mc} =$	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}{}^0 * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y}/\gamma_{Mc}$

$F_{v,Rd,c,y} =$ 35.58	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}{}^0 =$	158.01	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z} =$	1.00		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z} =$	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z} =$	1.00		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z} =$	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z} =$	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]

$V_{Rk,c,z}^0$ =	158.01	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{ucr,V,z}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}^0 * \psi_{A,V,z} * \psi_{h,V,z} * \psi_{s,V,z} * \psi_{ec,V,z} * \psi_{\alpha,V,z} * \psi_{ucr,V,z} / \gamma_{Mc}$

$F_{v,Rd,c,z}$ =	73.15	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	0.00	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	0.00	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b * \min(F_{1,vb,Rd,y}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,y}) + F_{f,Rd}$

$V_{j,Rd,y}$ =	77.31	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,y} / V_{j,Rd,y} \leq 1,0$	0.00 < 1.00	verified	(0.00)

$V_{j,Rd,z} = n_b * \min(F_{1,vb,Rd,z}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,z}) + F_{f,Rd}$

$V_{j,Rd,z}$ =	77.31	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.16 < 1.00	verified	(0.16)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.16 < 1.00	verified	(0.16)

Stiffener check

Trapezoid plate parallel to the column web

M_1 =	1.11	[kN*m]	Bending moment acting on a stiffener	
Q_1 =	27.76	[kN]	Shear force acting on a stiffener	
z_s =	27	[mm]	Location of the neutral axis (from the plate base)	
I_s =	672.28	[cm^4]	Moment of inertia of a stiffener	
σ_d =	0.35	[MPa]	Normal stress on the contact surface between stiffener and plate	EN 1993-1-1:[6.2.1.(5)]
σ_g =	19.47	[MPa]	Normal stress in upper fibers	EN 1993-1-1:[6.2.1.(5)]
τ =	23.14	[MPa]	Tangent stress in a stiffener	EN 1993-1-1:[6.2.1.(5)]
σ_z =	40.08	[MPa]	Equivalent stress on the contact surface between stiffener and plate	EN 1993-1-1:[6.2.1.(5)]

max (σ_g, τ / (0.58), σ_z) / (f_{yp}/γ_{M0}) ≤ 1.0 (6.1)	0.17 < 1.00	verified	(0.17)

Stiffener perpendicular to the web (along the extension of the column flanges)

M_1 =	1.00	[kN*m]	Bending moment acting on a stiffener	
Q_1 =	20.09	[kN]	Shear force acting on a stiffener	
z_s =	22	[mm]	Location of the neutral axis (from the plate base)	
I_s =	726.81	[cm^4]	Moment of inertia of a stiffener	
σ_d =	0.35	[MPa]	Normal stress on the contact surface between stiffener and plate	EN 1993-1-1:[6.2.1.(5)]
σ_g =	16.93	[MPa]	Normal stress in upper fibers	EN 1993-1-1:[6.2.1.(5)]
τ =	16.74	[MPa]	Tangent stress in a stiffener	EN 1993-1-1:[6.2.1.(5)]
σ_z =	29.00	[MPa]	Equivalent stress on the contact surface between stiffener and plate	EN 1993-1-1:[6.2.1.(5)]

max (σ_g, τ / (0.58), σ_z) / (f_{yp}/γ_{M0}) ≤ 1.0 (6.1)	0.12 < 1.00	verified	(0.12)

Welds between the column and the base plate

$\sigma_\perp$ =	4.93	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	4.93	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	-0.02	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	-0.91	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

$\sigma_\perp$ / (0.9*f_u/γ_{M2})) ≤ 1.0 (4.1)	0.02 < 1.00	verified	(0.02)
$\sqrt{}(\sigma_\perp^2 + 3.0\ (\tau_{yII}^2 + \tau_\perp^2))$ / ($f_u/(\beta_W*\gamma_{M2})$)) ≤ 1.0 (4.1)	0.03 < 1.00	verified	(0.03)
$\sqrt{}(\sigma_\perp^2 + 3.0\ (\tau_{zII}^2 + \tau_\perp^2))$ / ($f_u/(\beta_W*\gamma_{M2})$)) ≤ 1.0 (4.1)	0.03 < 1.00	verified	(0.03)

Vertical welds of stiffeners

Trapezoid plate parallel to the column web

$\sigma_\perp$ =	0.00	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	0.00	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{II} =	28.92	[MPa]	Parallel tangent stress	[4.5.3.(7)]
σ_z =	0.00	[MPa]	Total equivalent stress	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

max ($\sigma_\perp$, τ_{II} * √3, σ_z) / ($f_u/(\beta_W*\gamma_{M2})$)) ≤ 1.0 (4.1)	0.14 < 1.00	verified	(0.14)

Stiffener perpendicular to the web (along the extension of the column flanges)

$\sigma_\perp$ =	37.00	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	37.00	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]

$\sigma_{\perp}$ =	37.00	[MPa]	Normal stress in a weld	[4.5.3.(7)]
τ_{II} =	20.93	[MPa]	Parallel tangent stress	[4.5.3.(7)]
σ_z =	82.40	[MPa]	Total equivalent stress	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

max ($\sigma_{\perp}$, τ_{II} * √3, σ_z) / (f_u/(β_W*γ_{M2})) ≤ 1.0 (4.1) 0.23 < 1.00 verified (0.23)

Transversal welds of stiffeners

Trapezoid plate parallel to the column web

$\sigma_{\perp}$ =	24.54	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_{\perp}$ =	24.54	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{II} =	35.84	[MPa]	Parallel tangent stress	[4.5.3.(7)]
σ_z =	79.13	[MPa]	Total equivalent stress	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

max ($\sigma_{\perp}$, τ_{II} * √3, σ_z) / (f_u/(β_W*γ_{M2})) ≤ 1.0 (4.1) 0.22 < 1.00 verified (0.22)

Stiffener perpendicular to the web (along the extension of the column flanges)

$\sigma_{\perp}$ =	19.73	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_{\perp}$ =	19.73	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{II} =	25.01	[MPa]	Parallel tangent stress	[4.5.3.(7)]
σ_z =	58.60	[MPa]	Total equivalent stress	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

max ($\sigma_{\perp}$, τ_{II} * √3, σ_z) / (f_u/(β_W*γ_{M2})) ≤ 1.0 (4.1) 0.16 < 1.00 verified (0.16)

Connection stiffness

Bending moment $M_{j,Ed,y}$

b_{eff} =	102	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	268	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c*\sqrt{(b_{eff}*l_{eff})}/(1.275*E)$

$k_{13,y}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	337	[mm]	Effective length for a single bolt row for mode 2	[6.2.6.5]
m =	84	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.425*l_{eff}*t_p^3/(m^3)$

$k_{15,y}$ =	4	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]

L_b = 201 [mm] Effective anchorage depth [Table 6.11]

$k_{16,y} = 1.6*A_b/L_b$

$k_{16,y}$ = 1 [mm] Stiffness coeff. of an anchor subjected to tension [Table 6.11]

$\lambda_{0,y}$ = 0.71 Column slenderness [5.2.2.5.(2)]

$S_{j,ini,y}$ = 22652.29 [kN*m] Initial rotational stiffness [Table 6.12]

$S_{j,rig,y}$ = 14163.24 [kN*m] Stiffness of a rigid connection [5.2.2.5]

$S_{j,ini,y} \geq S_{j,rig,y}$ RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ = 30 [mm] Stiffness coeff. of compressed concrete [Table 6.11]

l_{eff} = 32 [mm] Effective length for a single bolt row for mode 2 [6.2.6.5]

m = 8 [mm] Distance of a bolt from the stiffening edge [6.2.6.5]

$k_{15,z} = 0.425*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ = 415 [mm] Stiffness coeff. of the base plate subjected to tension [Table 6.11]

L_b = 201 [mm] Effective anchorage depth [Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ = 1 [mm] Stiffness coeff. of an anchor subjected to tension [Table 6.11]

$\lambda_{0,z}$ = 2.99 Column slenderness [5.2.2.5.(2)]

$S_{j,ini,z}$ = 11774.69 [kN*m] Initial rotational stiffness [6.3.1.(4)]

$S_{j,rig,z}$ = 9408.45 [kN*m] Stiffness of a rigid connection [5.2.2.5]

$S_{j,ini,z} \geq S_{j,rig,z}$ RIGID [5.2.2.5.(2)]

Weakest component:

FOUNDATION - CONCRETE CONE PULL-OUT FAILURE

Connection conforms to the code	Ratio	0.99

	Autodesk Robot Structural Analysis Professional 2022 **Pinned column base design** Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete	Ratio **0.41**

General

Connection no.: 37

Connection name: Pinned column base

Geometry

Column

Section: TCAR 120x5

L_c =	5.00	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	120	[mm]	Height of column section
b_{fc} =	120	[mm]	Width of column section
t_{wc} =	5	[mm]	Thickness of the web of column section
t_{fc} =	5	[mm]	Thickness of the flange of column section
r_c =	5	[mm]	Radius of column section fillet
A_c =	22.88	[cm^2]	Cross-sectional area of a column
I_{yc} =	502.60	[cm^4]	Moment of inertia of the column section

$L_c =$ 5.00 [m] Column length

Material: S235

$f_{yc} =$ 235.00 [MPa] Resistance

$f_{uc} =$ 360.00 [MPa] Yield strength of a material

Column base

$l_{pd} =$ 300 [mm] Length

$b_{pd} =$ 300 [mm] Width

$t_{pd} =$ 25 [mm] Thickness

Material: S235

$f_{ypd} =$ 235.00 [MPa] Resistance

$f_{upd} =$ 360.00 [MPa] Yield strength of a material

Anchorage

The shear plane passes through the UNTHREADED portion of the bolt.

Class = 8.8 Anchor class

$f_{yb} =$ 640.00 [MPa] Yield strength of the anchor material

$f_{ub} =$ 800.00 [MPa] Tensile strength of the anchor material

d = 12 [mm] Bolt diameter

$A_s =$ 0.84 [cm^2] Effective section area of a bolt

$A_v =$ 1.13 [cm^2] Area of bolt section

n = 2 Number of bolt rows

$e_V =$ 180 [mm] Vertical spacing

Anchor dimensions

$L_1 =$ 60 [mm]

$L_2 =$ 540 [mm]

Washer

$l_{wd} =$ 50 [mm] Length

$b_{wd} =$ 60 [mm] Width

$t_{wd} =$ 10 [mm] Thickness

Wedge

Section: IPE 100

$l_w =$ 100 [mm] Length

Material: S235

f_{yw} =	235.00	[MPa]	Resistance

Material factors

γ_{M0} =	1.00	Partial safety factor
γ_{M2} =	1.25	Partial safety factor
γ_C =	1.50	Partial safety factor

Spread footing

L =	1200	[mm]	Spread footing length
B =	1200	[mm]	Spread footing width
H =	600	[mm]	Spread footing height

Concrete

Class C25/30

f_{ck} =	25.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

Welds

a_p =	4	[mm]	Footing plate of the column base
a_w =	4	[mm]	Wedge

Loads

Case: Manual calculations.

$N_{j,Ed}$ =	34.00	[kN]	Axial force
$V_{j,Ed,y}$ =	-16.00	[kN]	Shear force

Results

Tension zone

STEEL FAILURE

A_b =	0.84	[cm^2]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1}$ = beta*0.9*f_{ub}*A_b/γ_{M2}

$F_{t,Rd,s1}$ = 41.27 [kN] Anchor resistance to steel failure [Table 3.4]

γ_{Ms} = 1.20 Partial safety factor CEB [3.2.3.2]

f_{yb} = 640.00 [MPa] Yield strength of the anchor material CEB [9.2.2]

$F_{t,Rd,s2}$ = f_{yb}*A_b/γ_{Ms}

$F_{t,Rd,s2}$ = 44.96 [kN] Anchor resistance to steel failure CEB [9.2.2]

$F_{t,Rd,s}$ = min($F_{t,Rd,s1}$,$F_{t,Rd,s2}$)

$F_{t,Rd,s}$ = 41.27 [kN] Anchor resistance to steel failure

PULL-OUT FAILURE

f_{ck} = 25.00 [MPa] Characteristic compressive strength of concrete EN 1992-1:[3.1.2]

f_{ctd} = 0.7*0.3*$f_{ck}^{2/3}$/γ_C

f_{ctd} = 1.20 [MPa] Design tensile resistance EN 1992-1:[8.4.2.(2)]

η_1 = 1.00 Coeff. related to the quality of the bond conditions and concreting conditions EN 1992-1:[8.4.2.(2)]

η_2 = 1.00 Coeff. related to the bar diameter EN 1992-1:[8.4.2.(2)]

f_{bd} = 2.25*η_1*η_2*f_{ctd}

f_{bd} = 2.69 [MPa] Design value of the ultimate bond stress EN 1992-1:[8.4.2.(2)]

h_{ef} = 510 [mm] Effective anchorage depth EN 1992-1:[8.4.2.(2)]

$F_{t,Rd,p}$ = π*d*h_{ef}*f_{bd}

$F_{t,Rd,p}$ = 51.78 [kN] Design uplift capacity EN 1992-1:[8.4.2.(2)]

CONCRETE CONE FAILURE

h_{ef} = 400 [mm] Effective anchorage depth CEB [9.2.4]

$N_{Rk,c}^0$ = 7.5[$N^{0.5}$/$mm^{0.5}$]*$f_{ck}^{0.5}$*$h_{ef}^{1.5}$

$N_{Rk,c}^0$ = 300.00 [kN] Characteristic resistance of an anchor CEB [9.2.4]

$s_{cr,N}$ = 1200 [mm] Critical width of the concrete cone CEB [9.2.4]

$c_{cr,N}$ = 600 [mm] Critical edge distance CEB [9.2.4]

$A_{c,N0}$ = 14400.00 [cm^2] Maximum area of concrete cone CEB [9.2.4]

$A_{c,N}$ = 7200.00 [cm^2] Actual area of concrete cone CEB [9.2.4]

$\psi_{A,N}$ = $A_{c,N}$/$A_{c,N0}$

$\psi_{A,N}$ = 0.50 Factor related to anchor spacing and edge distance CEB [9.2.4]

c = 510 [mm] Minimum edge distance from an anchor CEB [9.2.4]

$\psi_{A,N}$ = 0.50 Factor related to anchor spacing and edge distance CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ = 0.95 Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete CEB [9.2.4]

$\psi_{ec,N}$ = 1.00 Factor related to distribution of tensile forces acting on anchors CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ = 1.00 Shell spalling factor CEB [9.2.4]

$\psi_{ucr,N}$ = 1.40 Factor taking into account whether the anchorage is in cracked or non-cracked concrete CEB [9.2.4]

γ_{Mc} = 2.16 Partial safety factor CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}{}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ = 92.85 [kN] Design anchor resistance to concrete cone failure EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} = 510 [mm] Effective anchorage depth CEB [9.2.5]

$N_{Rk,c}{}^{0} = 7.5[N^{0.5}/mm^{0.5}]*f_{ck}{}^{0.5}*h_{ef}{}^{1.5}$

$N_{Rk,c}{}^{0}$ = 431.90 [kN] Design uplift capacity CEB [9.2.5]

$s_{cr,N}$ = 1020 [mm] Critical width of the concrete cone CEB [9.2.5]

$c_{cr,N}$ = 510 [mm] Critical edge distance CEB [9.2.5]

$A_{c,N0}$ = 10404.00 [cm^2] Maximum area of concrete cone CEB [9.2.5]

$A_{c,N}$ = 6120.00 [cm^2] Actual area of concrete cone CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ = 0.59 Factor related to anchor spacing and edge distance CEB [9.2.5]

c = 510 [mm] Minimum edge distance from an anchor CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ = 1.00 Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete CEB [9.2.5]

$\psi_{ec,N}$ = 1.00 Factor related to distribution of tensile forces acting on anchors CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N} =$ 1.00 Shell spalling factor CEB [9.2.5]

$\psi_{ucr,N} =$ 1.40 Factor taking into account whether the anchorage is in cracked or non-cracked concrete CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \le 1.2$

$\psi_{h,N} =$ 0.70 Coeff. related to the foundation height CEB [9.2.5]

$\gamma_{M,sp} =$ 2.16 Partial safety factor CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}{}^{0} * \psi_{A,N} * \psi_{s,N} * \psi_{ec,N} * \psi_{re,N} * \psi_{ucr,N} * \psi_{h,N} / \gamma_{M,sp}$

$F_{t,Rd,sp} =$ 115.61 [kN] Design anchor resistance to splitting of concrete CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s} , F_{t,Rd,p} , F_{t,Rd,c} , F_{t,Rd,sp})$

$F_{t,Rd} =$ 41.27 [kN] Tensile resistance of an anchor

BENDING OF THE BASE PLATE

$l_{eff,1} =$	150	[mm]	Effective length for a single bolt row for mode 1	[6.2.6.5]
$l_{eff,2} =$	150	[mm]	Effective length for a single bolt row for mode 2	[6.2.6.5]
m =	25	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd} =$	5.51	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd} =$	5.51	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd} =$	864.83	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd} =$	238.04	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd} =$	82.55	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd} = \min(F_{T,1,Rd} , F_{T,2,Rd} , F_{T,3,Rd})$

$F_{t,pl,Rd} =$ 82.55 [kN] Tension resistance of a plate [6.2.4]

TENSILE RESISTANCE OF A COLUMN WEB

$t_{wc} =$	5	[mm]	Effective thickness of the column web	[6.2.6.3.(8)]
$b_{eff,t,wc} =$	150	[mm]	Effective width of the web for tension	[6.2.6.3.(2)]
$A_{vc} =$	11.44	[cm^2]	Shear area	EN1993-1-1:[6.2.6.(3)]
$\omega =$	0.56		Reduction factor for interaction with shear	[6.2.6.3.(4)]

$F_{t,wc,Rd} = \omega \, b_{eff,t,wc} \, t_{wc} \, f_{yc} / \gamma_{M0}$

$F_{t,wc,Rd} =$ 195.99 [kN] Column web resistance [6.2.6.3.(1)]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$N_{j,Rd}$ = 82.55 [kN] Resistance of a spread footing for axial tension [6.2.8.3]

Connection capacity check

$N_{j,Ed} / N_{j,Rd} \le 1,0$ (6.24)	0.41 < 1.00	verified	(0.41)

Shear

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y}$ = 1.43 Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,y}$ = 1.00 Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,y}$ = 2.50 Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y}$ = 216.00 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

α_b = 0.25 Coeff. for resistance calculation $F_{2,vb,Rd}$ [6.2.2.(7)]

A_{vb} = 1.13 [cm^2] Area of bolt section [6.2.2.(7)]

f_{ub} = 800.00 [MPa] Tensile strength of the anchor material [6.2.2.(7)]

γ_{M2} = 1.25 Partial safety factor [6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd}$ = 17.95 [kN] Shear resistance of a bolt - without lever arm [6.2.2.(7)]

α_M = 2.00 Factor related to the fastening of an anchor in the foundation CEB [9.3.2.2]

$M_{Rk,s}$ = 0.10 [kN*m] Characteristic bending resistance of an anchor CEB [9.3.2.2]

l_{sm} = 48 [mm] Lever arm length CEB [9.3.2.2]

γ_{Ms} = 1.20 Partial safety factor CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm}$ = 3.48 [kN] Shear resistance of a bolt - with lever arm CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c}$ = 200.55 [kN] Design uplift capacity CEB [9.2.4]

k_3 = 2.00 Factor related to the anchor length CEB [9.3.3]

γ_{Mc} = 2.16 Partial safety factor CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3*N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp}$ = 185.69 [kN] Concrete resistance for pry-out failure CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}^{0}$ =	228.97	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y}$ =	0.46		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,y}$ =	1.08		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.88		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}^{0} * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y} / \gamma_{Mc}$

$F_{v,Rd,c,y}$ =	46.48	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	0.00	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	0.00	[kN]	Slip resistance	[6.2.2.(6)]

BEARING PRESSURE OF THE WEDGE ONTO CONCRETE

$F_{v,Rd,wg,y} = 1.4 * l_w * b_{wy} * f_{ck} / \gamma_c$

$F_{v,Rd,wg,y}$ = 233.33 [kN] Resistance for bearing pressure of the wedge onto concrete

SHEAR CHECK

$V_{j,Rd,y} = n_b * \min(F_{1,vb,Rd,y}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,y}) + F_{v,Rd,wg,y} + F_{f,Rd}$

$V_{j,Rd,y}$ =	240.29	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,y} / V_{j,Rd,y} \leq 1,0$	0.07 < 1.00	verified	(0.07)

Welds between the column and the base plate

$\sigma_\perp$ =	12.52	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	12.52	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	-16.67	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	0.00	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

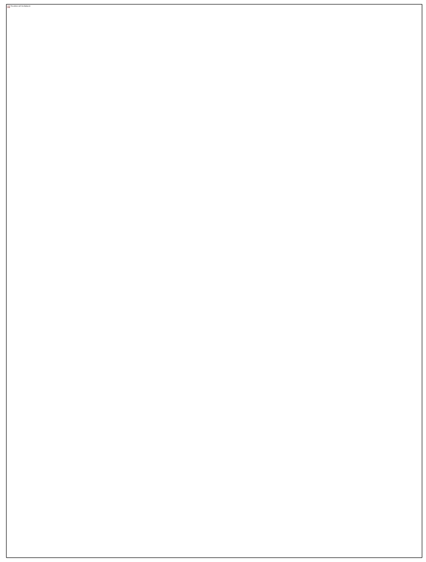
$\sigma_\perp / (0.9 * f_u/\gamma_{M2}) \leq 1.0$ (4.1)	0.05 < 1.00	verified	(0.05)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{yII}^2 + \tau_\perp^2))} / (f_u/(\beta_W * \gamma_{M2})) \leq 1.0$ (4.1)	0.11 < 1.00	verified	(0.11)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{zII}^2 + \tau_\perp^2))} / (f_u/(\beta_W * \gamma_{M2})) \leq 1.0$ (4.1)	0.07 < 1.00	verified	(0.07)

Weakest component:

ANCHOR BOLT - RUPTURE

Connection conforms to the code	Ratio	0.41

	Autodesk Robot Structural Analysis Professional 2022 **Calculation of the beam-column (web) connection** EN 1993-1-8:2005/AC:2009	Ratio **0.14**



General

Connection no.: 135

Connection name: Beam-column (web)

Structure node: 1581

Structure members: 862, 1168, 1167

Geometry

Column

Section: IPE 400

Member no.: 862

α =	-90.0	[Deg]	Inclination angle
h_c =	400	[mm]	Height of column section
b_{fc} =	180	[mm]	Width of column section
t_{wc} =	9	[mm]	Thickness of the web of column section
t_{fc} =	14	[mm]	Thickness of the flange of column section
r_c =	21	[mm]	Radius of column section fillet
A_c =	84.46	[cm^2]	Cross-sectional area of a column
I_{yc} =	23128.40	[cm^4]	Moment of inertia of the column section

Material: S275

f_{yc} =	275.00	[MPa]	Design resistance
f_{uc} =	430.00	[MPa]	Tensile resistance

Left side

Beam

Section:			IPE 400
Member no.:			1168
α =	0.0	[Deg]	Inclination angle
h_{bl} =	400	[mm]	Height of beam section
b_{bl} =	180	[mm]	Width of beam section
t_{wbl} =	9	[mm]	Thickness of the web of beam section
t_{fbl} =	14	[mm]	Thickness of the flange of beam section
r_{bl} =	21	[mm]	Radius of beam section fillet
A_b =	84.46	[cm^2]	Cross-sectional area of a beam
I_{ybl} =	23128.40	[cm^4]	Moment of inertia of the beam section

Material: S275

f_{ybl} =	275.00	[MPa]	Design resistance
f_{ubl} =	430.00	[MPa]	Tensile resistance

Angle

Section:			CAE 100x10
α =	0.0	[Deg]	Inclination angle
h_{kl} =	100	[mm]	Height of angle section
b_{kl} =	100	[mm]	Width of angle section
t_{fkl} =	10	[mm]	Thickness of the flange of angle section
r_{kl} =	12	[mm]	Fillet radius of the web of angle section
l_{kl} =	130	[mm]	Angle length

Material: S275

f_{ykl} =	275.00	[MPa]	Design resistance
f_{ukl} =	430.00	[MPa]	Tensile resistance

Upper support seat

Section:			CAE 100x10
h_{kl} =	100	[mm]	Height of angle section
b_{kl} =	100	[mm]	Width of angle section
t_{fkl} =	10	[mm]	Thickness of the flange of angle section
r_{kl} =	12	[mm]	Fillet radius of the web of angle section

h_{kl} =	100	[mm]	Height of angle section
Material:	S275		
f_{ysu} =	275.00	[MPa]	Design resistance
f_{usu} =	430.00	[MPa]	Tensile resistance

Lower support seat

Section: CAE 100x10

h_{kl} =	100	[mm]	Height of angle section
b_{kl} =	100	[mm]	Width of angle section
t_{fkl} =	10	[mm]	Thickness of the flange of angle section
r_{kl} =	12	[mm]	Fillet radius of the web of angle section
Material:	S275		
f_{ysl} =	275.00	[MPa]	Design resistance
f_{usl} =	430.00	[MPa]	Tensile resistance

Bolts

BOLTS CONNECTING ANGLE WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING UPPER SUPPORT SEAT WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1.00		Number of bolt columns
w =	2.00		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING LOWER SUPPORT SEAT WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	4.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

Right side

Beam

Section: IPE 400

Member no.: 1167

α =	0.0	[Deg]	Inclination angle
h_{br} =	400	[mm]	Height of beam section
b_{br} =	180	[mm]	Width of beam section
t_{wbr} =	9	[mm]	Thickness of the web of beam section
t_{fbr} =	14	[mm]	Thickness of the flange of beam section
r_{br} =	21	[mm]	Radius of beam section fillet
A_{br} =	84.46	[cm^2]	Cross-sectional area of a beam

Section: IPE 400

I_{ybr} = 23128.40 [cm^4] Moment of inertia of the beam section

Material: S275

f_{ybr} = 275.00 [MPa] Design resistance

f_{ubr} = 430.00 [MPa] Tensile resistance

Angle

Section: CAE 100x10

h_{kr} = 100 [mm] Height of angle section

b_{kr} = 100 [mm] Width of angle section

t_{fkr} = 10 [mm] Thickness of the flange of angle section

r_{kr} = 12 [mm] Fillet radius of the web of angle section

l_{kr} = 130 [mm] Angle length

Material: S275

f_{ykr} = 275.00 [MPa] Design resistance

f_{ukr} = 430.00 [MPa] Tensile resistance

Upper support seat

Section: CAE 100x10

h_{kr} = 100 [mm] Height of angle section

b_{kr} = 100 [mm] Width of angle section

t_{fkr} = 10 [mm] Thickness of the flange of angle section

r_{kr} = 12 [mm] Fillet radius of the web of angle section

Material: S275

f_{ykr} = 275.00 [MPa] Design resistance

f_{ukr} = 430.00 [MPa] Tensile resistance

Lower support seat

Section: CAE 100x10

h_{kr} = 100 [mm] Height of angle section

b_{kr} = 100 [mm] Width of angle section

t_{fkr} = 10 [mm] Thickness of the flange of angle section

r_{kr} = 12 [mm] Fillet radius of the web of angle section

Material:	S275		
f_{ykr} =	275.00	[MPa]	Design resistance
f_{ukr} =	430.00	[MPa]	Tensile resistance

Bolts

BOLTS CONNECTING COLUMN WITH ANGLE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING ANGLE WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING UPPER SUPPORT SEAT WITH COLUMN

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	2		Number of bolt columns
w =	1		Number of bolt rows
e_1 =	65	[mm]	Level of first bolt
p_2 =	60	[mm]	Horizontal spacing

BOLTS CONNECTING UPPER SUPPORT SEAT WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1.00		Number of bolt columns
w =	2.00		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING LOWER SUPPORT SEAT WITH COLUMN

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	2		Number of bolt columns

Class =	8.8		Bolt class
w =	1		Number of bolt rows
e_1 =	65	[mm]	Level of first bolt
p_2 =	60	[mm]	Horizontal spacing

BOLTS CONNECTING LOWER SUPPORT SEAT WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

Material factors

γ_{M0} =	1.00	Partial safety factor	[2.2]
γ_{M2} =	1.25	Partial safety factor	[2.2]

Loads

Case: 154: ACC:SEI/97=1*1.00 + 56*-1.00 1*1.00+56*-1.00

Left side

$N_{b2,Ed}$ =	19.47	[kN]	Axial force
$V_{b2,Ed}$ =	-1.01	[kN]	Shear force
$M_{b2,Ed}$ =	-1.95	[kN*m]	Bending moment

Right side

$N_{b1,Ed}$ =	36.36	[kN]	Axial force
$V_{b1,Ed}$ =	2.73	[kN]	Shear force
$M_{b1,Ed}$ =	-0.85	[kN*m]	Bending moment

Results

Left side

$N_{w2,Ed}$ =	8.27	[kN]	Axial force in the web	$N_{w2,Ed} = (N_{b2,Ed}*A_w)/A_b$
$N_{fu2,Ed}$ =	5.60	[kN]	Axial force in the upper flange	$N_{fu2,Ed} = (N_{b2,Ed}*A_f)/A_b$
$N_{fl2,Ed}$ =	5.60	[kN]	Axial force in the lower flange	$N_{fl2,Ed} = (N_{b2,Ed}*A_f)/A_b$

Bolts connecting column with angle

BOLT CAPACITIES

$F_{v,Rd}$ =	43.43	[kN]	Shear bolt resistance in the unthreaded portion of a bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$
$F_{t,Rd}$ =	48.56	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}= 0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the angle

Direction x

k_{1x} =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_{1x}=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$
$k_{1x} > 0.0$			2.50 > 0.00	verified
α_{bx} =	0.90		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_{bx} > 0.0$			0.90 > 0.00	verified
$F_{b,Rd2x}$ =	92.62	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$
$k_{1z} > 0.0$			2.50 > 0.00	verified
α_{bz} =	0.90		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$
$\alpha_{bz} > 0.0$			0.90 > 0.00	verified
$F_{b,Rd2z}$ =	92.62	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2z}=k_{1z}*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE COLUMN - ANGLE CONNECTION

Bolt shear

e =	69	[mm]	Distance between centroid of a bolt group of an angle and center of the beam web	
M_0 =	0.04	[kN*m]	Real bending moment	$M_0=0.5*V_{b2,Ed}*e$
F_{Vz} =	0.25	[kN]	Component force in a bolt due to influence of the shear force	$F_{Vz}=0.5*\|V_{b1,Ed}\|/n$
F_{Mx} =	0.58	[kN]	Component force in a bolt due to influence of the moment	$F_{Mx}=\|M_0\|*z_i/\sum z_i^2$
$F_{x2,Ed}$ =	0.58	[kN]	Design total force in a bolt on the direction x	$F_{x2,Ed} = F_{Mx}$
$F_{z2,Ed}$ =	0.25	[kN]	Design total force in a bolt on the direction z	$F_{z2,Ed} = F_{Vz} + F_{Mz}$

Bolt shear

$e =$	69	[mm]	Distance between centroid of a bolt group of an angle and center of the beam web	
$F_{Ed} =$	0.64	[kN]	Resultant shear force in a bolt	$F_{Ed} = \sqrt{(F_{x,Ed}^2 + F_{z,Ed}^2)}$
$F_{Rdx} =$	92.62	[kN]	Effective design capacity of a bolt on the direction x	$F_{Rdx}=F_{bRd2x}$
$F_{Rdz} =$	92.62	[kN]	Effective design capacity of a bolt on the direction z	$F_{Rdz}=F_{bRd2z}$

$\lvert F_{x2,Ed}\rvert \leq F_{Rdx}$	$\lvert 0.58\rvert < 92.62$	verified	(0.01)
$\lvert F_{z2,Ed}\rvert \leq F_{Rdz}$	$\lvert 0.25\rvert < 92.62$	verified	(0.00)
$F_{Ed} \leq F_{v,Rd}$	0.64 < 43.43	verified	(0.01)

Bolt tension

$e =$	69	[mm]	Distance between centroid of a bolt group and center of column web	
$M_{0t} =$	0.04	[kN*m]	Real bending moment	$M_{0t}=0.5*V_{b2,Ed}*e$
$F_{t,Ed} =$	2.65	[kN]	Tensile force in the outermost bolt	$F_{t,Ed}=M_{0t}*z_{max}/\sum z_i^2 + N_{w,Ed}/n$

$F_{t,Ed} \leq F_{tRd}$	2.65 < 48.56	verified	(0.05)

Simultaneous action of a tensile force and a shear force in a bolt

$F_{v,Ed} =$	0.64	[kN]	Resultant shear force in a bolt	$F_{v,Ed} = \sqrt{[F_{x,Ed}^2 + F_{z,Ed}^2]}$

$F_{v,Ed}/F_{vRd} + F_{t,Ed}/(1.4*F_{t,Rd}) \leq 1.0$	0.05 < 1.00	verified	(0.05)

Bolts connecting angle with beam

BOLT CAPACITIES

$F_{v,Rd} =$	86.86	[kN]	Shear bolt resistance in the unthreaded portion of a bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam

Direction x

$k_{1x} =$	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_{1x} = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$
$k_{1x} > 0.0$	2.50 > 0.00		verified	
$\alpha_{bx} =$	1.00		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_{bx} > 0.0$	1.00 > 0.00		verified	
$F_{b,Rd1x} =$	88.75	[kN]	Bearing resistance of a single bolt	$F_{b,Rd1x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} =	2.50		Coefficient for calculation of $F_{b,Rd}$	k_{1z}=min[2.8*(e_2/d_0)-1.7, 2.5]
k_{1z} > 0.0			2.50 > 0.00 verified	
α_{bz} =	1.00		Coefficient for calculation of $F_{b,Rd}$	α_{bz}=min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]
α_{bz} > 0.0			1.00 > 0.00 verified	
$F_{b,Rd1z}$ =	88.75	[kN]	Bearing resistance of a single bolt	$F_{b,Rd1z}$=k_{1z}*α_{bz}*f_u*d*t_i/γ_{M2}

Bolt bearing on the angle

Direction x

k_{1x} =	2.50		Coefficient for calculation of $F_{b,Rd}$	k_{1x}=min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]
k_{1x} > 0.0			2.50 > 0.00 verified	
α_{bx} =	0.90		Coefficient for calculation of $F_{b,Rd}$	α_{bx}=min[e_2/(3*d_0), f_{ub}/f_u, 1]
α_{bx} > 0.0			0.90 > 0.00 verified	
$F_{b,Rd2x}$ =	185.23	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2x}$=k_{1x}*α_{bx}*f_u*d*t_i/γ_{M2}

Direction z

k_{1z} =	2.50		Coefficient for calculation of $F_{b,Rd}$	k_{1z}=min[2.8*(e_2/d_0)-1.7, 2.5]
k_{1z} > 0.0			2.50 > 0.00 verified	
α_{bz} =	0.90		Coefficient for calculation of $F_{b,Rd}$	α_{bz}=min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]
α_{bz} > 0.0			0.90 > 0.00 verified	
$F_{b,Rd2z}$ =	185.23	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2z}$=k_{1z}*α_{bz}*f_u*d*t_i/γ_{M2}

FORCES ACTING ON BOLTS IN THE ANGLE - BEAM CONNECTION

Bolt shear

e =	69	[mm]	Distance between centroid of a bolt group and center of column web	
M_0 =	-0.07	[kN*m]	Real bending moment	M_0=$V_{b2,Ed}$*e
F_{Nx} =	4.13	[kN]	Component force in a bolt due to influence of the longitudinal force	F_{Nx}= |$N_{w2,Ed}$|/n
F_{Vz} =	0.51	[kN]	Component force in a bolt due to influence of the shear force	F_{Vz}=|$V_{b2,Ed}$|/n
F_{Mx} =	1.17	[kN]	Component force in a bolt due to influence of the moment on the x direction	F_{Mx}=|M_0|*z_i/∑(x_i^2+z_i^2)
F_{Mz} =	0.00	[kN]	Component force in a bolt due to influence of the moment on the z direction	F_{Mz}=|M_0|*x_i/∑(x_i^2+z_i^2)
$F_{x,Ed}$ =	5.30	[kN]	Design total force in a bolt on the direction x	$F_{x,Ed}$ = F_{Nx} + F_{Mx}
$F_{z2,Ed}$ =	0.51	[kN]	Design total force in a bolt on the direction z	$F_{z2,Ed}$ = F_{Vz} + F_{Mz}

Bolt shear

e =	69	[mm]	Distance between centroid of a bolt group and center of column web	
F_{Ed} =	5.33	[kN]	Resultant shear force in a bolt	$F_{Ed} = \sqrt{(F_{x,Ed}^2 + F_{z,Ed}^2)}$
F_{Rdx} =	88.75	[kN]	Effective design capacity of a bolt on the direction x	$F_{Rdx}=\min(F_{bRd1x}, F_{bRd2x})$
F_{Rdz} =	88.75	[kN]	Effective design capacity of a bolt on the direction z	$F_{Rdz}=\min(F_{bRd1z}, F_{bRd2z})$

$\lvert F_{x,Ed}\rvert \le F_{Rdx}$	$\lvert 5.30\rvert < 88.75$	verified	(0.06)
$\lvert F_{z,Ed}\rvert \le F_{Rdz}$	$\lvert 0.51\rvert < 88.75$	verified	(0.01)
$F_{Ed} \le F_{v,Rd}$	5.33 < 86.86	verified	(0.06)

Bolts connecting upper support seat with column

BOLT CAPACITIES

$F_{v,Rd}$ =	38.60	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$
$F_{t,Rd}$ =	45.22	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}= 0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the column web

k_1 =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_1=\min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$
$k_1 > 0.0$	2.50 > 0.00		verified	
α_b =	0.86		Coefficient for calculation of $F_{b,Rd}$	$\alpha_b=\min[e_1/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_b > 0.0$	0.86 > 0.00		verified	
$F_{b,Rd1}$ =	101.90	[kN]	Bearing resistance of a single bolt	$F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

k_1 =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_1=\min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$
$k_1 > 0.0$	2.50 > 0.00		verified	
α_b =	0.65		Coefficient for calculation of $F_{b,Rd}$	$\alpha_b=\min[e_1/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_b > 0.0$	0.65 > 0.00		verified	
$F_{b,Rd2}$ =	89.19	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE COLUMN - UPPER SEAT CONNECTION

Bolt tension

$F_{t,Ed}$ =	0.37	[kN]	Tensile force in the outermost bolt	$F_{t,Ed}=[0.5*N_{b2,Ed} + M_{b2,Ed}/z]/n$
$F_{t,Ed} \le F_{t,Rd}$	0.37 < 45.22	verified		(0.01)

Bolts connecting upper support seat with beam

Bolt capacities

$F_{v,Rd}$ = 43.43 [kN] Shear resistance of the shank of a single bolt $F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam flange

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1 = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rd1}$ = 139.32 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 0.90 > 0.00 verified

$F_{b,Rd2}$ = 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Forces acting on bolts in the upper seat - beam connection

Bolt shear

F_{Ed} = 0.37 [kN] Shear force in a bolt $F_{Ed} = [N_{fu2,Ed} + M_{b2,Ed}/h_{bl}]/n$

F_{Rd} = 43.43 [kN] Effective design capacity of a bolt $F_{Rd}=\min(F_{vRd}, F_{bRd1}, F_{bRd2})$

$|F_{Ed}| \le F_{Rd}$ |0.37| < 43.43 verified (0.01)

Bolts connecting lower support seat with column

Bolt capacities

$F_{v,Rd}$ = 38.60 [kN] Shear resistance of the shank of a single bolt $F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

$F_{t,Rd}$ = 45.22 [kN] Tensile resistance of a single bolt $F_{t,Rd}= 0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the column web

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 0.86 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_1/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 0.86 > 0.00 verified

$F_{b,Rd1}$ = 101.90 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 0.65	Coefficient for calculation of $F_{b,Rd}$		α_b=min[e_1/(3*d_0), f_{ub}/f_u, 1]
α_b > 0.0	0.65 > 0.00	verified	
$F_{b,Rd2}$ = 89.19 [kN]	Bearing resistance of a single bolt		$F_{b,Rd2}$=k_1*α_b*f_u*d*t_i/γ_{M2}

FORCES ACTING ON BOLTS IN THE COLUMN - LOWER SEAT CONNECTION

Bolt tension

$F_{t,Ed}$ = 5.24 [kN]	Tensile force in the outermost bolt		$F_{t,Ed}$=[0.5*$N_{b2,Ed}$ - $M_{b2,Ed}$/z]/n
$F_{t,Ed}$ ≤ $F_{t,Rd}$	5.24 < 45.22	verified	(0.12)

Bolts connecting lower support seat with beam

BOLT CAPACITIES

$F_{v,Rd}$ = 43.43 [kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}$= 0.6*f_{ub}*A_v*m/γ_{M2}

Bolt bearing on the beam flange

k_1 = 2.50	Coefficient for calculation of $F_{b,Rd}$		k_1 = min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]
k_1 > 0.0	2.50 > 0.00	verified	
α_b = 1.00	Coefficient for calculation of $F_{b,Rd}$		α_b=min[e_2/(3*d_0), f_{ub}/f_u, 1]
α_b > 0.0	1.00 > 0.00	verified	
$F_{b,Rd1}$ = 139.32 [kN]	Bearing resistance of a single bolt		$F_{b,Rd1}$=k_1*α_b*f_u*d*t_i/γ_{M2}

Bolt bearing on the support seat

k_1 = 2.50	Coefficient for calculation of $F_{b,Rd}$		k_1=min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]
k_1 > 0.0	2.50 > 0.00	verified	
α_b = 0.90	Coefficient for calculation of $F_{b,Rd}$		α_b=min[e_2/(3*d_0), f_{ub}/f_u, 1]
α_b > 0.0	0.90 > 0.00	verified	
$F_{b,Rd2}$ = 92.62 [kN]	Bearing resistance of a single bolt		$F_{b,Rd2}$=k_1*α_b*f_u*d*t_i/γ_{M2}

CONNECTION - FOR FORCES ACTING ON BOLTS

Bolt shear

F_{Ed} = 5.24 [kN]	Shear force in a bolt		F_{Ed} = [$N_{fl2,Ed}$ - $M_{b2,Ed}$/h_{bl}]/n
F_{Rd} = 43.43 [kN]	Effective design capacity of a bolt		F_{Rd}=min(F_{vRd}, F_{bRd1}, F_{bRd2})
$\lvert F_{Ed}\rvert$ ≤ F_{Rd}	|5.24| < 43.43	verified	(0.12)

Verification of the section due to block tearing (axial force)

ANGLE

A_{nt} = 4.70 [cm^2] Net area of the section in tension

A_{nv} = 5.70 [cm^2] Area of the section in shear

V_{effRd} = 252.18 [kN] Design capacity of a section weakened by openings $V_{effRd}=f_u*A_{nt}/\gamma_{M2} + (1/\sqrt{3})*f_y*A_{nv}/\gamma_{M0}$

$\|0.5*N_{b2,Ed}\| \leq V_{effRd}$	|9.73| < 252.18	verified	(0.04)

BEAM

A_{nt} = 4.04 [cm^2] Net area of the section in tension

A_{nv} = 7.48 [cm^2] Area of the section in shear

V_{effRd} = 257.84 [kN] Design capacity of a section weakened by openings $V_{effRd}=f_u*A_{nt}/\gamma_{M2} + (1/\sqrt{3})*f_y*A_{nv}/\gamma_{M0}$

$\|N_{b2,Ed}\| \leq V_{effRd}$	|19.47| < 257.84	verified	(0.08)

Verification of the section due to block tearing (shear force)

ANGLE

A_{nt} = 2.85 [cm^2] Net area of the section in tension

A_{nv} = 7.55 [cm^2] Area of the section in shear

V_{effRd} = 168.89 [kN] Design capacity of a section weakened by openings $V_{effRd}=0.5*f_u*A_{nt}/\gamma_{M2} + (1/\sqrt{3})*f_y*A_{nv}/\gamma_{M0}$

$\|0.5*V_{b2,Ed}\| \leq V_{effRd}$	|-0.51| < 168.89	verified	(0.00)

BEAM

A_{nt} = 3.74 [cm^2] Net area of the section in tension

A_{nv} = 18.10 [cm^2] Area of the section in shear

V_{effRd} = 351.77 [kN] Design capacity of a section weakened by openings $V_{effRd}=0.5*f_u*A_{nt}/\gamma_{M2} + (1/\sqrt{3})*f_y*A_{nv}/\gamma_{M0}$

$\|V_{b2,Ed}\| \leq V_{effRd}$	|-1.01| < 351.77	verified	(0.00)

Verification of angle section weakened by openings

A_t = 13.00 [cm^2] Area of tension zone of the gross section

$A_{t,net}$ = 10.40 [cm^2] Net area of the section in tension

$0.9*(A_{t,net}/A_t) \geq (f_y*\gamma_{M2})/(f_u*\gamma_{M0})$	0.72 < 0.80

W_{net} = 24.51 [cm^3] Elastic section modulus

$M_{c,Rdnet}$ = 6.74 [kN*m] Design resistance of the section for bending $M_{c,Rdnet} = W_{net}*f_{yp}/\gamma_{M0}$

$\|M_0\| \leq M_{c,Rdnet}$	|-0.04| < 6.74	verified	(0.01)

A_v = 13.00 [cm^2] Effective section area for shear $A_v = l_a*t_{fa}$

$A_{v,net}$ = 10.40 [cm^2] Net area of a section effective for shear $A_{vnet}=A_v-n_v*d_0$

A_v =	13.00	[cm^2]	Effective section area for shear	$A_v = l_a*t_{fa}$
$V_{pl,Rd}$ =	206.40	[kN]	Design plastic resistance for shear	$V_{pl,Rd}=(A_v*f_y)/(\sqrt{3}*\gamma_{M0})$

$\|0.5*V_{b2,Ed}\| \leq V_{pl,Rd}$	|-0.51| < 206.40	verified	(0.00)

Verification of a beam section weakened by openings

A_t =	34.40	[cm^2]	Area of tension zone of the gross section
$A_{t,net}$ =	32.16	[cm^2]	Net area of the section in tension

$0.9*(A_{t,net}/A_t) \geq (f_y*\gamma_{M2})/(f_u*\gamma_{M0})$	0.84 > 0.80

W =	229.33	[cm^3]	Elastic section modulus	
$M_{c,Rd}$ =	63.07	[kN*m]	Design resistance of the section for bending	$M_{c,Rd} = W*f_{yp}/\gamma_{M0}$

$\|M_0\| \leq M_{c,Rd}$	|-0.07| < 63.07	verified	(0.00)

A_v =	34.40	[cm^2]	Effective section area for shear	
$A_{v,net}$ =	32.16	[cm^2]	Net area of a section effective for shear	$A_{vnet}=A_v-n_v*d_0$
$V_{pl,Rd}$ =	546.17	[kN]	Design plastic resistance for shear	$V_{pl,Rd}=(A_v*f_y)/(\sqrt{3}*\gamma_{M0})$

$V_{b2,Ed} \leq V_{pl,Rd}$	|-1.01| < 546.17	verified	(0.00)

Right side

$N_{w1,Ed}$ =	15.44	[kN]	Axial force in the web	$N_{w1,Ed} = (N_{b1,Ed}*A_w)/A_b$
$N_{fu1,Ed}$ =	10.46	[kN]	Axial force in the upper flange	$N_{fu1,Ed} = (N_{b1,Ed}*A_f)/A_b$
$N_{fl1,Ed}$ =	10.46	[kN]	Axial force in the lower flange	$N_{fl1,Ed} = (N_{b1,Ed}*A_f)/A_b$

Bolts connecting column with angle

BOLT CAPACITIES

$F_{v,Rd}$ =	43.43	[kN]	Shear bolt resistance in the unthreaded portion of a bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$
$F_{t,Rd}$ =	48.56	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}= 0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the angle

Direction x

k_{1x} =	2.50	Coefficient for calculation of $F_{b,Rd}$	$k_{1x}=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_{1x} > 0.0$	2.50 > 0.00	verified

α_{bx} =	0.90	Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_{bx} > 0.0$	0.90 > 0.00	verified

$F_{b,Rd2x}$ =	92.62	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} =	2.50	Coefficient for calculation of $F_{b,Rd}$	k_{1z}=min[2.8*(e_2/d_0)-1.7, 2.5]
k_{1z} > 0.0	2.50 > 0.00	verified	
α_{bz} =	0.90	Coefficient for calculation of $F_{b,Rd}$	α_{bz}=min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]
α_{bz} > 0.0	0.90 > 0.00	verified	
$F_{b,Rd2z}$ =	92.62 [kN]	Bearing resistance of a single bolt	$F_{b,Rd2z}$=k_{1z}*α_{bz}*f_u*d*t_i/γ_{M2}

FORCES ACTING ON BOLTS IN THE COLUMN - ANGLE CONNECTION

Bolt shear

e =	69	[mm]	Distance between centroid of a bolt group of an angle and center of the beam web	
M_0 =	0.09	[kN*m]	Real bending moment	M_0=0.5*$V_{b2,Ed}$*e
F_{Vz} =	0.68	[kN]	Component force in a bolt due to influence of the shear force	F_{Vz}=0.5*|$V_{b2,Ed}$|/n
F_{Mx} =	1.58	[kN]	Component force in a bolt due to influence of the moment	F_{Mx}=|M_0|*z_i/$\sum z_i^2$
$F_{x1,Ed}$ =	1.58	[kN]	Design total force in a bolt on the direction x	$F_{x1,Ed}$ = F_{Mx}
$F_{z1,Ed}$ =	0.68	[kN]	Design total force in a bolt on the direction z	$F_{z1,Ed}$ = F_{Vz} + F_{Mz}
F_{Ed} =	1.72	[kN]	Resultant shear force in a bolt	F_{Ed} = √($F_{x,Ed}^2$ + $F_{z,Ed}^2$)
F_{Rdx} =	92.62	[kN]	Effective design capacity of a bolt on the direction x	F_{Rdx}=F_{bRd2x}
F_{Rdz} =	92.62	[kN]	Effective design capacity of a bolt on the direction z	F_{Rdz}=F_{bRd2z}

|$F_{x1,Ed}$| ≤ F_{Rdx}	|1.58| < 92.62	verified	(0.02)
|$F_{z1,Ed}$| ≤ F_{Rdz}	|0.68| < 92.62	verified	(0.01)
F_{Ed} ≤ $F_{v,Rd}$	1.72 < 43.43	verified	(0.04)

Bolt tension

e =	69	[mm]	Distance between centroid of a bolt group and center of column web	
M_{0t} =	0.09	[kN*m]	Real bending moment	M_{0t}=0.5*$V_{b1,Ed}$*e
$F_{t,Ed}$ =	5.44	[kN]	Tensile force in the outermost bolt	$F_{t,Ed}$=M_{0t}*z_{max}/$\sum z_i^2$ + ($N_{b2,Ed}$/3)/n

$F_{t,Ed}$ ≤ $F_{t,Rd}$	5.44 < 48.56	verified	(0.11)

Simultaneous action of a tensile force and a shear force in a bolt

$F_{v,Ed}$ =	1.72	[kN]	Resultant shear force in a bolt	$F_{v,Ed}$ = f[$F_{x,Ed}^2$ + $F_{z,Ed}^2$]

$F_{v,Ed}/F_{v,Rd} + F_{t,Ed}/(1.4*F_{t,Rd}) \leq 1.0$	0.12 < 1.00	verified	(0.12)

Bolts connecting angle with beam

BOLT CAPACITIES

$F_{v,Rd}$ = 86.86 [kN] Shear bolt resistance in the unthreaded portion of a bolt $F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam

Direction x

k_{1x} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1x} = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_{1x} > 0.0$	2.50 > 0.00	verified

α_{bx} = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_{bx} > 0.0$	1.00 > 0.00	verified

$F_{b,Rd1x}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rd1x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$

$k_{1z} > 0.0$	2.50 > 0.00	verified

α_{bz} = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$

$\alpha_{bz} > 0.0$	1.00 > 0.00	verified

$F_{b,Rd1z}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rd1z}=k_{1z}*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the angle

Direction x

k_{1x} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1x}=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_{1x} > 0.0$	2.50 > 0.00	verified

α_{bx} = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_{bx} > 0.0$	0.90 > 0.00	verified

$F_{b,Rd2x}$ = 185.23 [kN] Bearing resistance of a single bolt $F_{b,Rd2x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$

$k_{1z} > 0.0$	2.50 > 0.00	verified

α_{bz} = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$

$\alpha_{bz} > 0.0$	0.90 > 0.00	verified

$F_{b,Rd2z}$ = 185.23 [kN] Bearing resistance of a single bolt $F_{b,Rd2z}=k_{1z}*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE ANGLE - BEAM CONNECTION

Bolt shear

$e =$	69	[mm]	Distance between centroid of a bolt group and center of column web	
$M_0 =$	0.19	[kN*m]	Real bending moment	$M_0=V_{b1,Ed}*e$
$F_{Nx} =$	7.72	[kN]	Component force in a bolt due to influence of the longitudinal force	$F_{Nx}= \lvert N_{w1,Ed}\rvert/n$
$F_{Vz} =$	1.37	[kN]	Component force in a bolt due to influence of the shear force	$F_{Vz}=\lvert V_{b1,Ed}\rvert/n$
$F_{Mx} =$	3.16	[kN]	Component force in a bolt due to influence of the moment on the x direction	$F_{Mx}=\lvert M_0\rvert*z_i/\sum(x_i^2+z_i^2)$
$F_{Mz} =$	0.00	[kN]	Component force in a bolt due to influence of the moment on the z direction	$F_{Mz}=\lvert M_0\rvert*x_i/\sum(x_i^2+z_i^2)$
$F_{x,Ed} =$	10.88	[kN]	Design total force in a bolt on the direction x	$F_{x,Ed} = F_{Nx} + F_{Mx}$
$F_{z1,Ed} =$	1.37	[kN]	Design total force in a bolt on the direction z	$F_{z1,Ed} = F_{Vz} + F_{Mz}$
$F_{Ed} =$	10.96	[kN]	Resultant shear force in a bolt	$F_{Ed} = \sqrt{(F_{x,Ed}^2 + F_{z,Ed}^2)}$
$F_{Rdx} =$	88.75	[kN]	Effective design capacity of a bolt on the direction x	$F_{Rdx}=\min(F_{bRd1x}, F_{bRd2x})$
$F_{Rdz} =$	88.75	[kN]	Effective design capacity of a bolt on the direction z	$F_{Rdz}=\min(F_{bRd1z}, F_{bRd2z})$

$\lvert F_{x,Ed}\rvert \le F_{Rdx}$	$\lvert 10.88\rvert < 88.75$	verified	(0.12)
$\lvert F_{z,Ed}\rvert \le F_{Rdz}$	$\lvert 1.37\rvert < 88.75$	verified	(0.02)
$F_{Ed} \le F_{v,Rd}$	$10.96 < 86.86$	verified	(0.13)

Bolts connecting upper support seat with column

BOLT CAPACITIES

$F_{v,Rd} =$	43.43	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$
$F_{t,Rd} =$	48.56	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}= 0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the column web

$k_1 =$	2.50	Coefficient for calculation of $F_{b,Rd}$	$k_1=\min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$
$k_1 > 0.0$	$2.50 > 0.00$	verified	
$\alpha_b =$	1.00	Coefficient for calculation of $F_{b,Rd}$	$\alpha_b=\min[e_1/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_b > 0.0$	$1.00 > 0.00$	verified	

$F_{b,Rd1} =$	88.75	[kN]	Bearing resistance of a single bolt	$F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

$k_1 =$ 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_2/d_0)-1.7,\ 1.4*(p_2/d_0)-1.7,\ 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

$\alpha_b =$ 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_1/(3*d_0),\ f_{ub}/f_u,\ 1]$

$\alpha_b > 0.0$ 0.90 > 0.00 verified

$F_{b,Rd2} =$ 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE COLUMN - UPPER SEAT CONNECTION

Bolt tension

$F_{t,Ed} =$ 4.16 [kN] Tensile force in the outermost bolt $F_{t,Ed}=[0.5*N_{b1,Ed} + M_{yR}/z]/n$

$F_{t,Ed} \leq F_{t,Rd}$ 4.16 < 48.56 verified (0.09)

Bolts connecting upper support seat with beam

BOLT CAPACITIES

$F_{v,Rd} =$ 43.43 [kN] Shear resistance of the shank of a single bolt $F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam flange

$k_1 =$ 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1 = \min[2.8*(e_1/d_0)-1.7,\ 1.4*(p_1/d_0)-1.7,\ 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

$\alpha_b =$ 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_2/(3*d_0),\ f_{ub}/f_u,\ 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rd1} =$ 139.32 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

$k_1 =$ 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_1/d_0)-1.7,\ 1.4*(p_1/d_0)-1.7,\ 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

$\alpha_b =$ 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_2/(3*d_0),\ f_{ub}/f_u,\ 1]$

$\alpha_b > 0.0$ 0.90 > 0.00 verified

$F_{b,Rd2} =$ 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE UPPER SEAT - BEAM CONNECTION

Bolt shear

$F_{Ed} =$ 4.16 [kN] Shear force in a bolt $F_{Ed} = [N_{fu1,Ed} + M_{b1,Ed}/h_{br}]/n$

$F_{Rd} =$ 43.43 [kN] Effective design capacity of a bolt $F_{Rd}=\min(F_{vRd},\ F_{bRd1},\ F_{bRd2})$

$|F_{Ed}| \leq F_{Rd}$ |4.16| < 43.43 verified (0.10)

Bolts connecting lower support seat with column

BOLT CAPACITIES

$F_{v,Rd}$ =	43.43	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}$= $0.6*f_{ub}*A_v*m/\gamma_{M2}$
$F_{t,Rd}$ =	48.56	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}$= $0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the column web

k_1 =	2.50	Coefficient for calculation of $F_{b,Rd}$	k_1=min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]
$k_1 > 0.0$	2.50 > 0.00	verified	
α_b =	1.00	Coefficient for calculation of $F_{b,Rd}$	α_b=min[e_1/(3*d_0), f_{ub}/f_u, 1]
$\alpha_b > 0.0$	1.00 > 0.00	verified	
$F_{b,Rd1}$ =	88.75 [kN]	Bearing resistance of a single bolt	$F_{b,Rd1}$=$k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$
k_1 =	2.50	Coefficient for calculation of $F_{b,Rd}$	k_1=min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]
$k_1 > 0.0$	2.50 > 0.00	verified	
α_b =	0.90	Coefficient for calculation of $F_{b,Rd}$	α_b=min[e_1/(3*d_0), f_{ub}/f_u, 1]
$\alpha_b > 0.0$	0.90 > 0.00	verified	
$F_{b,Rd2}$ =	92.62 [kN]	Bearing resistance of a single bolt	$F_{b,Rd2}$=$k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE COLUMN - LOWER SEAT CONNECTION

Bolt tension

$F_{t,Ed}$ =	6.30	[kN]	Tensile force in the outermost bolt	$F_{t,Ed}$=[0.5*$N_{b1,Ed}$ - $M_{b1,Ed}$/z)/n
$F_{t,Ed} \le F_{t,Rd}$	6.30 < 48.56	verified		(0.13)

Bolts connecting lower support seat with beam

BOLT CAPACITIES

$F_{v,Rd}$ =	43.43	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}$= $0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam flange

k_1 =	2.50	Coefficient for calculation of $F_{b,Rd}$	k_1 = min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]
$k_1 > 0.0$	2.50 > 0.00	verified	
α_b =	1.00	Coefficient for calculation of $F_{b,Rd}$	α_b=min[e_2/(3*d_0), f_{ub}/f_u, 1]
$\alpha_b > 0.0$	1.00 > 0.00	verified	
$F_{b,Rd1}$ =	139.32 [kN]	Bearing resistance of a single bolt	$F_{b,Rd1}$=$k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

k_1 =	2.50	Coefficient for calculation of $F_{b,Rd}$	k_1=min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]
$k_1 > 0.0$	2.50 > 0.00	verified	

α_b =	0.90		Coefficient for calculation of $F_{b,Rd}$	α_b=min[e_2/(3*d_0), f_{ub}/f_u, 1]
α_b > 0.0		0.90 > 0.00	verified	
$F_{b,Rd2}$ =	92.62	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2}$=k_1*α_b*f_u*d*t_i/γ_{M2}

FORCES ACTING ON BOLTS IN THE LOWER SEAT - BEAM CONNECTION

Bolt shear

F_{Ed} =	6.30	[kN]	Shear force in a bolt	F_{Ed} = [$N_{fl1,Ed}$ - $M_{b1,Ed}$/h_{br}]/n
F_{Rd} =	43.43	[kN]	Effective design capacity of a bolt	F_{Rd}=min(F_{vRd}, F_{bRd1}, F_{bRd2})
|F_{Ed}| ≤ F_{Rd}		|6.30| < 43.43	verified	(0.14)

Verification of the section due to block tearing (axial force)

ANGLE

A_{nt} =	4.70	[cm²]	Net area of the section in tension	
A_{nv} =	5.70	[cm²]	Area of the section in shear	
V_{effRd} =	252.18	[kN]	Design capacity of a section weakened by openings	V_{effRd}=f_u*A_{nt}/γ_{M2} + (1/√3)*f_y*A_{nv}/γ_{M0}
|0.5*$N_{b1,Ed}$| ≤ V_{effRd}		|18.18| < 252.18	verified	(0.07)

BEAM

A_{nt} =	4.04	[cm²]	Net area of the section in tension	
A_{nv} =	7.48	[cm²]	Area of the section in shear	
V_{effRd} =	257.84	[kN]	Design capacity of a section weakened by openings	V_{effRd}=f_u*A_{nt}/γ_{M2} + (1/√3)*f_y*A_{nv}/γ_{M0}
|$N_{b1,Ed}$| ≤ V_{effRd}		|36.36| < 257.84	verified	(0.14)

Verification of the section due to block tearing (shear force)

ANGLE

A_{nt} =	2.85	[cm²]	Net area of the section in tension	
A_{nv} =	7.55	[cm²]	Area of the section in shear	
V_{effRd} =	168.89	[kN]	Design capacity of a section weakened by openings	V_{effRd}=0.5*f_u*A_{nt}/γ_{M2} + (1/√3)*f_y*A_{nv}/γ_{M0}
|0.5*$V_{b1,Ed}$| ≤ V_{effRd}		|1.37| < 168.89	verified	(0.01)

BEAM

A_{nt} =	3.74	[cm²]	Net area of the section in tension	
A_{nv} =	18.10	[cm²]	Area of the section in shear	
V_{effRd} =	351.77	[kN]	Design capacity of a section weakened by openings	V_{effRd}=0.5*f_u*A_{nt}/γ_{M2} + (1/√3)*f_y*A_{nv}/γ_{M0}

$\|V_{b1,Ed}\| \le V_{effRd}$	$\|2.73\| < 351.77$	verified	(0.01)

Verification of angle section weakened by openings

A_t = 13.00 [cm^2] Area of tension zone of the gross section

$A_{t,net}$ = 10.40 [cm^2] Net area of the section in tension

$0.9*(A_{t,net}/A_t) \ge (f_y*\gamma_{M2})/(f_u*\gamma_{M0})$ 0.72 < 0.80

W_{net} = 24.51 [cm^3] Elastic section modulus

$M_{c,Rdnet}$ = 6.74 [kN*m] Design resistance of the section for bending $M_{c,Rdnet} = W_{net}*f_{yp}/\gamma_{M0}$

$\|M_0\| \le M_{c,Rdnet}$	$\|0.09\| < 6.74$	verified	(0.01)

A_v = 13.00 [cm^2] Effective section area for shear $A_v = l_a*t_{fa}$

$A_{v,net}$ = 10.40 [cm^2] Net area of a section effective for shear $A_{vnet}=A_v-n_v*d_0$

$V_{pl,Rd}$ = 206.40 [kN] Design plastic resistance for shear $V_{pl,Rd}=(A_v*f_y)/(\sqrt{3}*\gamma_{M0})$

$\|0.5*V_{b1,Ed}\| \le V_{pl,Rd}$	$\|1.37\| < 206.40$	verified	(0.01)

Verification of a beam section weakened by openings

A_t = 34.40 [cm^2] Area of tension zone of the gross section

$A_{t,net}$ = 32.16 [cm^2] Net area of the section in tension

$0.9*(A_{t,net}/A_t) \ge (f_y*\gamma_{M2})/(f_u*\gamma_{M0})$ 0.84 > 0.80

W = 229.33 [cm^3] Elastic section modulus

$M_{c,Rd}$ = 63.07 [kN*m] Design resistance of the section for bending $M_{c,Rd} = W*f_{yp}/\gamma_{M0}$

$\|M_0\| \le M_{c,Rd}$	$\|0.19\| < 63.07$	verified	(0.00)

A_v = 34.40 [cm^2] Effective section area for shear

$A_{v,net}$ = 32.16 [cm^2] Net area of a section effective for shear $A_{vnet}=A_v-n_v*d_0$

$V_{pl,Rd}$ = 546.17 [kN] Design plastic resistance for shear $V_{pl,Rd}=(A_v*f_y)/(\sqrt{3}*\gamma_{M0})$

$\|V_{b1,Ed}\| \le V_{pl,Rd}$	$\|2.73\| < 546.17$	verified	(0.01)

Column verification

Bolt bearing on the column web

Direction x

k_x = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_x = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_x > 0.0$ 2.50 > 0.00 verified

α_{bx} = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rdx}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rdx}=k_x*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

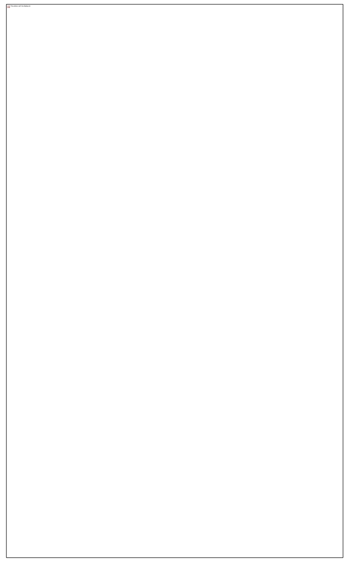
k_z =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_z=\min[2.8*(e_2/d_0)-1.7, 2.5]$
$k_z > 0.0$		2.50 > 0.00	verified	
α_{bz} =	1.00		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$
$\alpha_{bz} > 0.0$		1.00 > 0.00	verified	
$F_{b,Rdz}$ =	88.75	[kN]	Bearing resistance of a single bolt	$F_{b,Rdz}=k_z*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

RESULTANT FORCE ACTING ON THE OUTERMOST BOLT

$F_{x,Ed}$ =	2.16	[kN]	Design total force in a bolt on the direction x	$F_{x,Ed} = F_{x1,Ed} + F_{x2,Ed}$
$F_{z,Ed}$ =	0.94	[kN]	Design total force in a bolt on the direction z	$F_{z,Ed} = F_{z1,Ed} + F_{z2,Ed}$
$\lvert F_{x,Ed}\rvert \le F_{b,Rdx}$		|2.16| < 88.75	verified	(0.02)
$\lvert F_{z,Ed}\rvert \le F_{b,Rdz}$		|0.94| < 88.75	verified	(0.01)

Connection conforms to the code		Ratio	0.14

	Autodesk Robot Structural Analysis Professional 2022 **Calculation of the beam-column (web) connection** EN 1993-1-8:2005/AC:2009	Ratio **0.13**



General

Connection no.:	39
Connection name:	Beam-column (web)
Structure node:	1093
Structure members:	699, 1194

Geometry

Column

Section:	IPE 400
Member no.:	699

α =	-90.0	[Deg]	Inclination angle
h_c =	400	[mm]	Height of column section
b_{fc} =	180	[mm]	Width of column section
t_{wc} =	9	[mm]	Thickness of the web of column section
t_{fc} =	14	[mm]	Thickness of the flange of column section
r_c =	21	[mm]	Radius of column section fillet
A_c =	84.46	[cm^2]	Cross-sectional area of a column
I_{yc} =	23128.40	[cm^4]	Moment of inertia of the column section

Material: S275

f_{yc} =	275.00	[MPa]	Design resistance
f_{uc} =	430.00	[MPa]	Tensile resistance

Beam

Section:	IPE 400		
Member no.:	1194		
α =	0.0	[Deg]	Inclination angle
h_b =	400	[mm]	Height of beam section
b_b =	180	[mm]	Width of beam section
t_{wb} =	9	[mm]	Thickness of the web of beam section
t_{fb} =	14	[mm]	Thickness of the flange of beam section
r_b =	21	[mm]	Radius of beam section fillet
A_b =	84.46	[cm^2]	Cross-sectional area of a beam
I_{yb} =	23128.40	[cm^4]	Moment of inertia of the beam section
Material:	S275		
f_{yb} =	275.00	[MPa]	Design resistance
f_{ub} =	430.00	[MPa]	Tensile resistance

Angle

Section:	CAE 100x10		
h_k =	100	[mm]	Height of angle section
b_k =	100	[mm]	Width of angle section
t_{fk} =	10	[mm]	Thickness of the flange of angle section
r_k =	12	[mm]	Fillet radius of the web of angle section
l_k =	130	[mm]	Angle length
Material:	S275		
f_{yk} =	275.00	[MPa]	Design resistance
f_{uk} =	430.00	[MPa]	Tensile resistance

Upper support seat

Section:	CAE 100x10		
h_k =	100	[mm]	Height of angle section
b_k =	100	[mm]	Width of angle section
t_{fk} =	10	[mm]	Thickness of the flange of angle section
r_k =	12	[mm]	Fillet radius of the web of angle section

Material:	S275		
f_{yk} =	275.00	[MPa]	Design resistance
f_{uk} =	430.00	[MPa]	Tensile resistance

Lower support seat

Section:	CAE 100x10		
h_k =	100	[mm]	Height of angle section
b_k =	100	[mm]	Width of angle section
t_{fk} =	10	[mm]	Thickness of the flange of angle section
r_k =	12	[mm]	Fillet radius of the web of angle section
Material:	S275		
f_{yk} =	275.00	[MPa]	Design resistance
f_{uk} =	430.00	[MPa]	Tensile resistance

Bolts

BOLTS CONNECTING COLUMN WITH ANGLE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING ANGLE WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt

Class =	8.8		Bolt class
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING UPPER SUPPORT SEAT WITH COLUMN

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	2		Number of bolt columns
w =	1		Number of bolt rows
e_1 =	65	[mm]	Level of first bolt
p_2 =	60	[mm]	Horizontal spacing

BOLTS CONNECTING UPPER SUPPORT SEAT WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1.00		Number of bolt columns
w =	2.00		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

BOLTS CONNECTING LOWER SUPPORT SEAT WITH COLUMN

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	2		Number of bolt columns
w =	1		Number of bolt rows
e_1 =	65	[mm]	Level of first bolt
p_2 =	60	[mm]	Horizontal spacing

BOLTS CONNECTING LOWER SUPPORT SEAT WITH BEAM

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Bolt class
d =	12	[mm]	Bolt diameter
d_0 =	13	[mm]	Bolt opening diameter
A_s =	0.84	[cm^2]	Effective section area of a bolt
A_v =	1.13	[cm^2]	Area of bolt section
f_{ub} =	800.00	[MPa]	Tensile resistance
k =	1		Number of bolt columns
w =	2		Number of bolt rows
e_1 =	35	[mm]	Level of first bolt
p_1 =	60	[mm]	Vertical spacing

Material factors

γ_{M0} =	1.00	Partial safety factor	[2.2]
γ_{M2} =	1.25	Partial safety factor	[2.2]

Loads

Case: 74: ACC:SEI/17=1*1.00 + 19*1.00 (1+19)*1.00

$N_{b,Ed}$ =	1.70	[kN]	Axial force	
$V_{b,Ed}$ =	3.35	[kN]	Shear force	
$M_{b,Ed}$ =	4.33	[kN*m]	Bending moment	

Results

$N_{w,Ed}$ =	0.72	[kN]	Axial force in the web	$N_{w,Ed} = (N_{b,Ed}*A_w)/A_b$
$N_{fu,Ed}$ =	0.49	[kN]	Axial force in the upper flange	$N_{fu,Ed} = (N_{b,Ed}*A_f)/A_b$
$N_{fl,Ed}$ =	0.49	[kN]	Axial force in the lower flange	$N_{fl,Ed} = (N_{b,Ed}*A_f)/A_b$

Bolts connecting column with angle

BOLT CAPACITIES

$F_{v,Rd}$ =	43.43	[kN]	Shear bolt resistance in the unthreaded portion of a bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$
$F_{t,Rd}$ =	48.56	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}= 0.9*f_u*A_s/\gamma_{M2}$

Bolt bearing on the column web

Direction x

k_{1x} =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_{1x} = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$
$k_{1x} > 0.0$			2.50 > 0.00 verified	
α_{bx} =	1.00		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_{bx} > 0.0$			1.00 > 0.00 verified	
$F_{b,Rd1x}$ =	88.75	[kN]	Bearing resistance of a single bolt	$F_{b,Rd1x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$
$k_{1z} > 0.0$			2.50 > 0.00 verified	
α_{bz} =	1.00		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$
$\alpha_{bz} > 0.0$			1.00 > 0.00 verified	
$F_{b,Rd1z}$ =	88.75	[kN]	Bearing resistance of a single bolt	$F_{b,Rd1z}=k_{1z}*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the angle

Direction x

k_{1x} =	2.50		Coefficient for calculation of $F_{b,Rd}$	$k_{1x}=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$
$k_{1x} > 0.0$			2.50 > 0.00 verified	
α_{bx} =	0.90		Coefficient for calculation of $F_{b,Rd}$	$\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_{bx} > 0.0$	$0.90 > 0.00$	verified	

$F_{b,Rd2x}$ = 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$

$k_{1z} > 0.0$	$2.50 > 0.00$	verified	

α_{bz} = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$

$\alpha_{bz} > 0.0$	$0.90 > 0.00$	verified	

$F_{b,Rd2z}$ = 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2z}=k_{1z}*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE COLUMN - ANGLE CONNECTION

Bolt shear

e =	69	[mm]	Distance between centroid of a bolt group of an angle and center of the beam web	
M_0 =	0.12	[kN*m]	Real bending moment	$M_0=0.5*V_{b,Ed}*e$
F_{Vz} =	0.84	[kN]	Component force in a bolt due to influence of the shear force	$F_{Vz}=0.5*\|V_{b,Ed}\|/n$
F_{Mx} =	1.94	[kN]	Component force in a bolt due to influence of the moment	$F_{Mx}=\|M_0\|*z_i/\sum z_i^2$
$F_{x,Ed}$ =	1.94	[kN]	Design total force in a bolt on the direction x	$F_{x,Ed} = F_{Nx} + F_{Mx}$
$F_{z,Ed}$ =	0.84	[kN]	Design total force in a bolt on the direction z	$F_{z,Ed} = F_{Vz} + F_{Mz}$
F_{Ed} =	2.11	[kN]	Resultant shear force in a bolt	$F_{Ed} = \sqrt{(F_{x,Ed}^2 + F_{z,Ed}^2)}$
F_{Rdx} =	88.75	[kN]	Effective design capacity of a bolt on the direction x	$F_{Rdx}=\min(F_{bRd1x}, F_{bRd2x})$
F_{Rdz} =	88.75	[kN]	Effective design capacity of a bolt on the direction z	$F_{Rdz}=\min(F_{bRd1z}, F_{bRd2z})$

$\|F_{x,Ed}\| \le F_{Rdx}$	$\|1.94\| < 88.75$	verified	(0.02)
$\|F_{z,Ed}\| \le F_{Rdz}$	$\|0.84\| < 88.75$	verified	(0.01)
$F_{Ed} \le F_{v,Rd}$	$2.11 < 43.43$	verified	(0.05)

Bolt tension

e =	69	[mm]	Distance between centroid of a bolt group and center of column web	
M_{0t} =	0.12	[kN*m]	Real bending moment	$M_{0t}=0.5*V_{b,Ed}*e$
$F_{t,Ed}$ =	2.12	[kN]	Tensile force in the outermost bolt	$F_{t,Ed}=M_{0t}*z_{max}/\sum z_i^2 + (N_{b2,Ed}/3)/n$

$F_{t,Ed} \le F_{t,Rd}$	2.12 < 48.56	verified	(0.04)

Simultaneous action of a tensile force and a shear force in a bolt

$F_{v,Ed}$ = 2.11 [kN] Resultant shear force in a bolt $F_{v,Ed} = \sqrt{[F_{x,Ed}^2 + F_{z,Ed}^2]}$

$F_{v,Ed}/F_{v,Rd} + F_{t,Ed}/(1.4*F_{t,Rd}) \le 1.0$	0.08 < 1.00	verified	(0.08)

Bolts connecting angle with beam

BOLT CAPACITIES

$F_{v,Rd}$ = 86.86 [kN] Shear bolt resistance in the unthreaded portion of a bolt $F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam

Direction x

k_{1x} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1x} = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_{1x} > 0.0$	2.50 > 0.00	verified

α_{bx} = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_{bx} > 0.0$	1.00 > 0.00	verified

$F_{b,Rd1x}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rd1x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$

$k_{1z} > 0.0$	2.50 > 0.00	verified

α_{bz} = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bz}=\min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]$

$\alpha_{bz} > 0.0$	1.00 > 0.00	verified

$F_{b,Rd1z}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rd1z}=k_{1z}*\alpha_{bz}*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the angle

Direction x

k_{1x} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1x}=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_{1x} > 0.0$	2.50 > 0.00	verified

α_{bx} = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_{bx}=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_{bx} > 0.0$	0.90 > 0.00	verified

$F_{b,Rd2x}$ = 185.23 [kN] Bearing resistance of a single bolt $F_{b,Rd2x}=k_{1x}*\alpha_{bx}*f_u*d*t_i/\gamma_{M2}$

Direction z

k_{1z} = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_{1z}=\min[2.8*(e_2/d_0)-1.7, 2.5]$

$k_{1z} > 0.0$	2.50 > 0.00	verified

α_{bz} =	0.90		Coefficient for calculation of $F_{b,Rd}$	α_{bz}=min[e_1/(3*d_0), p_1/(3*d_0)-0.25, f_{ub}/f_u, 1]
α_{bz} > 0.0	0.90 > 0.00		verified	
$F_{b,Rd2z}$ =	185.23	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2z}$=k_{1z}*α_{bz}*f_u*d*t_i/γ_{M2}

FORCES ACTING ON BOLTS IN THE ANGLE - BEAM CONNECTION

Bolt shear

e =	69	[mm]	Distance between centroid of a bolt group and center of column web	
M_0 =	0.23	[kN*m]	Real bending moment	M_0=$V_{b,Ed}$*e
F_{Nx} =	0.36	[kN]	Component force in a bolt due to influence of the longitudinal force	F_{Nx}=|$N_{w,Ed}$|/n
F_{Vz} =	1.68	[kN]	Component force in a bolt due to influence of the shear force	F_{Vz}=|$V_{b,Ed}$|/n
F_{Mx} =	3.87	[kN]	Component force in a bolt due to influence of the moment on the x direction	F_{Mx}=|M_0|*z_i/∑(x_i^2+z_i^2)
F_{Mz} =	0.00	[kN]	Component force in a bolt due to influence of the moment on the z direction	F_{Mz}=|M_0|*x_i/∑(x_i^2+z_i^2)
$F_{x,Ed}$ =	4.23	[kN]	Design total force in a bolt on the direction x	$F_{x,Ed}$ = F_{Nx} + F_{Mx}
$F_{z,Ed}$ =	1.68	[kN]	Design total force in a bolt on the direction z	$F_{z,Ed}$ = F_{Vz} + F_{Mz}
F_{Ed} =	4.55	[kN]	Resultant shear force in a bolt	F_{Ed} = √($F_{x,Ed}^2$ + $F_{z,Ed}^2$)
F_{Rdx} =	88.75	[kN]	Effective design capacity of a bolt on the direction x	F_{Rdx}=min(F_{bRd1x}, F_{bRd2x})
F_{Rdz} =	88.75	[kN]	Effective design capacity of a bolt on the direction z	F_{Rdz}=min(F_{bRd1z}, F_{bRd2z})

|$F_{x,Ed}$| ≤ F_{Rdx}	|4.23| < 88.75	verified	(0.05)
|$F_{z,Ed}$| ≤ F_{Rdz}	|1.68| < 88.75	verified	(0.02)
F_{Ed} ≤ $F_{v,Rd}$	4.55 < 86.86	verified	(0.05)

Bolts connecting upper support seat with column

BOLT CAPACITIES

$F_{v,Rd}$ =	43.43	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}$= 0.6*f_{ub}*A_v*m/γ_{M2}
$F_{t,Rd}$ =	48.56	[kN]	Tensile resistance of a single bolt	$F_{t,Rd}$= 0.9*f_u*A_s/γ_{M2}

Bolt bearing on the column web

k_1 =	2.50	Coefficient for calculation of $F_{b,Rd}$	k_1=min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]
k_1 > 0.0	2.50 > 0.00	verified	

α_b = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_1/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rd1}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_1/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 0.90 > 0.00 verified

$F_{b,Rd2}$ = 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE COLUMN - UPPER SEAT CONNECTION

Bolt tension

$F_{t,Ed}$ = 4.90 [kN] Tensile force in the outermost bolt $F_{t,Ed}=[0.5*N_{b,Ed} + M_{b,Ed}/z]/n$

$F_{t,Ed} \le F_{t,Rd}$ 4.90 < 48.56 verified (0.10)

Bolts connecting upper support seat with beam

BOLT CAPACITIES

$F_{v,Rd}$ = 43.43 [kN] Shear resistance of the shank of a single bolt $F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam flange

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1 = \min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rd1}$ = 139.32 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=\min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 0.90 > 0.00 verified

$F_{b,Rd2}$ = 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE UPPER SEAT - BEAM CONNECTION

Bolt shear

F_{Ed} =	5.66	[kN]	Shear force in a bolt	$F_{Ed} = [N_{fu,Ed} + M_{b,Ed}/h_{br}]/n$
F_{Rd} =	43.43	[kN]	Effective design capacity of a bolt	$F_{Rd}=min(F_{vRd}, F_{bRd1}, F_{bRd2})$

$|F_{Ed}| \le F_{Rd}$ |5.66| < 43.43 verified (0.13)

Bolts connecting lower support seat with column

Bolt capacities

$F_{v,Rd}$ =	43.43	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the column web

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=min[e_1/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rd1}$ = 88.75 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=min[2.8*(e_2/d_0)-1.7, 1.4*(p_2/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 0.90 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=min[e_1/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 0.90 > 0.00 verified

$F_{b,Rd2}$ = 92.62 [kN] Bearing resistance of a single bolt $F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Forces acting on bolts in the column - lower seat connection

Bolts connecting lower support seat with beam

Bolt capacities

$F_{v,Rd}$ =	43.43	[kN]	Shear resistance of the shank of a single bolt	$F_{v,Rd}= 0.6*f_{ub}*A_v*m/\gamma_{M2}$

Bolt bearing on the beam flange

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1 = min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b = 1.00 Coefficient for calculation of $F_{b,Rd}$ $\alpha_b=min[e_2/(3*d_0), f_{ub}/f_u, 1]$

$\alpha_b > 0.0$ 1.00 > 0.00 verified

$F_{b,Rd1}$ = 139.32 [kN] Bearing resistance of a single bolt $F_{b,Rd1}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

Bolt bearing on the support seat

k_1 = 2.50 Coefficient for calculation of $F_{b,Rd}$ $k_1=min[2.8*(e_1/d_0)-1.7, 1.4*(p_1/d_0)-1.7, 2.5]$

$k_1 > 0.0$ 2.50 > 0.00 verified

α_b =	0.90		Coefficient for calculation of $F_{b,Rd}$	$\alpha_b=\min[e_2/(3*d_0), f_{ub}/f_u, 1]$
$\alpha_b > 0.0$		0.90 > 0.00	verified	
$F_{b,Rd2}$ =	92.62	[kN]	Bearing resistance of a single bolt	$F_{b,Rd2}=k_1*\alpha_b*f_u*d*t_i/\gamma_{M2}$

FORCES ACTING ON BOLTS IN THE LOWER SEAT - BEAM CONNECTION

Bolt shear

F_{Ed} =	-5.17	[kN]	Shear force in a bolt	$F_{Ed} = [N_{fl,Ed} - M_{b,Ed}/h_{br}]/n$
F_{Rd} =	43.43	[kN]	Effective design capacity of a bolt	$F_{Rd}=\min(F_{vRd}, F_{bRd1}, F_{bRd2})$
$\lvert F_{Ed}\rvert \le F_{Rd}$		|-5.17| < 43.43	verified	(0.12)

Verification of the section due to block tearing (axial force)

ANGLE

A_{nt} =	4.70	[cm^2]	Net area of the section in tension	
A_{nv} =	5.70	[cm^2]	Area of the section in shear	
V_{effRd} =	252.18	[kN]	Design capacity of a section weakened by openings	$V_{effRd}=f_u*A_{nt}/\gamma_{M2} + (1/\surd 3)*f_y*A_{nv}/\gamma_{M0}$
$\lvert 0.5*N_{b,Ed}\rvert \le V_{effRd}$		|0.85| < 252.18	verified	(0.00)

BEAM

A_{nt} =	4.04	[cm^2]	Net area of the section in tension	
A_{nv} =	7.48	[cm^2]	Area of the section in shear	
V_{effRd} =	257.84	[kN]	Design capacity of a section weakened by openings	$V_{effRd}=f_u*A_{nt}/\gamma_{M2} + (1/\surd 3)*f_y*A_{nv}/\gamma_{M0}$
$\lvert N_{b,Ed}\rvert \le V_{effRd}$		|1.70| < 257.84	verified	(0.01)

Verification of the section due to block tearing (shear force)

ANGLE

A_{nt} =	2.85	[cm^2]	Net area of the section in tension	
A_{nv} =	7.55	[cm^2]	Area of the section in shear	
V_{effRd} =	168.89	[kN]	Design capacity of a section weakened by openings	$V_{effRd}=0.5*f_u*A_{nt}/\gamma_{M2} + (1/\surd 3)*f_y*A_{nv}/\gamma_{M0}$
$\lvert 0.5*V_{b,Ed}\rvert \le V_{effRd}$		|1.68| < 168.89	verified	(0.01)

BEAM

A_{nt} =	3.74	[cm^2]	Net area of the section in tension	
A_{nv} =	18.10	[cm^2]	Area of the section in shear	
V_{effRd} =	351.77	[kN]	Design capacity of a section weakened by openings	$V_{effRd}=0.5*f_u*A_{nt}/\gamma_{M2} + (1/\surd 3)*f_y*A_{nv}/\gamma_{M0}$

$\lvert V_{b,Ed}\rvert \le V_{effRd}$	$\lvert 3.35\rvert$ < 351.77	verified	(0.01)

Verification of angle section weakened by openings

A_t = 7.53 [cm^2] Area of tension zone of the gross section

$A_{t,net}$ = 6.23 [cm^2] Net area of the section in tension

$0.9*(A_{t,net}/A_t) \ge (f_y*\gamma_{M2})/(f_u*\gamma_{M0})$	0.74 < 0.80

W_{net} = 27.55 [cm^3] Elastic section modulus

$M_{c,Rdnet}$ = 7.58 [kN*m] Design resistance of the section for bending $M_{c,Rdnet} = W_{net}*f_{yp}/\gamma_{M0}$

$\lvert M_0\rvert \le M_{c,Rdnet}$	$\lvert 0.12\rvert$ < 7.58	verified	(0.02)

A_v = 13.00 [cm^2] Effective section area for shear $A_v = l_a*t_{fa}$

$A_{v,net}$ = 10.40 [cm^2] Net area of a section effective for shear $A_{vnet}=A_v-n_v*d_0$

$V_{pl,Rd}$ = 206.40 [kN] Design plastic resistance for shear $V_{pl,Rd}=(A_v*f_y)/(\sqrt{3}*\gamma_{M0})$

$\lvert 0.5*V_{b,Ed}\rvert \le V_{pl,Rd}$	$\lvert 1.68\rvert$ < 206.40	verified	(0.01)

Verification of a beam section weakened by openings

A_t = 25.61 [cm^2] Area of tension zone of the gross section

$A_{t,net}$ = 23.37 [cm^2] Net area of the section in tension

$0.9*(A_{t,net}/A_t) \ge (f_y*\gamma_{M2})/(f_u*\gamma_{M0})$	0.82 > 0.80

W = 229.33 [cm^3] Elastic section modulus

$M_{c,Rd}$ = 63.07 [kN*m] Design resistance of the section for bending $M_{c,Rd} = W*f_{yp}/\gamma_{M0}$

$\lvert M_0\rvert \le M_{c,Rd}$	$\lvert 0.23\rvert$ < 63.07	verified	(0.00)

A_v = 34.40 [cm^2] Effective section area for shear

$A_{v,net}$ = 32.16 [cm^2] Net area of a section effective for shear $A_{vnet}=A_v-n_v*d_0$

$V_{pl,Rd}$ = 546.17 [kN] Design plastic resistance for shear $V_{pl,Rd}=(A_v*f_y)/(\sqrt{3}*\gamma_{M0})$

$V_{b,Ed} \le V_{pl,Rd}$	$\lvert 3.35\rvert$ < 546.17	verified	(0.01)

Connection conforms to the code	Ratio	0.13

	Autodesk Robot Structural Analysis Professional 2022 **Design of truss node connection** EN 1993-1-8:2005/AC:2009	Ratio **0.05**

General

Connection no.: 50

Connection name: Tube

Structure node: 1729

Structure members: 995, 987, 965

Geometry

Members

		Chord	Diagonal 1	Diagonal 2	Post	
Member no.:		995		987	965	
Section:		80x5		80x5	80x5	
	h	80		80	80	mm
	b_f	80		80	80	mm
	t_w	5		5	5	mm
	t_f	5		5	5	mm
	r	0		0	0	mm

		Chord	Diagonal 1	Diagonal 2	Post	
Material:		S235		S235	S235	
	f_y	235.00		235.00	235.00	MPa
	f_u	360.00		360.00	360.00	MPa
Angle	θ	0.0		42.0	90.0	Deg
Length	l	7000		1345	2700	mm

Offset

e_0 = 0 [mm] Offset

Spacings

g_2 = -55 [mm] Spacing of 2nd diagonal

Welds

a_d = 5 [mm] Thickness of welds of diagonals and posts

Loads

Case: 82: ACC:SEI/25=1*1.00 + 28*1.00 (1+28)*1.00

Chord

$N_{01,Ed}$ = -10.39 [kN] Axial force

$M_{01,Ed}$ = 0.01 [kN*m] Bending moment

$N_{02,Ed}$ = -11.17 [kN] Axial force

$M_{02,Ed}$ = 0.02 [kN*m] Bending moment

Diagonal 2

N_2 = -11.53 [kN] Axial force

M_2 = 0.00 [kN*m] Bending moment

Post

N_3 = -10.75 [kN] Axial force

M_3 = 0.00 [kN*m] Bending moment

Shear forces were not included in the connection verification. The connection was designed as a truss node.

Results

Capacity verification Eurocode 3: EN 1993-1-8:2005

γ_{M5} = 1.00 Partial safety factor [Table 2.1]

FAILURE MODES FOR JOINTS (RHS CHORD MEMBERS) [Table 7.10] for $N_{i,Rd}$ and [Table 7.14] for $M_{i,Rd}$

GEOMETRICAL PARAMETERS

β = 1.00 Coefficient taking account of geometry of connection members $\beta = (b_2+b_3)/(2*b_0)$ [1.5 (6)]

γ = 8.00 Coefficient taking account of geometry of the chord $\gamma = b_0/(2*t_0)$ [1.5 (6)]

Tube brace failure

DIAGONAL 2

λ_{ov} = 46.28 [%] Value of the overlap of members

$b_{e,ov}$ = 50 [mm] Effective width for the overlapping diagonal $b_{e,ov} = [10/(b_3/t_3)] * [f_{y3}*t_3/(f_{y2}*t_2)] * b_2$

b_{eff} = 50 [mm] Effective width in the connection of the diagonal to the chord $b_{eff} = [10/(b_0/t_0)] * [f_{y0}*t_0/(f_{y2}*t_2)] * b_2$

$N_{2,Rd}$ = 268.03 [kN] Compression capacity $N_{2,Rd} = f_{y2}*t_2 * [b_{eff}+b_{e,ov} + 2*h_2 * (\lambda_{ov}/50) - 4*t_2] / \gamma_{M5}$

$\lvert N_2\rvert \le N_{2,Rd}$	$\lvert -11.53\rvert < 268.03$	verified	(0.04)

POST

λ_{ov} = 46.28 [%] Value of the overlap of members

$b_{e,ov}$ = 50 [mm] Effective width for the overlapping diagonal $b_{e,ov} = [10/(b_3/t_3)] * [f_{y3}*t_3/(f_{y2}*t_2)] * b_2$

b_{eff} = 50 [mm] Effective width in the connection of the post to the chord $b_{eff} = [10/(b_0/t_0)] * [f_{y0}*t_0/(f_{y2}*t_2)] * b_2$

$N_{3,Rd}$ = 268.03 [kN] Compression capacity $N_{3,Rd} = f_{y2}*t_2 * [b_{eff}+b_{e,ov} + 2*h_2 * (\lambda_{ov}/50) - 4*t_2] / \gamma_{M5}$

$\lvert N_3\rvert \le N_{3,Rd}$	$\lvert -10.75\rvert < 268.03$	verified	(0.04)

Chord side wall crushing

DIAGONAL 2

$M_{2,Rd}$ = 6.48 [kN*m] Bending resistance $M_{2,Rd} = 0.5*f_{y0}*t_0*(h_2+5*t_0)^2/ \gamma_{M5}$

$\lvert M_2\rvert \le M_{2,Rd}$	$\lvert 0.00\rvert < 6.48$	verified	(0.00)

POST

$M_{3,Rd}$ = 6.48 [kN*m] Bending resistance $M_{3,Rd} = 0.5*f_{y0}*t_0*(h_3+5*t_0)^2/ \gamma_{M5}$

$\lvert M_3\rvert \le M_{3,Rd}$	$\lvert 0.00\rvert < 6.48$	verified	(0.00)

Verification of welds

DIAGONAL 2

β_w = 0.80 Correlation coefficient [Table 4.1]

γ_{M2} = 1.25 Partial safety factor [Table 2.1]

Longitudinal weld

$\sigma_\perp =$	-2.81	[MPa]	Normal stress in a weld
$\tau_\perp =$	-2.81	[MPa]	Perpendicular tangent stress
$\tau_{II} =$	-4.42	[MPa]	Tangent stress

$\lvert\sigma_\perp\rvert \le 0.9*f_u/\gamma_{M2}$	$\lvert -2.81 \rvert < 259.20$	verified	(0.01)
$\sqrt{[\sigma_\perp^2 + 3*(\tau_\perp^2+\tau_{II}^2)]} \le f_u/(\beta_w*\gamma_{M2})$	$9.49 < 360.00$	verified	(0.03)

Transverse inner weld

$\sigma_\perp =$	-5.55	[MPa]	Normal stress in a weld
$\tau_\perp =$	-2.13	[MPa]	Perpendicular tangent stress
$\tau_{II} =$	0.00	[MPa]	Tangent stress

$\lvert\sigma_\perp\rvert \le 0.9*f_u/\gamma_{M2}$	$\lvert -5.55 \rvert < 259.20$	verified	(0.02)
$\sqrt{[\sigma_\perp^2 + 3*(\tau_\perp^2+\tau_{II}^2)]} \le f_u/(\beta_w*\gamma_{M2})$	$6.66 < 360.00$	verified	(0.02)

Transverse outer weld

$\sigma_\perp =$	-2.13	[MPa]	Normal stress in a weld
$\tau_\perp =$	-5.55	[MPa]	Perpendicular tangent stress
$\tau_{II} =$	0.00	[MPa]	Tangent stress

$\lvert\sigma_\perp\rvert \le 0.9*f_u/\gamma_{M2}$	$\lvert -2.13 \rvert < 259.20$	verified	(0.01)
$\sqrt{[\sigma_\perp^2 + 3*(\tau_\perp^2+\tau_{II}^2)]} \le f_u/(\beta_w*\gamma_{M2})$	$9.84 < 360.00$	verified	(0.03)

POST

$\beta_w =$	0.80	Correlation coefficient	[Table 4.1]
$\gamma_{M2} =$	1.25	Partial safety factor	[Table 2.1]

Longitudinal weld

$\sigma_\perp =$	-6.33	[MPa]	Normal stress in a weld
$\tau_\perp =$	-6.33	[MPa]	Perpendicular tangent stress
$\tau_{II} =$	-0.00	[MPa]	Tangent stress

$\lvert\sigma_\perp\rvert \le 0.9*f_u/\gamma_{M2}$	$\lvert -6.33 \rvert < 259.20$	verified	(0.02)
$\sqrt{[\sigma_\perp^2 + 3*(\tau_\perp^2+\tau_{II}^2)]} \le f_u/(\beta_w*\gamma_{M2})$	$12.67 < 360.00$	verified	(0.04)

Transverse outer weld

$\sigma_\perp =$	-9.69	[MPa]	Normal stress in a weld
$\tau_\perp =$	-9.69	[MPa]	Perpendicular tangent stress

$\sigma_\perp$ =	-9.69	[MPa]	Normal stress in a weld
τ_{II} =	0.00	[MPa]	Tangent stress

$\lvert\sigma_\perp\rvert \leq 0.9 f_u/\gamma_{M2}$	$\lvert-9.69\rvert$ < 259.20	verified	(0.04)
$\sqrt{[\sigma_\perp^2 + 3(\tau_\perp^2+\tau_{II}^2)]} \leq f_u/(\beta_w \gamma_{M2})$	19.38 < 360.00	verified	(0.05)

Remarks

Width of the overlapping diagonal is too large 80 [mm] > 60 [mm]

Connection conforms to the code	Ratio	0.05

Έλεγχος θεμελίωσης

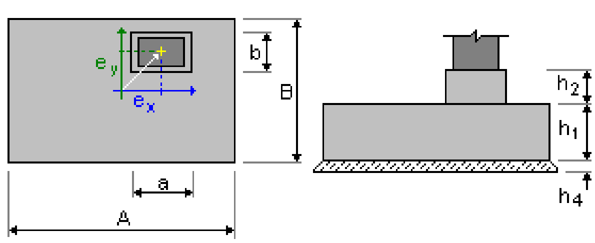
1 Spread footing: Foundation1629...1632 Number of identical elements: 1

1.1 Basic data

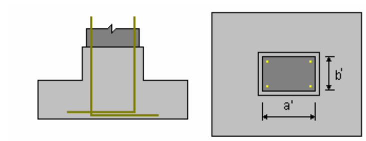
1.1.1 Assumptions

- Geotechnic calculations according to : EN 1997-1:2004/A1:2013
- Concrete calculations according to : EN 1992-1-1:2004/A1:2014
- Shape selection : without limits

1.1.2 Geometry:



A	= 1.20 (m)	a	= 0.65 (m)
B	= 1.20 (m)	b	= 0.65 (m)
h1	= 0.50 (m)	e_x	= 0.00 (m)
h2	= 0.00 (m)	e_y	= 0.00 (m)
h4	= 0.05 (m)		



a' = 25.00 (cm)
b' = 25.00 (cm)
$c_{nom}1$ = 6.00 (cm)
$c_{nom}2$ = 6.00 (cm)
Cover deviations: Cdev = 1.00(cm), Cdur = 0.00(cm)

1.1.3 Materials

- Concrete : C25/30; Characteristic strength = 25.00 MPa
  Unit weight = 2501.36 (kG/m3)
  Rectangular stress distribution [3.1.7(3)]
- Longitudinal reinforcement : type B500C Characteristic strength = 500.00 MPa
  Ductility class: C
  Horizontal branch of the stress-strain diagram
- Transversal reinforcement : type B500C Characteristic strength = 500.00 MPa
- Additional reinforcement: : type B500C Characteristic strength = 500.00 MPa

1.2 Geotechnical design

1.2.1 Assumptions

- Cohesion reduction coefficient: 0.00
- Smooth precast foundation 6.5.3(10)
- Sliding with soil pressure considered: for X and Y directions
- Design approach: 1
  A1 + M1 + R1
  $\gamma_{\phi'}$ = 1.00
  $\gamma_{c'}$ = 1.00
  γ_{cu} = 1.00
  γ_{qu} = 1.00
  γ_{γ} = 1.00
  $\gamma_{R,v}$ = 1.00
  $\gamma_{R,h}$ = 1.00
  A2 + M2 + R1
  $\gamma_{\phi'}$ = 1.25
  $\gamma_{c'}$ = 1.25
  γ_{cu} = 1.40
  γ_{qu} = 1.40
  γ_{γ} = 1.00
  $\gamma_{R,v}$ = 1.00
  $\gamma_{R,h}$ = 1.00

1.2.2 Soil:

Soil level:	N_1	= 0.00 (m)
Column pier level:	N_a	= 0.00 (m)
Minimum reference level:	N_f	= -0.50 (m)

Clay

- Soil level: 0.00 (m)
- Unit weight:2243.38 (kG/m3)
- Unit weight of solid: 2753.23 (kG/m3)
- Internal friction angle: 25.0 (Deg)
- Cohesion: 0.06 (MPa)

1.2.3 Limit states

Stress calculations

Soil type under foundation: not layered

Design combination **ULS : ULS/1=1*1.35 N=10.23 My=0.00**

Fy=-4.55

Load factors: **1.35** * Foundation weight

1.35 * Soil weight

Calculation results: On the foundation level

Weight of foundation and soil over it: Gr = 23.84 (kN)

Design load:

Nr = 34.07 (kN) Mx = 2.28 (kN*m) My = 0.00 (kN*m)

Allowable stress calculation method: Semi-empirical - stress limit

Load eccentricity:

$|e_B|$ = 0.07 (m) $|e_L|$ = 0.00 (m)

Equivalent foundation dimensions:

$B' = B - 2|e_B|$ = 1.07 (m)

$L' = L - 2|e_L|$ = 1.20 (m)

qu = 0.30 (MPa)

p_{le}^* = 0.32 (MPa)

D_e = Dmin - d = 0.50 (m)

k_p = 0.89

q'_0 = 0.01 (MPa)

qu = kp * (ple*) + q'_0 = 0.30 (MPa)

Stress in soil: qref = 0.03 (MPa)

Safety factor: qlim / qref = 9.398 > 1

Uplift

Uplift in ULS

Design combination **ULS : ULS/1=1*1.35 N=10.23 My=0.00**

Fy=-4.55

Load factors: **1.00** * Foundation weight

1.00 * Soil weight

Contact area: s = 0.07

s_{lim} = 0.17

Sliding

Design combination **ULS : ULS/1=1*1.35 N=8.20 My=0.00 Fy=-3.60**

Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 17.66 (kN)
Design load:
Nr = 25.86 (kN) Mx = 1.80 (kN*m) My = 0.00 (kN*m)
Equivalent foundation dimensions: A_ = 1.20 (m)B_ = 1.20 (m)
Sliding area: 1.44 (m2)
Foundation/soil friction coefficient: tan(δ_d) = 0.30
Cohesion: c_u = 0.06 (MPa)
Soil pressure considered:
Hx = 0.00 (kN) Hy = -3.60 (kN)
Ppx = 0.00 (kN) Ppy = 8.13 (kN)
Pax = 0.00 (kN) Pay = -1.34 (kN)
Sliding force value H_d = 0.00 (kN)
Value of force preventing foundation sliding:
- On the foundation level: R_d = 7.74 (kN)
Stabilility for sliding: ∞

Average settlement

Soil type under foundation: not layered
Design combination **SLS : SLS:CHR/1=1*1.00 N=7.58 My=0.00 Fy=-3.37**

Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 17.66 (kN)
Average stress caused by design load: q = 0.02 (MPa)
Thickness of the actively settling soil: z = 0.60 (m)
Stress on the level z:
- Additional: σzd = 0.00 (MPa)
- Caused by soil weight: $\sigma z\gamma$ = 0.02 (MPa)
Settlement:
- Original s' = 0.00 (cm)
- Secondary s'' = 0.00 (cm)
- TOTAL S = 0.00 (cm) < Sadm = 5.00 (cm)
Safety factor: 1364 > 1

Settlement difference

Design combination **SLS : SLS:CHR/1=1*1.00 N=6.50 My=0.00 Fy=-2.87**

Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Settlement difference: S = 0.00 (cm) < Sadm = 5.00 (cm)
Safety factor: 1.064e+07 > 1

Rotation

<u>About OX axis</u>
Design combination **ULS : ULS/1=1*1.35 N=10.23 My=0.00 Fy=-4.55**

Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 17.66 (kN)
Design load:
Nr = 27.89 (kN) Mx = 2.28 (kN*m) My = 0.00 (kN*m)
Stability moment: M_{stab} = 16.74 (kN*m)

Rotation moment: M_{renv} = 2.28 (kN*m)
Stability for rotation: 7.353 > 1

About OY axis
Design combination: **ULS : ULS/1=1*1.35 N=8.78 My=0.00 Fy=-3.87**

Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 17.66 (kN)
Design load:
Nr = 26.44 (kN) Mx = 1.93 (kN*m) My = 0.00 (kN*m)
Stability moment: M_{stab} = 15.86 (kN*m)
Rotation moment: M_{renv} = 0.00 (kN*m)
Stability for rotation: 5.683e+04 > 1

1.3 RC design

1.3.1 Assumptions

- Exposure : XC2
- Structure class : S2

1.3.2 Analysis of punching and shear

Punching

Design combination **ULS : ULS/1=1*1.35 N=10.23 My=0.00 Fy=-4.55**
Load factors: **1.35** * Foundation weight
1.35 * Soil weight
Design load:
Nr = 34.07 (kN) Mx = 2.28 (kN*m) My = 0.00 (kN*m)
Length of critical circumference: 2.08 (m)
Punching force: 7.91 (kN)
Section effective height h_{eff} = 0.43 (m)
Reinforcement ratio: ρ = 0.14 %
Shear stress: 0.02 (MPa)
Admissible shear stress: 1.91 (MPa)
Safety factor: 120.6 > 1

1.3.3 Required reinforcement

Spread footing:

bottom:

ALS : ACC:SEI/37=1*1.00 + 42*1.00 N=27.78 My=-0.00 Fx=-0.00 Fy=-12.88
My = 1.65 (kN*m) A_{sx} = 5.81 (cm2/m)

ALS : ACC:SEI/37=1*1.00 + 42*1.00 N=27.78 My=-0.00 Fx=-0.00 Fy=-12.88
Mx = 3.12 (kN*m) A_{sy} = 5.81 (cm2/m)

$A_{s\ min}$ = 5.81 (cm2/m)

top:

ALS : ACC:SEI/79=1*1.00 + 35*-1.00 N=-12.40 My=0.00 Fx=0.00 Fy=6.03

My = -0.68 (kN*m) A'_{sx} = 5.81 (cm2/m)

ALS : ACC:SEI/8=1*1.00 + 8*1.00 N=-10.13 My=0.00 Fx=0.00 Fy=4.96
Mx = -0.98 (kN*m) A'_{sy} = 5.81 (cm2/m)

$A_{s\ min}$ = 5.81 (cm2/m)

Column pier:
Longitudinal reinforcement A = 0.00 (cm2) $A_{min.}$ = 0.00 (cm2)
A = 2 * (Asx + Asy)
Asx = 0.00 (cm2) Asy = 0.00 (cm2)

1.3.4 Provided reinforcement

Spread footing:
Bottom:
Along X axis:
7 B500C 12 l = 1.22 (m) e = 1*-0.44 + 6*0.15
Along Y axis:
7 B500C 12 l = 1.22 (m) e = 1*-0.44 + 6*0.15
Top:
Along X axis:
7 B500C 12 l = 1.22 (m) e = 1*-0.47 + 6*0.16
Along Y axis:
7 B500C 12 l = 1.22 (m) e = 1*-0.47 + 6*0.16

Pier
Longitudinal reinforcement
Along X axis:
2 B500C 12 l = 1.79 (m) e = 1*-0.22 + 1*0.43
Along Y axis:
2 B500C 12 l = 1.84 (m) e = 1*-0.22 + 1*0.43
Transversal reinforcement
3 B500C 12 l = 2.23 (m) e = 1*0.21 + 2*0.09

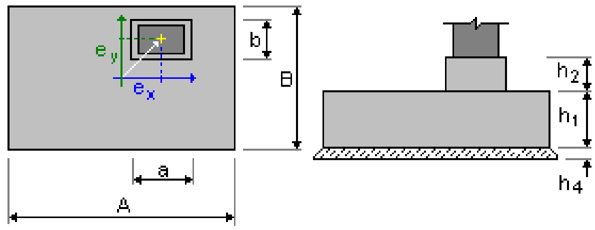
2 Spread footing: Foundation21...1941 Number of identical elements: 1

2.1 Basic data

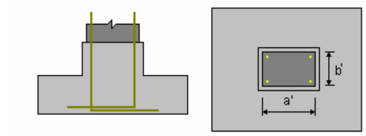
2.1.1 Assumptions

- Geotechnic calculations according to : EN 1997-1:2004/A1:2013
- Concrete calculations according to : EN 1992-1-1:2004/A1:2014
- Shape selection : without limits

2.1.2 Geometry:



A	= 1.20 (m)	a	= 0.40 (m)
B	= 1.50 (m)	b	= 0.40 (m)
h1	= 0.60 (m)	e_x	= 0.00 (m)
h2	= 0.00 (m)	e_y	= 0.20 (m)
h4	= 0.05 (m)		



a' = 20.00 (cm)
b' = 40.00 (cm)
cnom1 = 6.00 (cm)
cnom2 = 6.00 (cm)
Cover deviations: Cdev = 1.00(cm), Cdur = 0.00(cm)

2.1.3 Materials

- Concrete : C25/30; Characteristic strength = 25.00 MPa
  Unit weight = 2501.36 (kG/m3)
  Rectangular stress distribution [3.1.7(3)]
- Longitudinal reinforcement : type B500C Characteristic strength = 500.00 MPa
  Ductility class: C
  Horizontal branch of the stress-strain diagram
- Transversal reinforcement : type B500C Characteristic strength = 500.00 MPa
- Additional reinforcement: : type B500C Characteristic strength = 500.00 MPa

2.2 Geotechnical design

2.2.1 Assumptions

- Cohesion reduction coefficient: 0.00
- Smooth precast foundation 6.5.3(10)
- Sliding with soil pressure considered: for X and Y directions
- Design approach: 1
  A1 + M1 + R1
  $\gamma_{\phi'}$ = 1.00
  $\gamma_{c'}$ = 1.00
  γ_{cu} = 1.00
  γ_{qu} = 1.00
  γ_{γ} = 1.00
  $\gamma_{R,v}$ = 1.00

$\gamma_{R,h}$ = 1.00

A2 + M2 + R1

$\gamma_{\phi'}$ = 1.25

$\gamma_{c'}$ = 1.25

γ_{cu} = 1.40

γ_{qu} = 1.40

γ_{γ} = 1.00

$\gamma_{R,v}$ = 1.00

$\gamma_{R,h}$ = 1.00

2.2.2 Soil:

Soil level: N_1 = 0.00 (m)
Column pier level: N_a = 0.00 (m)
Minimum reference level: N_f = -0.50 (m)

Clay

- Soil level: 0.00 (m)
- Unit weight:2243.38 (kG/m3)
- Unit weight of solid: 2753.23 (kG/m3)
- Internal friction angle: 25.0 (Deg)
- Cohesion: 0.06 (MPa)

2.2.3 Limit states

Stress calculations

Soil type under foundation: not layered
Design combination **ULS : ULS/1=1*1.35 N=182.16 Mx=-0.26 My=-5.56 Fx=-8.92 Fy=0.31**
Load factors: **1.35** * Foundation weight
1.35 * Soil weight
Calculation results: On the foundation level
Weight of foundation and soil over it: Gr = 35.76 (kN)
Design load:
Nr = 217.92 (kN) Mx = -36.88 (kN*m) My = -10.91 (kN*m)

Allowable stress calculation method: Semi-empirical - stress limit

Load eccentricity:
$|e_B|$ = 0.05 (m) $|e_L|$ = 0.17 (m)
Equivalent foundation dimensions:
$B' = B - 2|e_B|$ = 1.10 (m)
$L' = L - 2|e_L|$ = 1.16 (m)

qu = 0.30 (MPa)

p_{le}^* = 0.31 (MPa)
D_e = Dmin - d = 0.60 (m)
k_p = 0.91
q'_0 = 0.01 (MPa)

qu = kp * (ple*) + q'_0 = 0.30 (MPa)

Stress in soil: qref = 0.23 (MPa)

Safety factor: qlim / qref = 1.268 > 1

Uplift

Uplift in ULS
Design combination **ULS : ULS/1=1*1.35 N=9.72 Mx=0.01 My=-4.35 Fx=-4.43 Fy=-0.01**
Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Contact area: s = 0.17
s_{lim} = 0.33

Sliding

Design combination **ULS : ULS/1=1*1.35 N=165.87 Mx=8.57 My=-0.37 Fx=-0.54 Fy=-11.54**
Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 26.49 (kN)
Design load:
Nr = 192.36 (kN) Mx = -17.69 (kN*m) My = -0.69 (kN*m)
Equivalent foundation dimensions: A_ = 1.20 (m)B_ = 1.50 (m)
Sliding area: 1.80 (m2)
Foundation/soil friction coefficient: $\tan(\delta_d)$ = 0.30
Cohesion: c_u = 0.06 (MPa)
Soil pressure considered:
Hx = -0.54 (kN) Hy = -11.54 (kN)
Ppx = 9.27 (kN) Ppy = 5.85 (kN)
Pax = -0.88 (kN) Pay = -0.96 (kN)
Sliding force value H_d = 6.65 (kN)
Value of force preventing foundation sliding:
- On the foundation level: R_d = 57.59 (kN)
Stabilility for sliding: 8.664 > 1

Average settlement

Soil type under foundation: not layered
Design combination **SLS : SLS:CHR/1=1*1.00 N=134.93 Mx=-0.19 My=-4.12 Fx=-6.61 Fy=0.23**
Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 26.49 (kN)
Average stress caused by design load: q = 0.09 (MPa)
Thickness of the actively settling soil: z = 2.40 (m)
Stress on the level z:
- Additional: σzd = 0.01 (MPa)
- Caused by soil weight: $\sigma z\gamma$ = 0.07 (MPa)
Settlement:
- Original s' = 0.09 (cm)
- Secondary s'' = 0.00 (cm)
- TOTAL S = 0.09 (cm) < Sadm = 5.00 (cm)
Safety factor: 54.88 > 1

Settlement difference

Design combination **SLS : SLS:CHR/1=1*1.00 N=134.93 Mx=-0.19 My=-4.12 Fx=-6.61 Fy=0.23**
Load factors: **1.00** * Foundation weight
1.00 * Soil weight

Settlement difference: S = 0.06 (cm) < Sadm = 5.00 (cm)
Safety factor: 87.88 > 1

Rotation

<u>About OX axis</u>
Design combination **ULS : ULS/1=1*1.35 N=38.73 Mx=6.40 My=-0.02 Fx=-0.01 Fy=-5.48**
Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 26.49 (kN)
Design load:
Nr = 65.23 (kN) Mx = 1.95 (kN*m) My = -0.02 (kN*m)
Stability moment: M_{stab} = 56.67 (kN*m)
Rotation moment: M_{renv} = 9.69 (kN*m)
Stability for rotation: 5.847 > 1

<u>About OY axis</u>
Design combination: **ULS : ULS/1=1*1.35 N=9.72 Mx=0.01 My=-4.35 Fx=-4.43 Fy=-0.01**
Load factors: **1.00** * Foundation weight
1.00 * Soil weight
Weight of foundation and soil over it: Gr = 26.49 (kN)
Design load:
Nr = 36.21 (kN) Mx = -1.93 (kN*m) My = -7.01 (kN*m)
Stability moment: M_{stab} = 21.73 (kN*m)
Rotation moment: M_{renv} = 7.01 (kN*m)
Stability for rotation: 3.102 > 1

2.3 RC design

2.3.1 Assumptions

- Exposure : XC2
- Structure class : S2

2.3.2 Analysis of punching and shear

Punching

Design combination **ULS : ULS/1=1*1.35 N=182.16 Mx=-0.26 My=-5.56 Fx=-8.92 Fy=0.31**
Load factors: **1.35** * Foundation weight
1.35 * Soil weight
Design load:
Nr = 217.92 (kN) Mx = -36.88 (kN*m) My = -10.91 (kN*m)
Length of critical circumference: 1.93 (m)
Punching force: 129.24 (kN)
Section effective height h_{eff} = 0.53 (m)
Reinforcement ratio: ρ = 0.14 %
Shear stress: 0.23 (MPa)
Admissible shear stress: 0.90 (MPa)
Safety factor: 3.917 > 1

2.3.3 Required reinforcement

Spread footing:

bottom:

ALS : ACC:SEI/47=1*1.00 + 54*1.00 N=197.52 Mx=-0.77 My=-17.91 Fx=-21.58 Fy=-0.54

My = 27.68 (kN*m) A_{sx} = 7.17 (cm2/m)

ALS : ACC:SEI/5=1*1.00 + 5*1.00 N=203.49 Mx=1.36 My=-1.06 Fx=-1.26 Fy=-13.83
Mx = 27.14 (kN*m) A_{sy} = 7.17 (cm2/m)

$A_{s\ min}$ = 7.17 (cm2/m)

top:

ALS : ACC:SEI/2=1*1.00 + 3*1.00 N=7.20 Mx=-0.01 My=-12.47 Fx=-11.18 Fy=0.00
My = -2.33 (kN*m) A'_{sx} = 7.70 (cm2/m)

ALS : ACC:SEI/85=1*1.00 + 42*-1.00 N=11.79 Mx=15.70 My=0.36 Fx=0.20 Fy=3.56
Mx = -1.32 (kN*m) A'_{sy} = 7.17 (cm2/m)

$A_{s\ min}$ = 7.70 (cm2/m)

Column pier:
Longitudinal reinforcement A = 0.00 (cm2) $A_{min.}$ = 0.00 (cm2)
A = 2 * (Asx + Asy)
Asx = 0.00 (cm2) Asy = 0.00 (cm2)

2.3.4 Provided reinforcement

Spread footing:
Bottom:
Along X axis:
14 B500C 12 l = 1.22 (m) e = 1*-0.64 + 13*0.10
Along Y axis:
11 B500C 12 l = 1.52 (m) e = 1*-0.49 + 10*0.10
Top:
Along X axis:
14 B500C 12 l = 1.22 (m) e = 1*-0.64 + 13*0.10
Along Y axis:
11 B500C 12 l = 1.52 (m) e = 1*-0.49 + 10*0.10

Pier
Longitudinal reinforcement
Along X axis:
2 B500C 12 l = 1.31 (m) e = 1*-0.09 + 1*0.18
Along Y axis:
2 B500C 12 l = 1.35 (m) e = 1*0.11 + 1*0.18
Transversal reinforcement
4 B500C 12 l = 1.23 (m) e = 1*0.11 + 1*0.20 + 2*0.09

Dowels
Longitudinal reinforcement
4 B500C 12 l = 1.09 (m) e = 1*-0.04 + 1*0.08

3 Material survey:

- Concrete volume = 1.80 (m3)
- Formwork = 5.64 (m2)

- Steel B500C
  - Total weight = 115.92 (kG)
  - Density = 64.40 (kG/m3)
  - Average diameter = 12.0 (mm)
  - Survey according to diameters:

Diameter	Length (m)	Weight (kG)
12	130.52	115.92

5. Τεχνική περιγραφή εργασιών

Οι εργασίες που θα εκτελεστούν περιγράφονται σε φάσεις ως εξής:

- Φάση 1
  Σκυροδέτηση με χρήση κουβουκλίου προστασίας.
- Φάση 2
  Ανέγερση εξωτερικής μεταλλικής κατασκευής. Παραμένει η χρήση κουβουκλίου.
- Φάση 3
  Εσωτερικές υποστυλώσεις Ισογείου με πλαίσια βαρέως τύπου και οριζόντιους σωλήνες αντιστήριξης.
- Φάση 4
  Εργοταξιακή κλίμακα ανόδου.
- Φάση 5
  Εσωτερικές υποστυλώσεις Α' Ορόφου με πλαίσια βαρέως τύπου και οριζόντιους σωλήνες αντιστήριξης.
- Φάση 6
  Εργοταξιακή κλίμακα ανόδου προς τη ΝΑ πτέρυγα του Α' Ορόφου.
- Φάση 7
  Εσωτερικές υποστυλώσεις Α' Ορόφου με πλαίσια βαρέως τύπου και οριζόντιους σωλήνες αντιστήριξης στη ΝΑ πτέρυγα.
- Φάση 8
  Υποστύλωση υφισταμένων κλιμάκων του κτιρίου.
- Φάση 9
  Εσωτερικές υποστυλώσεις Δώματος με πλαίσια βαρέως τύπου και οριζόντιους σωλήνες αντιστήριξης.
- Φάση 10
  Εξωτερικές υποστυλώσεις Δώματος Ιταλικής προσθήκης με οριζόντιους σωλήνες.

6. Προμετρήσεις

- Σκυροδέτηση C25/30 θεμελίωσης: 56.7m^3
- Μεταλλική κατασκευή αντιστήριξης:
  S235: 4800kgr
  S275: 32700kgr
- Πλαίσια βαρέως τύπου
  180 τεμ.
- Χιαστί σύνδεσμοι πλαισίων βαρέως τύπου
  210 τεμ.
- Σωλήνες διαμέτρου 48.3x3.2mm
  620m
- Οικοδομική ξυλεία (μαδέρια)
  310m^2 (συμπεριλαμβάνεται και η διαμόρφωση ταβανώματος για να καθαιρεθούν τα άοπλα σκυροδέματα της ΒΔ γωνίας)
- Πάνελ διογκωμένης πολυστερίνης
  200m^2
- Ικριώματα εργασίας:
  - Ανατολική Όψη: 82 m^2
  - Δυτική Όψη: 172 m^2
  - Βόρεια Όψη: 70 m^2
  - Νότια Όψη: 121 m^2

7. Κοστολόγηση έργου

Α/Α	Περιγραφή	Προμέτρηση	Τιμή μονάδας	Κόστος
1	Σκυροδέτηση C25/30	56.7m^3	280€ (συμπ. Οπλισμός)	15.876,00€
2	Μεταλλική κατασκευή αντιστήριξης	37500kgr	3€(συμπ. ανέγερση)	112.500,00€
3	Πλαίσια βαρέως τύπου	180τεμ	40,00€	7.200,00€
4	Χιαστί σύνδεσμοι	210τεμ	40,00€	8.400,00€
5	Σωλήνες διαμέτρου 48.3x3.2mm	620m	3,20€	2.000,00€

6	Οικοδομική ξυλεία	310 m^2	6,45€	2.000,00€
7	DOW	200m^2	8€	1.600,00
8	Ικριώματα όψεως (συνδυασμός όψεων ανά 2)	200 m^2	25€	5.000,00€
			Σύνολο:	154.576,00€

Οι παραπάνω τιμές συμπεριλαμβάνουν εργασία και ΦΠΑ24%. Επισημαίνεται ότι οι τιμές αυτές υπόκεινται στις διακυμάνσεις της αγοράς

8. Ανέγερση ικριωμάτων εργασίας

Τα ικριώματα θα συμμορφώνονται πλήρως με τις απαιτήσεις των EN12810 και EN12811. Αναφέρονται ενδεικτικά τα σημαντικότερα σημεία που απαιτείται συμμόρφωση, χωρίς όμως να εξαντλείται η λίστα των προβλέψεων των δύο EN. Ο λόγος είναι ότι η πλήρης λίστα απαιτήσεων θα διαμορφωθεί και από τα απάρτια που θα επιλέξει ο κατασκευαστής για να συνοδέψουν το σύστημα ικριωμάτων.

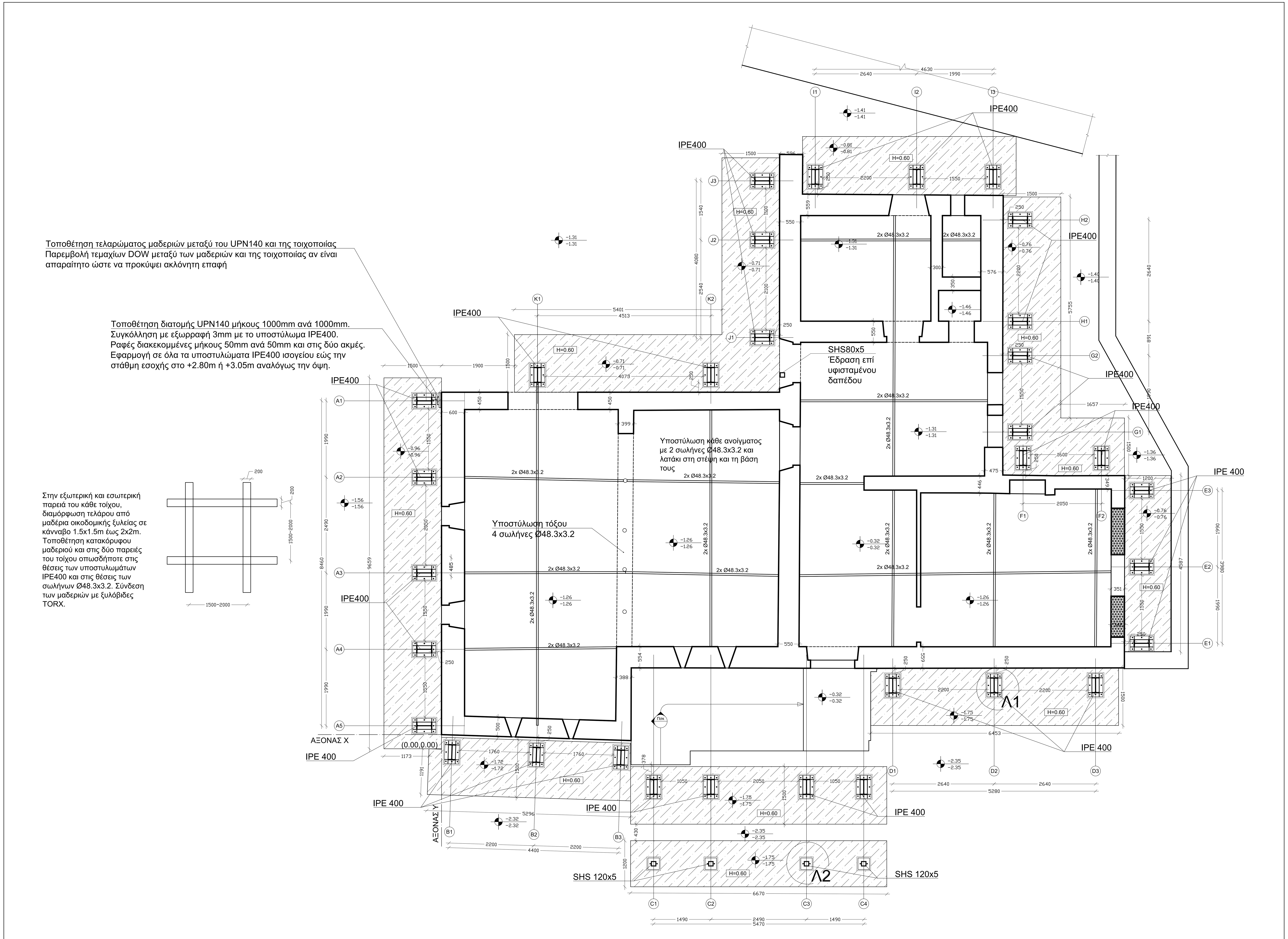
Πιο συγκεκριμένα, τα ικριώματα θα είναι χαρακτηρισμένα κατά EN12810 ως εξής:

- Scaffold EN12810 – 3D – SW06/200 – H2 – B – LA τα οποία σημαίνουν:
    - 3N: Τάξη φορτίου 3 με φορτίο εργασίας 2kN/m^2, πλατφόρμες με απαίτηση δοκιμών πτώσης
    - SW06/200: Το πλάτος του συστήματος θα είναι κατηγορίας 06 και πιο συγκεκριμένα 750mm. Το μήκος της κάθε πλατφόρμας θα είναι 200cm. Σημειώνεται ότι τα μεγέθη αυτά είναι ενδεικτικά, δεδομένου ότι η γεωμετρία των τειχών οδηγεί σε πολλά σημεία σε διαμορφώσεις με διαφορετικά πλάτη και μήκη. Τα τυπικά μεγέθη όμως είναι αυτά, και σε όποιες θέσεις αλλάζουν αυτό γίνεται με τρόπο τέτοιο ώστε τα μήκη που προκύπτουν να είναι μικρότερα.
    - H2: Η κατηγοριοποίηση του ύψους του ικριώματος μεταξύ των σταθμών. Βασική απαίτηση είναι το καθαρό ύψος στους ώμους να είναι μεγαλύτερο του 1,75m.
    - B: Τα ικριώματα θα καλυφθούν με λινάτσες ή δίχτυα.
    - LA: Η μετάβαση μεταξύ των επιπέδων θα γίνει με σκάλα και όχι με κλίμακα.
- Τα σωληνωτά μέλη, θα έχουν εξωτερική διάμετρο κατ’ ελάχιστο 48,3mm και πάχος τοιχώματος κατ΄ ελάχιστο 2,9mm. Το υλικό τους θα είναι χάλυβας κατηγορίας S235 ή ανώτερης ποιότητας.
- Τα στοιχεία των δαπέδων εργασίας θα έχουν ελάχιστο πάχος 2mm και θα είναι αντιολισθητικά.

- Σε κάθε επίπεδο εργασίας θα παρέχεται πλήρης προφύλαξη τόσο πλευρική σε ύψος 1m και 0,5m, όσο και στη βάση του δαπέδου για την αποφυγή πτώσης εργαλείων και αντικειμένων (ελάχιστο ύψος 150mm).
- Δεδομένης της γεωμετρίας των τειχών η διάταξη αγκύρωσης διαφέρει από την προτεινόμενη στο EN12810 κατά τρόπο συντηρητικότερο. Οι θέσεις αγκύρωσης φαίνονται στα σχέδια της μελέτης. Διευκρινίζεται ότι η αλλαγή σε σχέση με τον EN12810 αφορά το πλήθος των θέσεων αγκύρωσης οι οποίες είναι πλέον περισσότερες από τις απαιτούμενες. Η αγκύρωση θα γίνει στα μεταλλικά μέλη σύμφωνα με τα σχέδια.
- Οι βάσεις των ικριωμάτων θα έχουν ελάχιστο εμβαδόν 150cm^2 με ελάχιστη διάσταση 120mm.

Επιπλέον τα απάρτια θα πρέπει να καλύπτουν τις απαιτήσεις των:

- EN74-1, EN74-2 και EN74-3 για σφιγκτήρες και βάσεις
- EN39 για σωλήνες



Κάτοψη Στάθμης Θεμελίωσης

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
- ΕΥΡΩΚΩΔΙΚΑΣ 3, ΕΝ 1993 : 2005, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΧΑΛΥΒΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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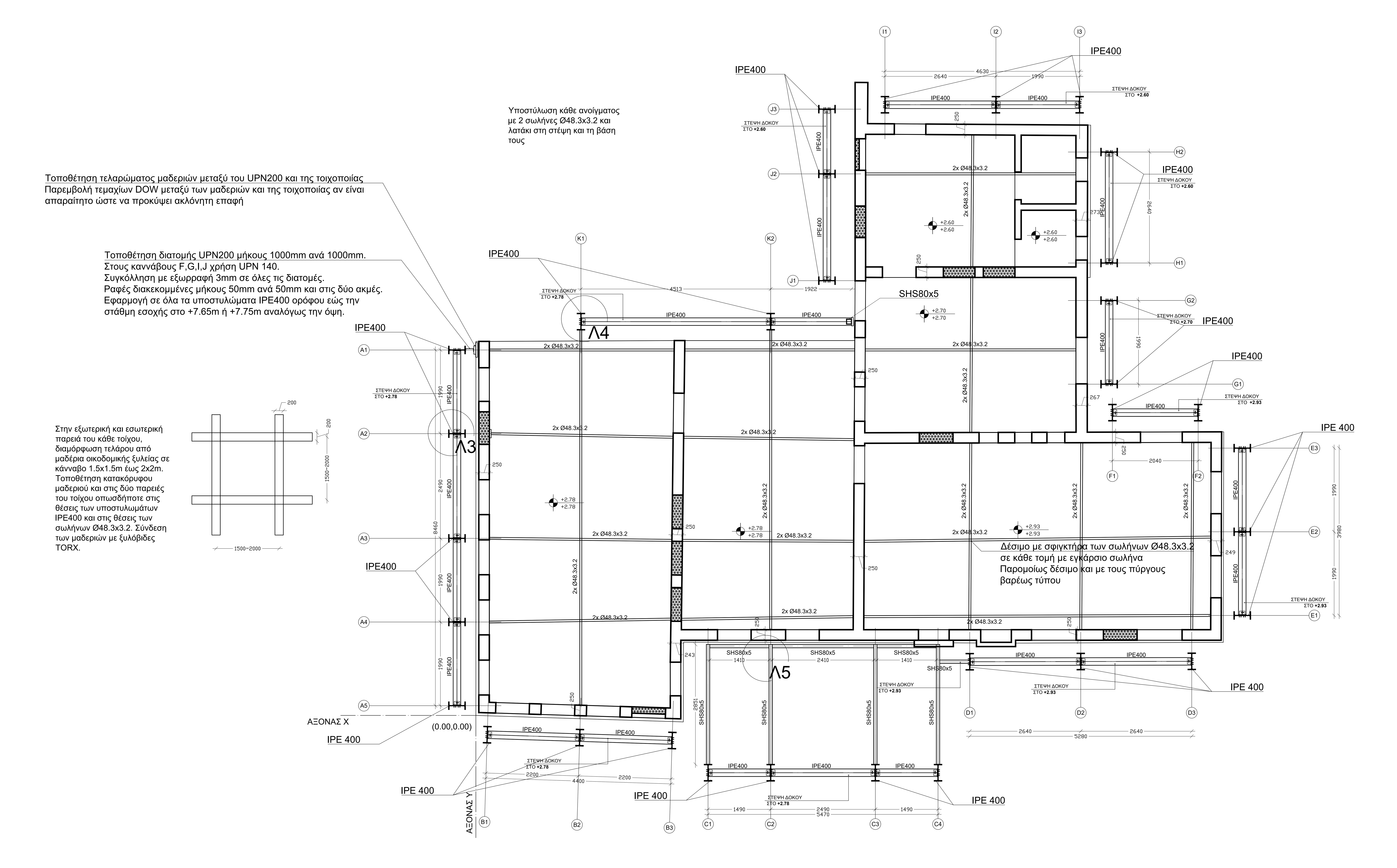
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



Κάτοψη Στάθμης Οροφής Ισογείου υφισταμένου κτιρίου

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
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- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
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7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ

ΕΦΑ Δωδεκανήσου

ΕΡΓΟ

T248

Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ

Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ

STRUSUS

ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ

ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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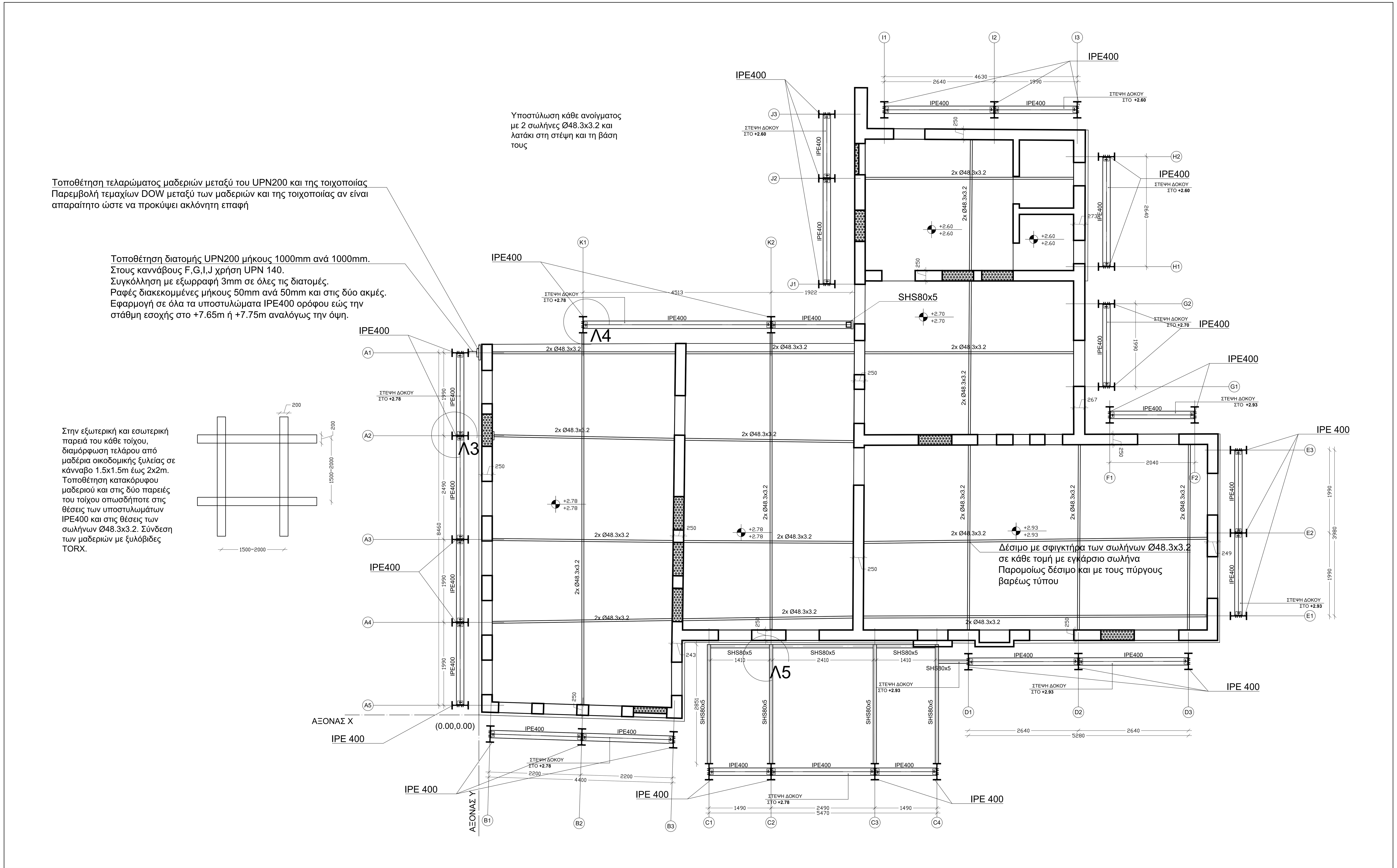
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ

ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



Κάτοψη Στάθμης Οροφής Ισογείου υφισταμένου κτιρίου

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
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7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
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ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
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ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
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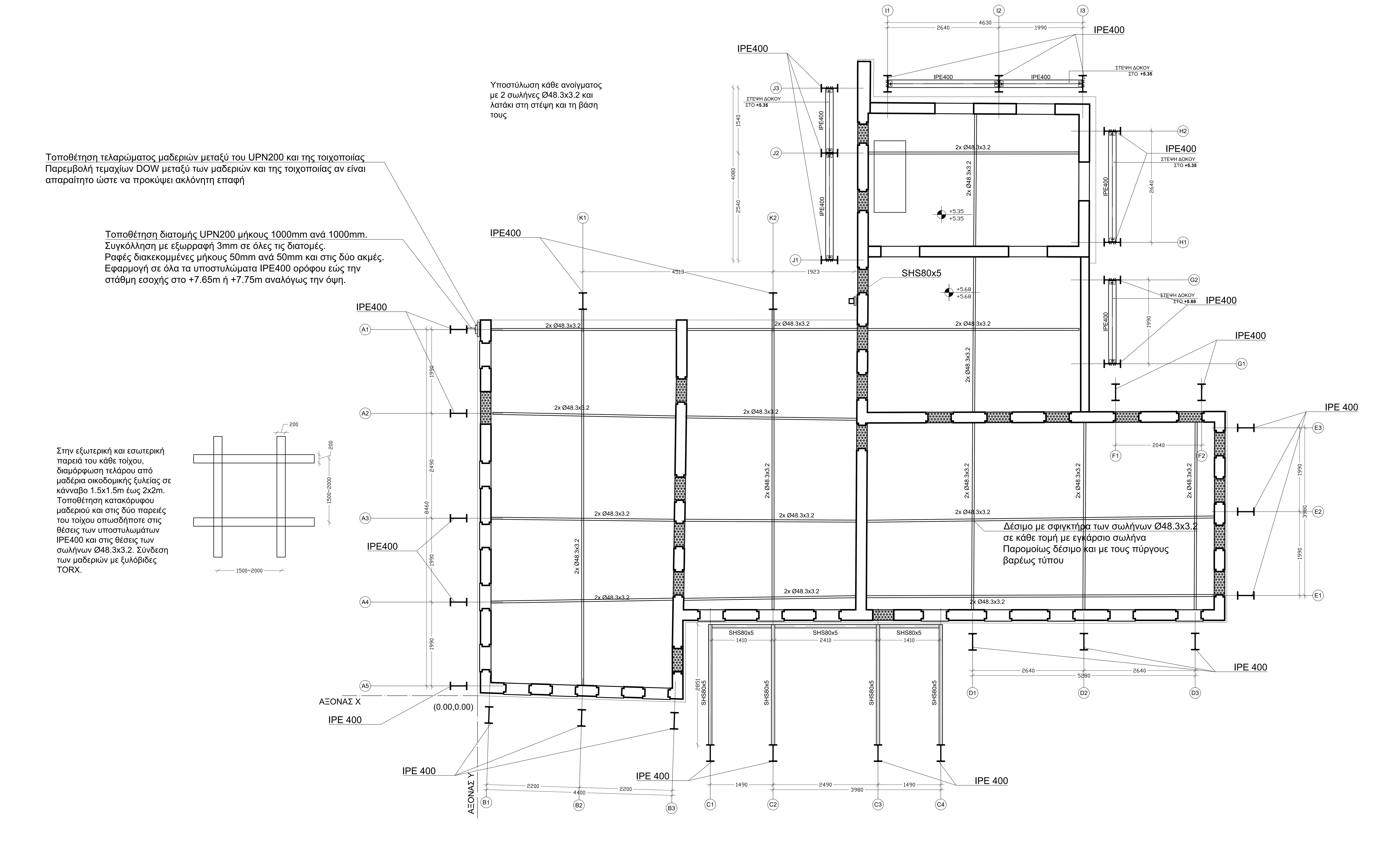
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



Κάτοψη Άνω Στάθμης προσθήκης Ιταλικής περιόδου | 1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
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ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

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ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
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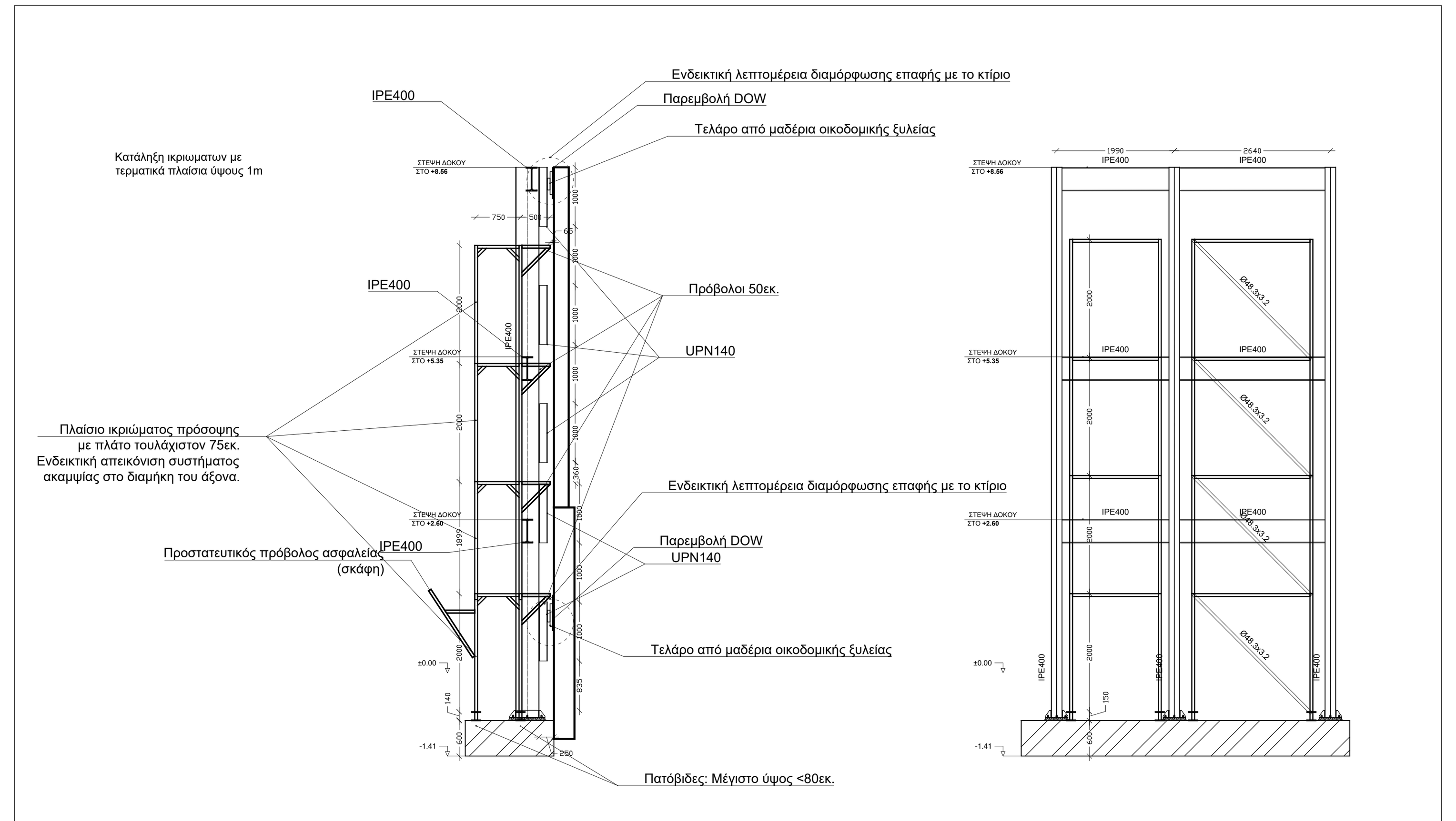
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

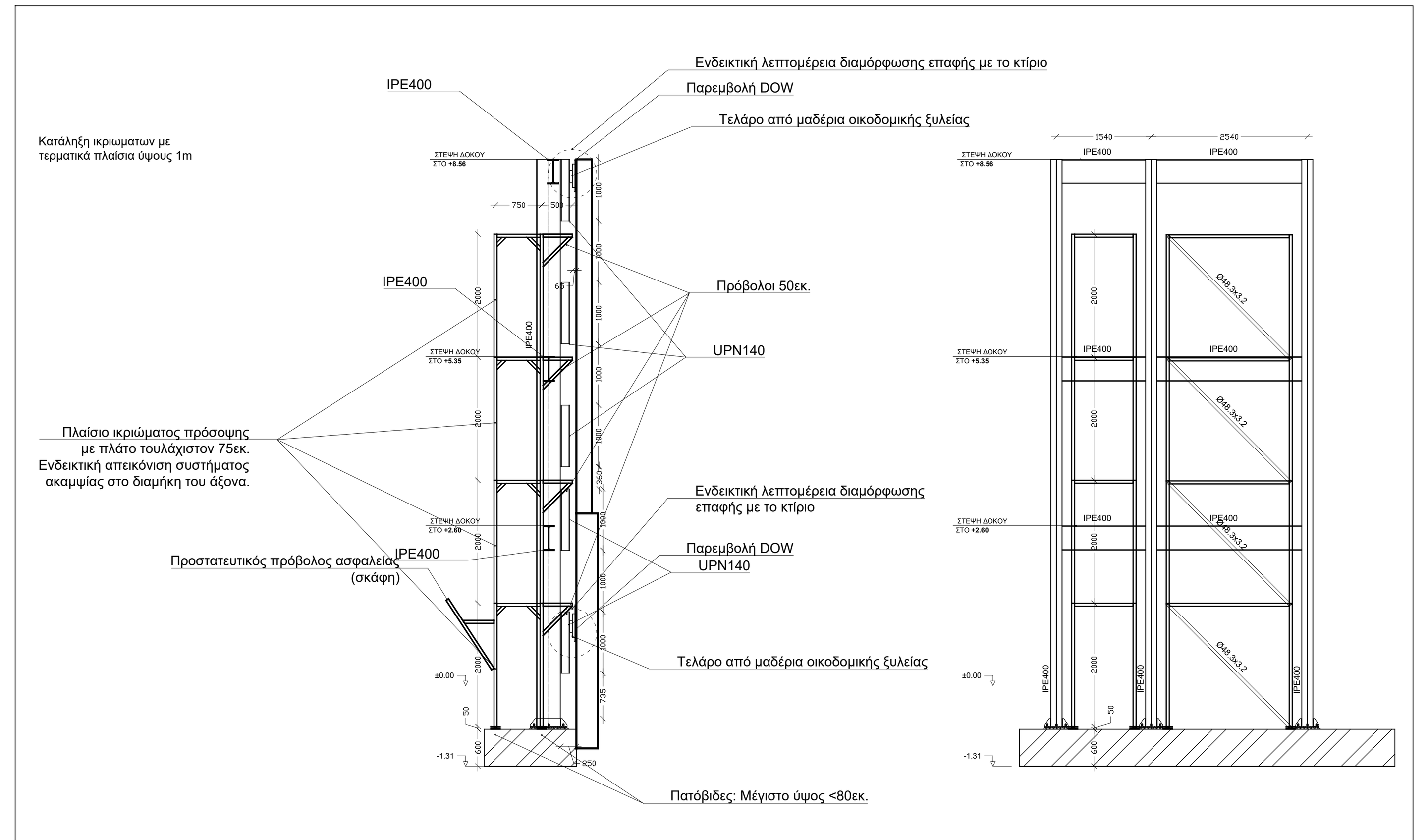
ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

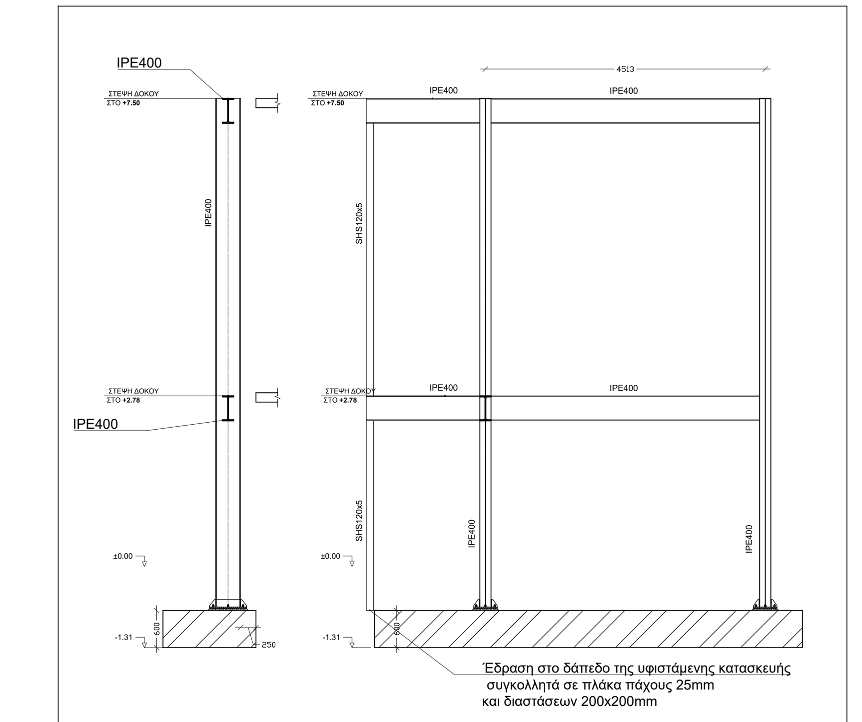
ΘΕΩΡΗΣΗ



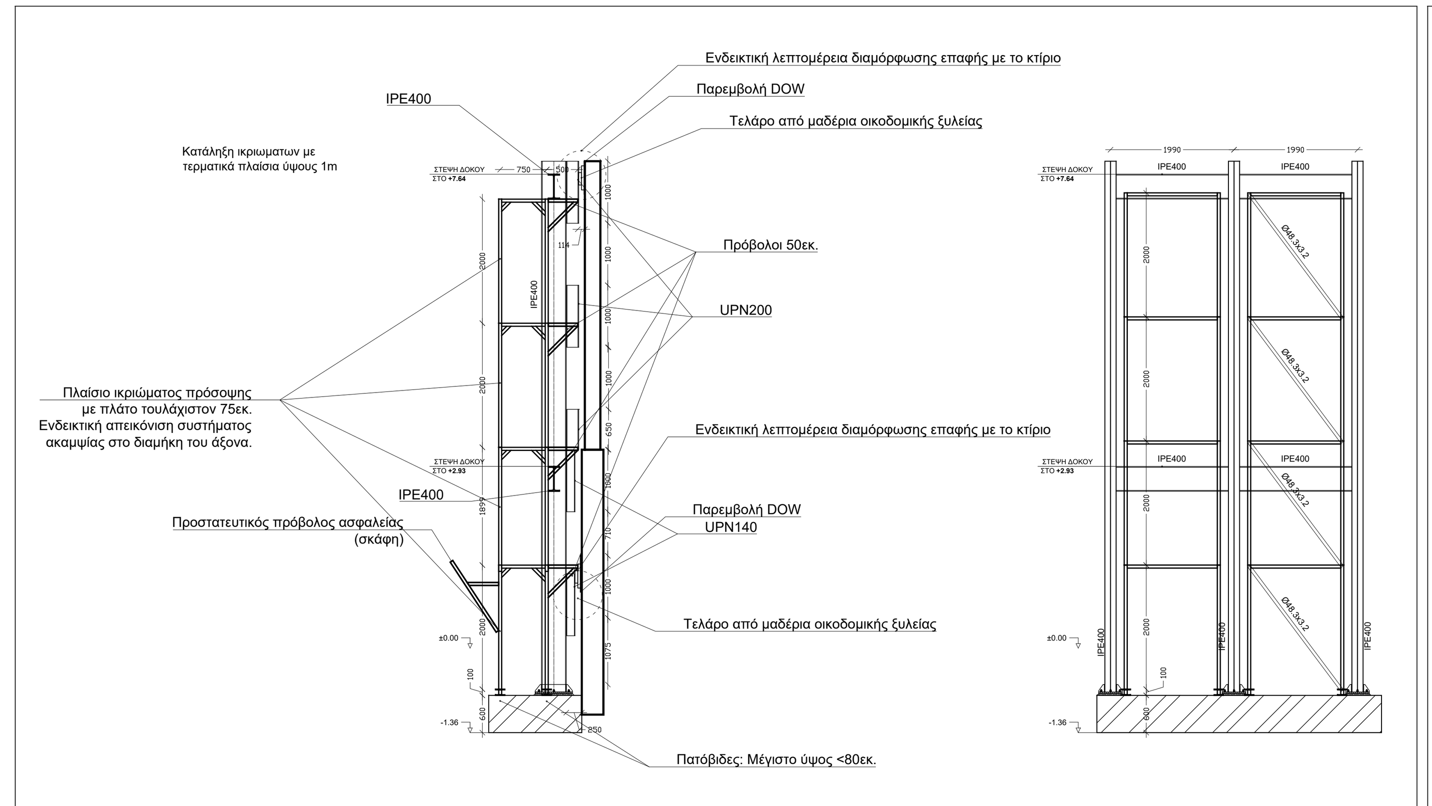
ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ I 1: 50



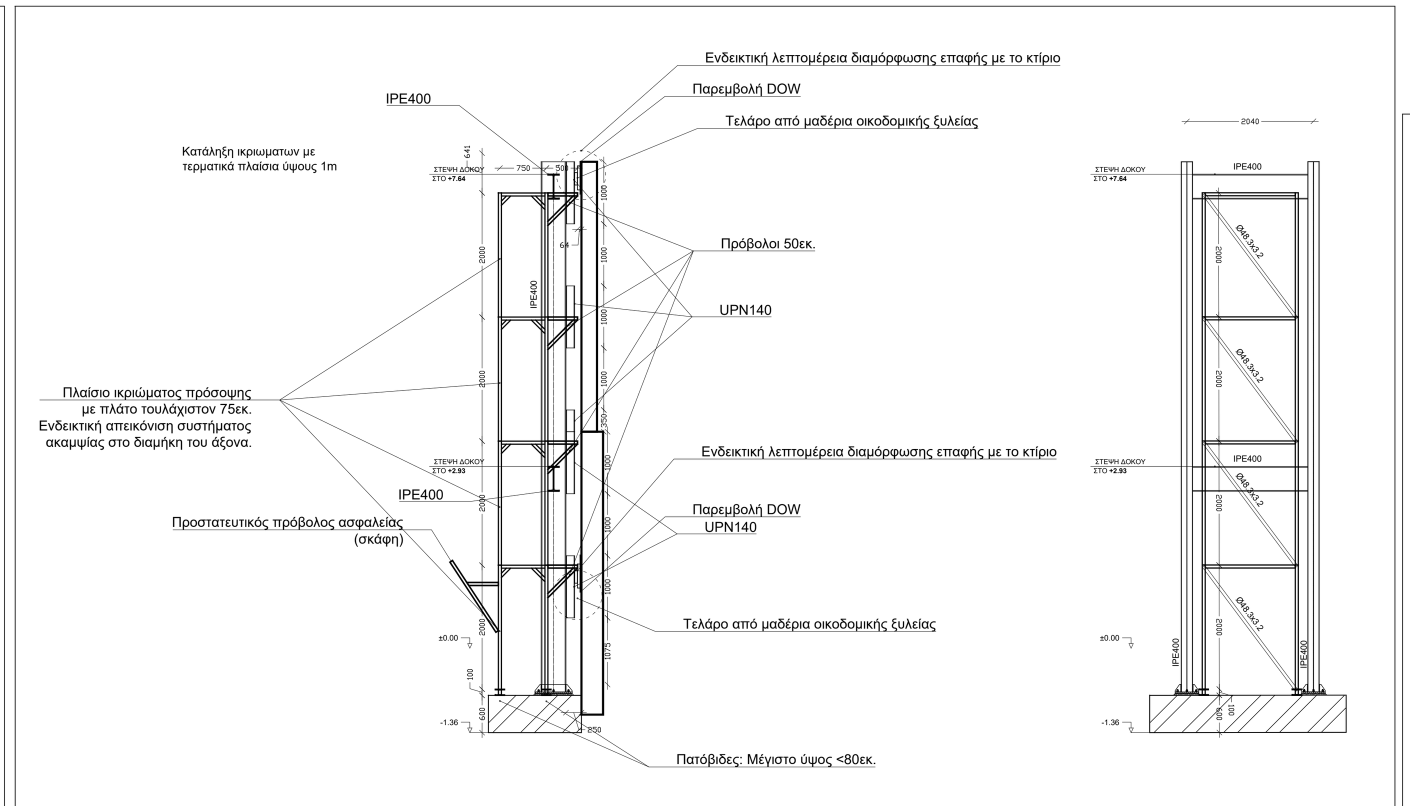
ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ J 1: 50



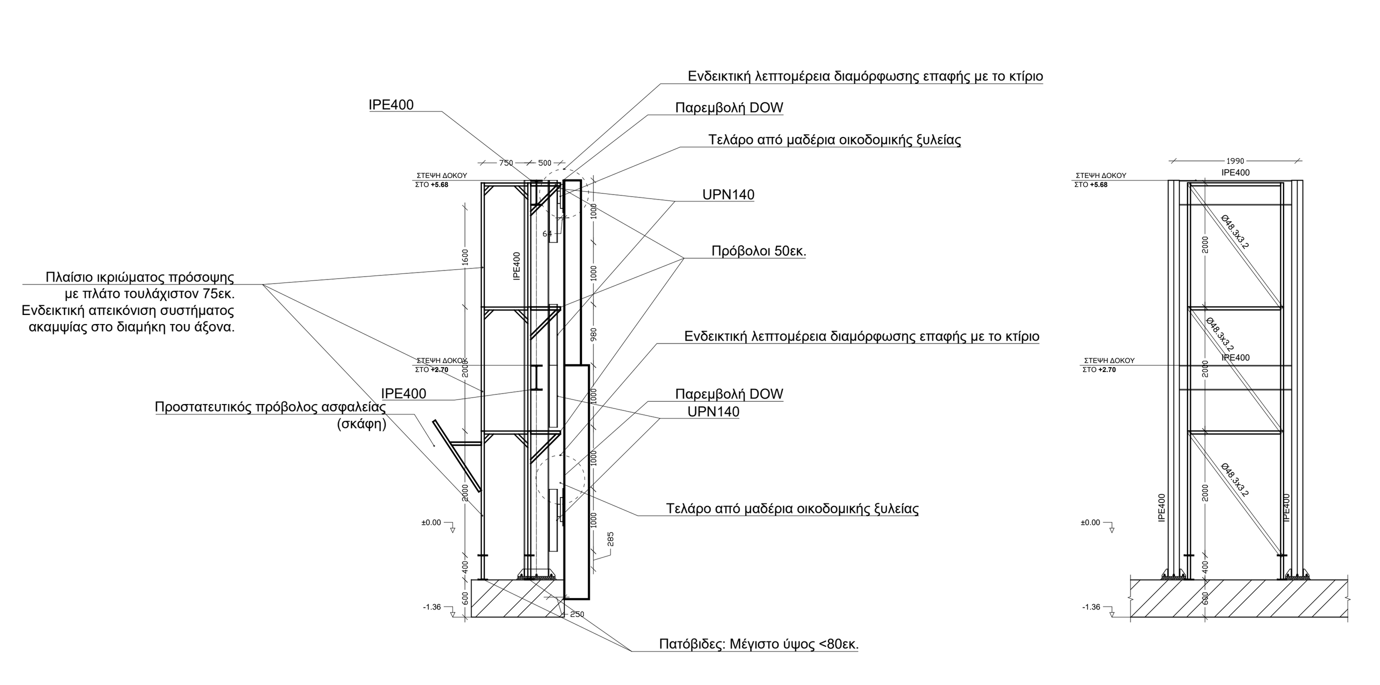
ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ I 1: 50



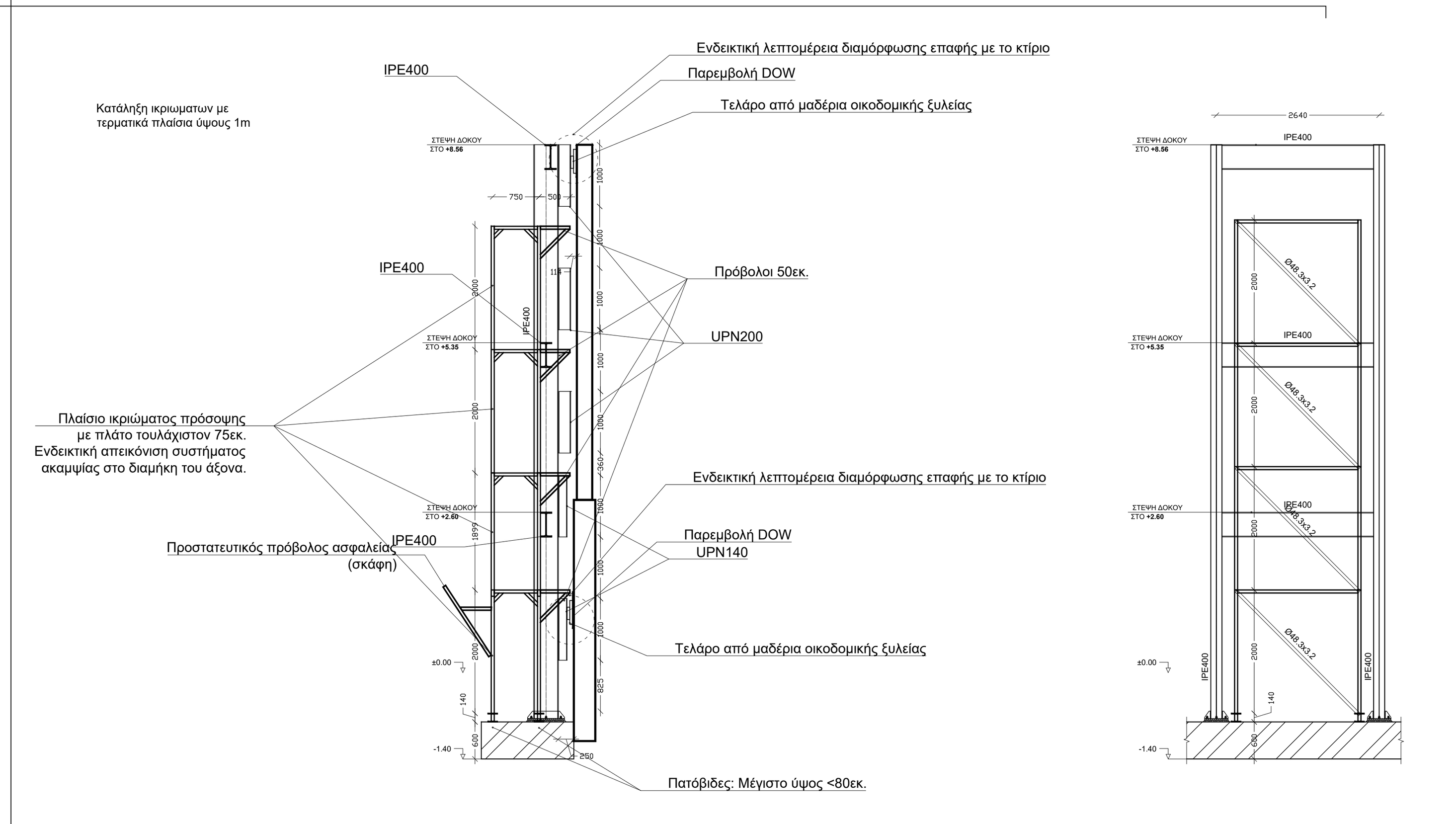
ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ E 1: 50



ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ F 1: 50



ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ G 1: 50



ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ H 1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

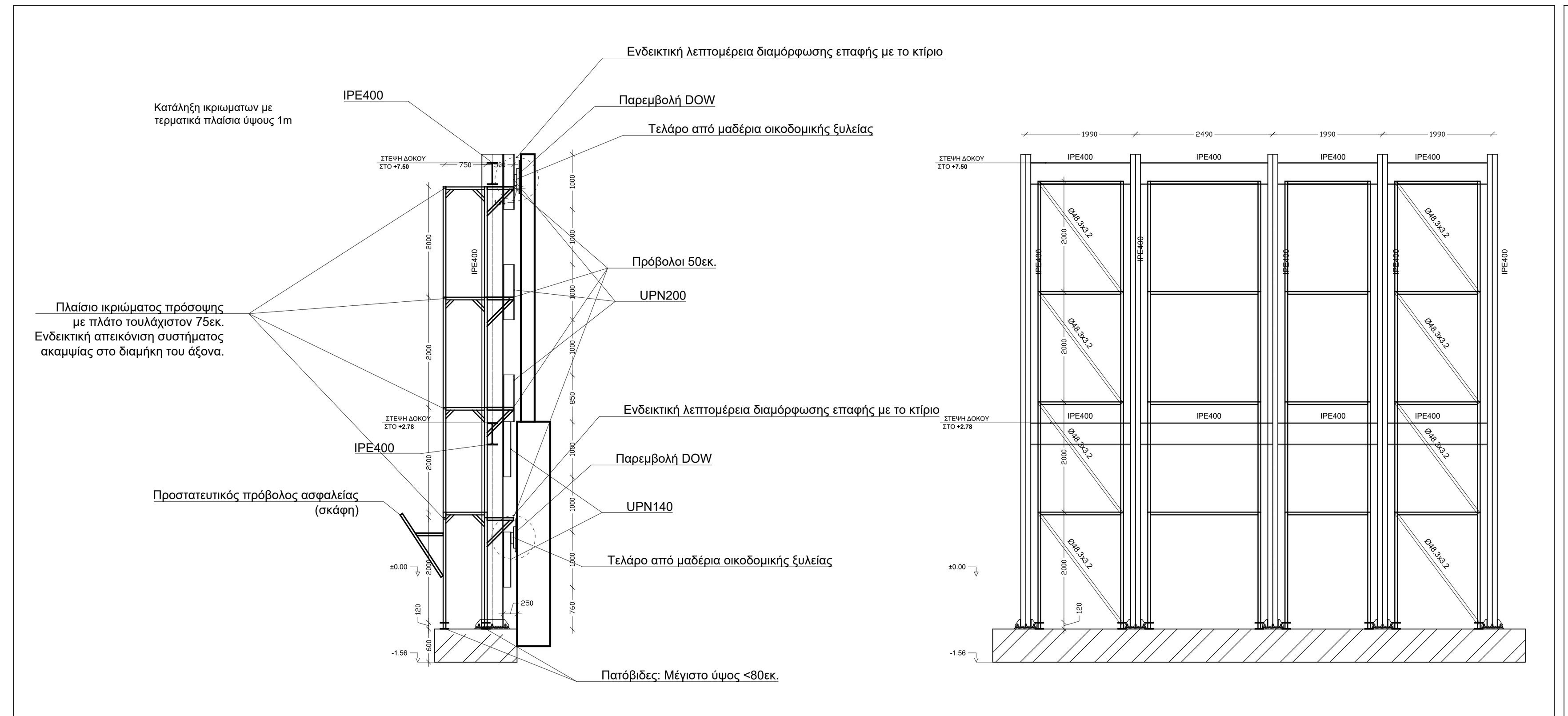
5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

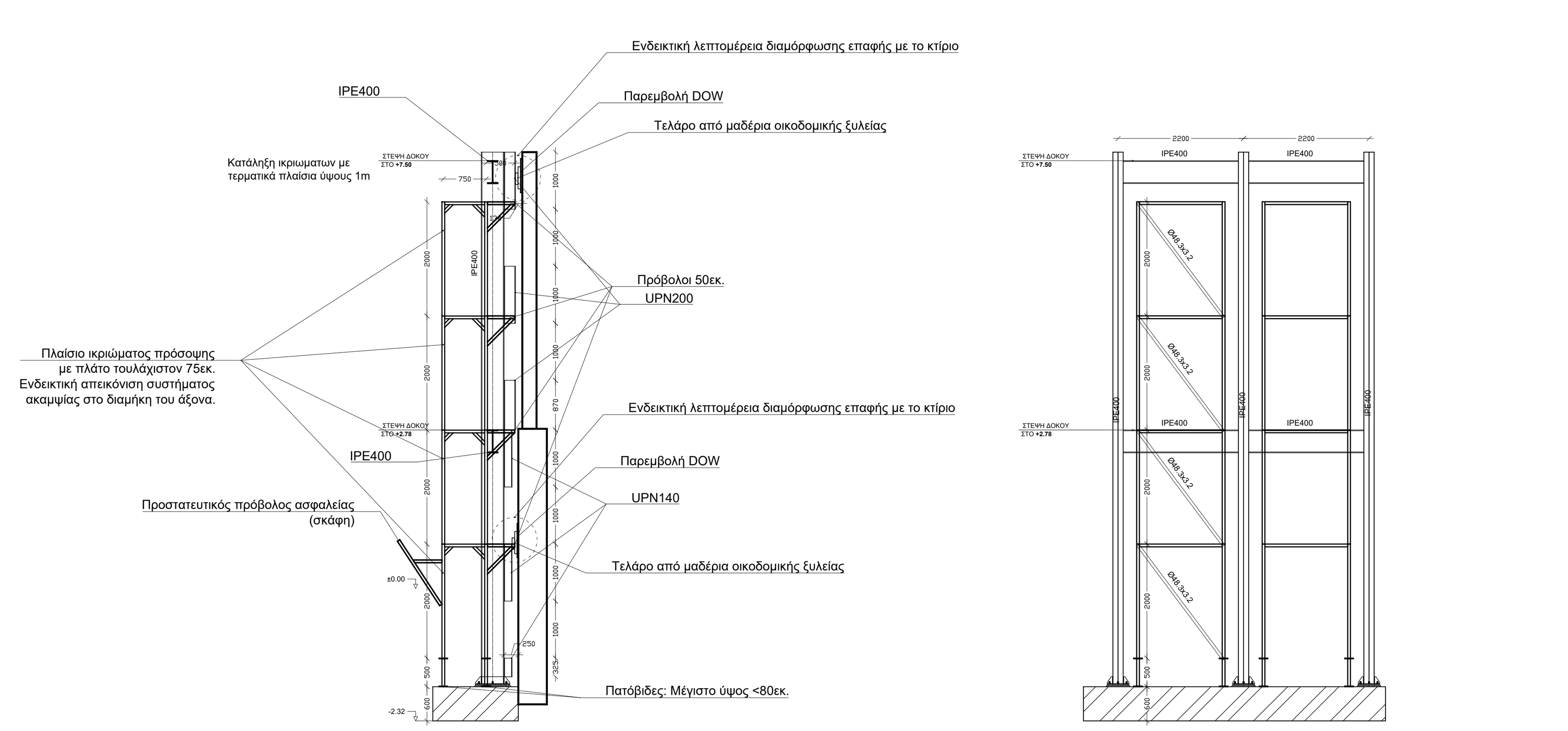
6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
- ΕΥΡΩΚΩΔΙΚΑΣ 3, ΕΝ 1993 : 2005, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΧΑΛΥΒΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

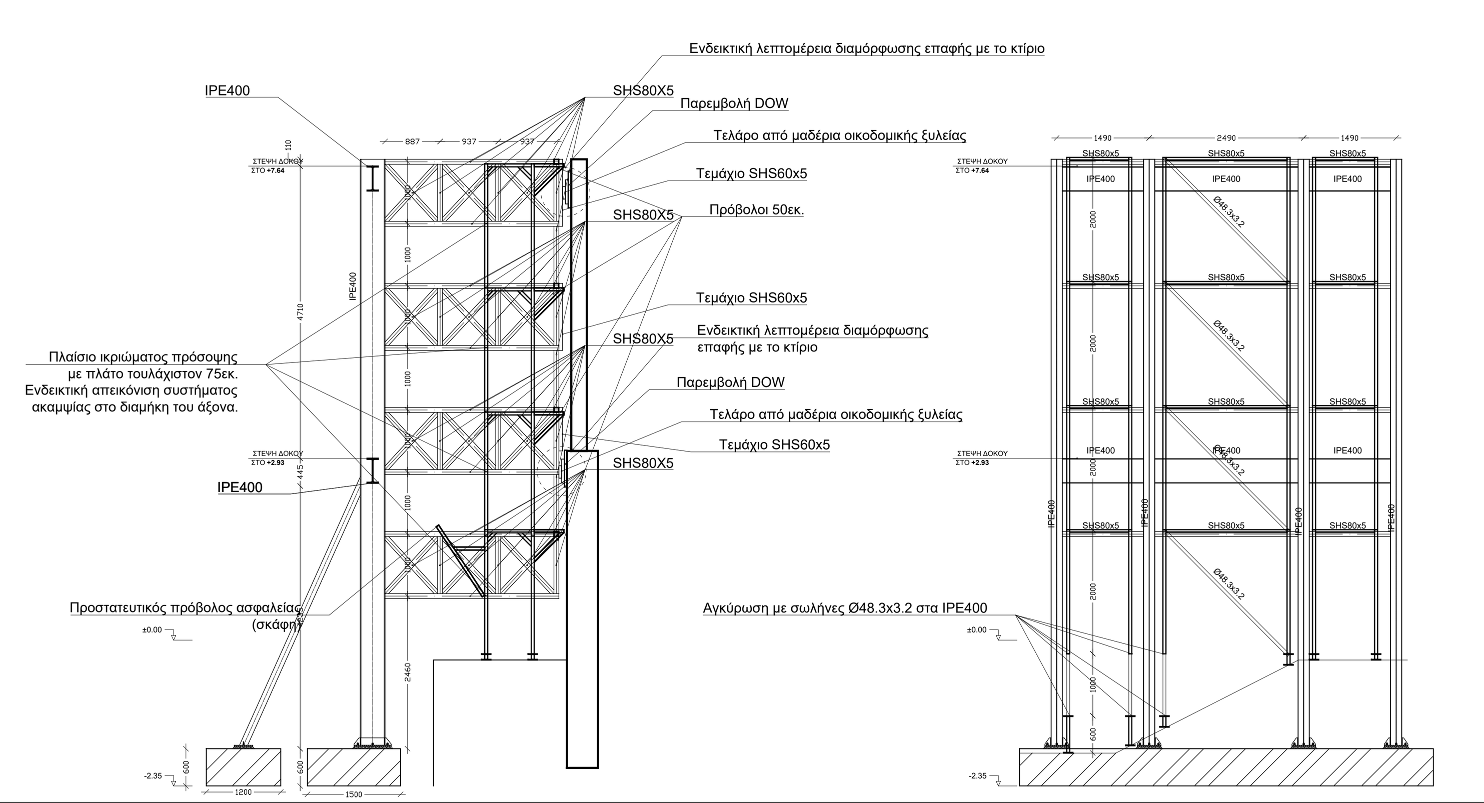
7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ



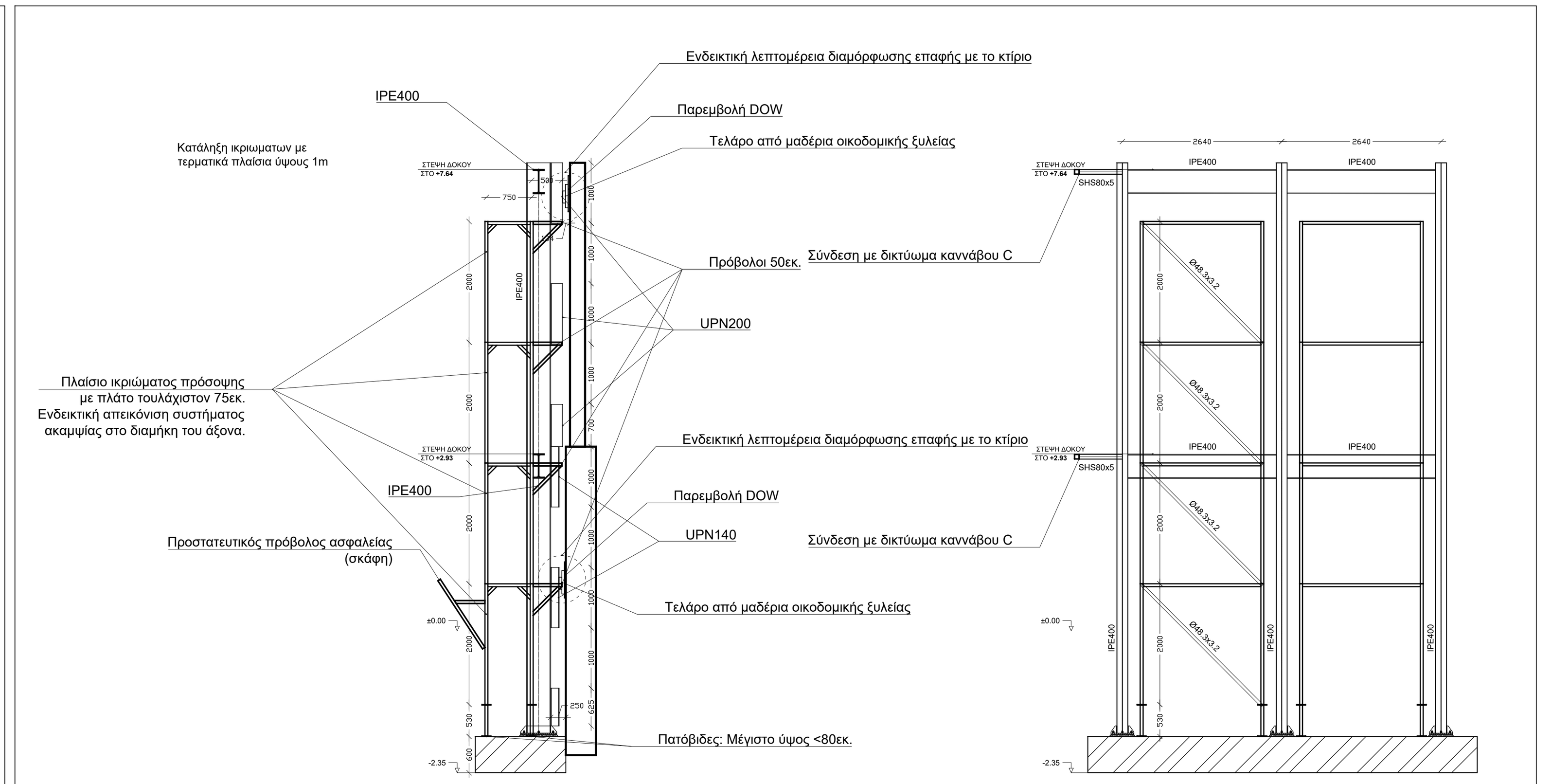
ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ A 1: 50



ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ B 1: 50



ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ D 1: 50



ΟΨΟΤΟΜΗ ΚΑΤΑ ΤΟΝ ΚΑΝΝΑΒΟ D 1: 50

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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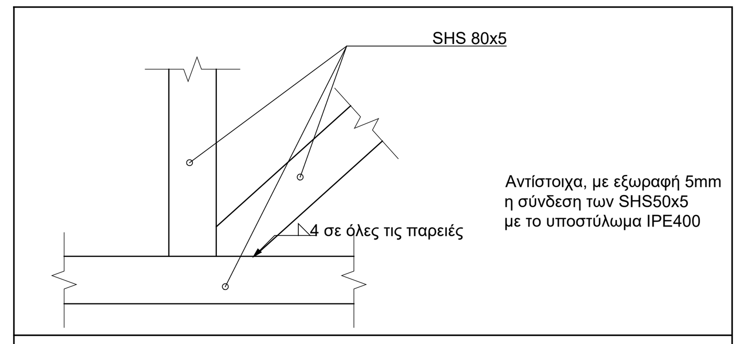
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

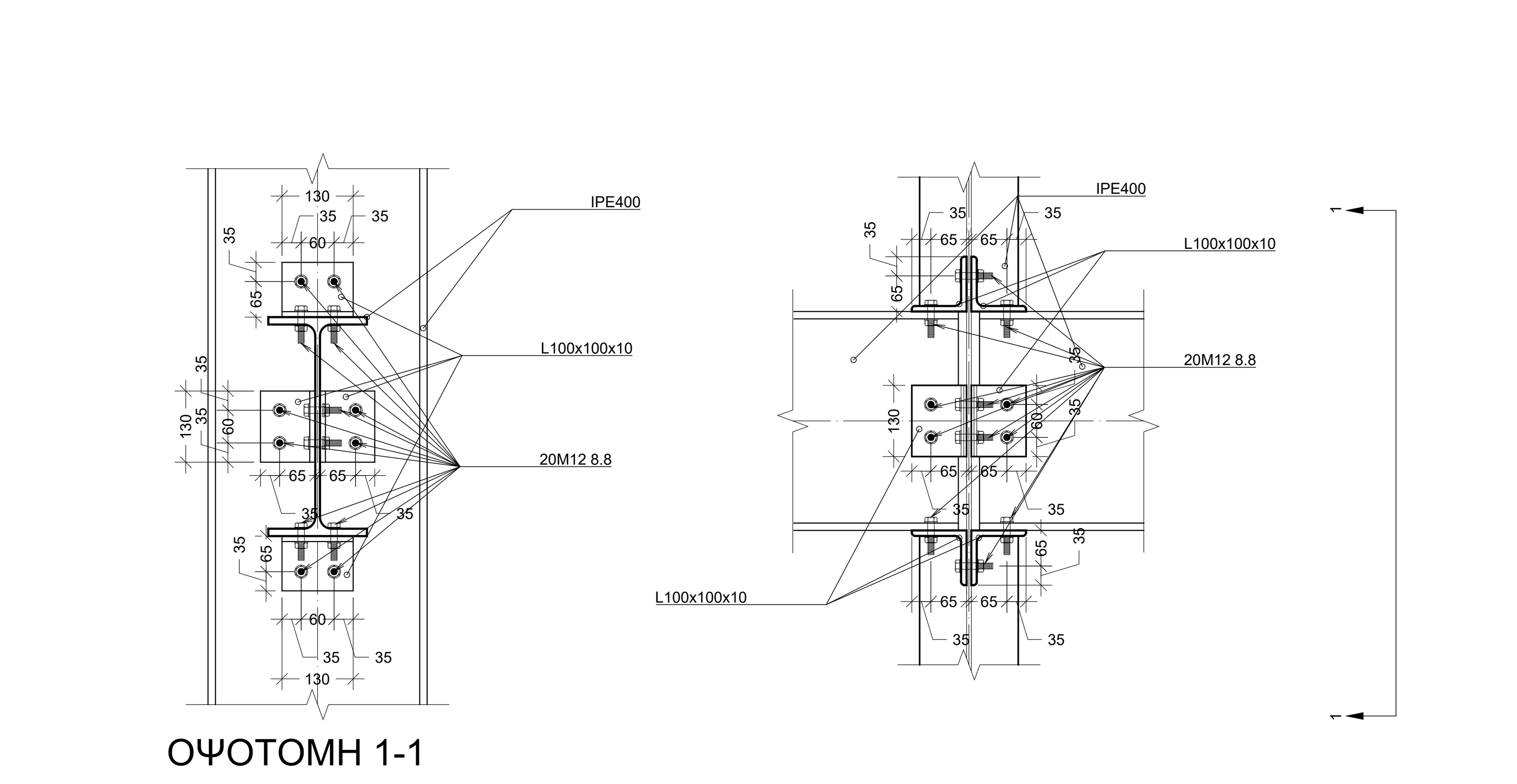
ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

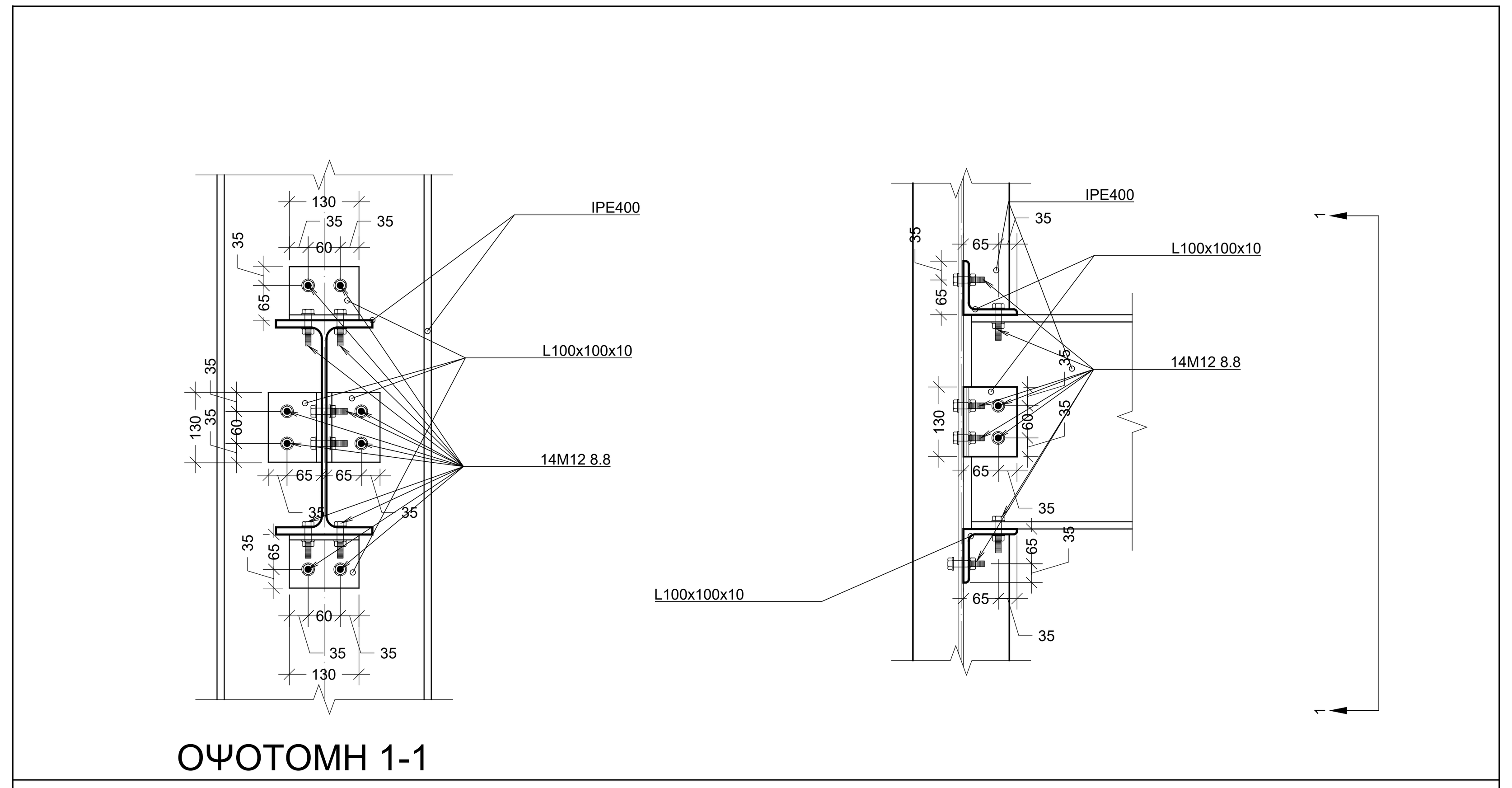
ΘΕΩΡΗΣΗ



ΛΕΠΤΟΜΕΡΕΙΑ 05: ΚΟΜΒΟΣ ΔΙΚΤΥΩΜΑΤΟΣ 1: 10



ΛΕΠΤΟΜΕΡΕΙΑ 03: ΔΙΑΜΟΡΦΩΣΗ ΑΜΦΙΠΛΕΥΡΗΣ ΣΥΝΔΕΣΗΣ IPE400 1: 10



ΛΕΠΤΟΜΕΡΕΙΑ 04: ΔΙΑΜΟΡΦΩΣΗ ΜΟΝΟΠΛΕΥΡΗΣ ΣΥΝΔΕΣΗΣ IPE400 1: 10

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βo = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

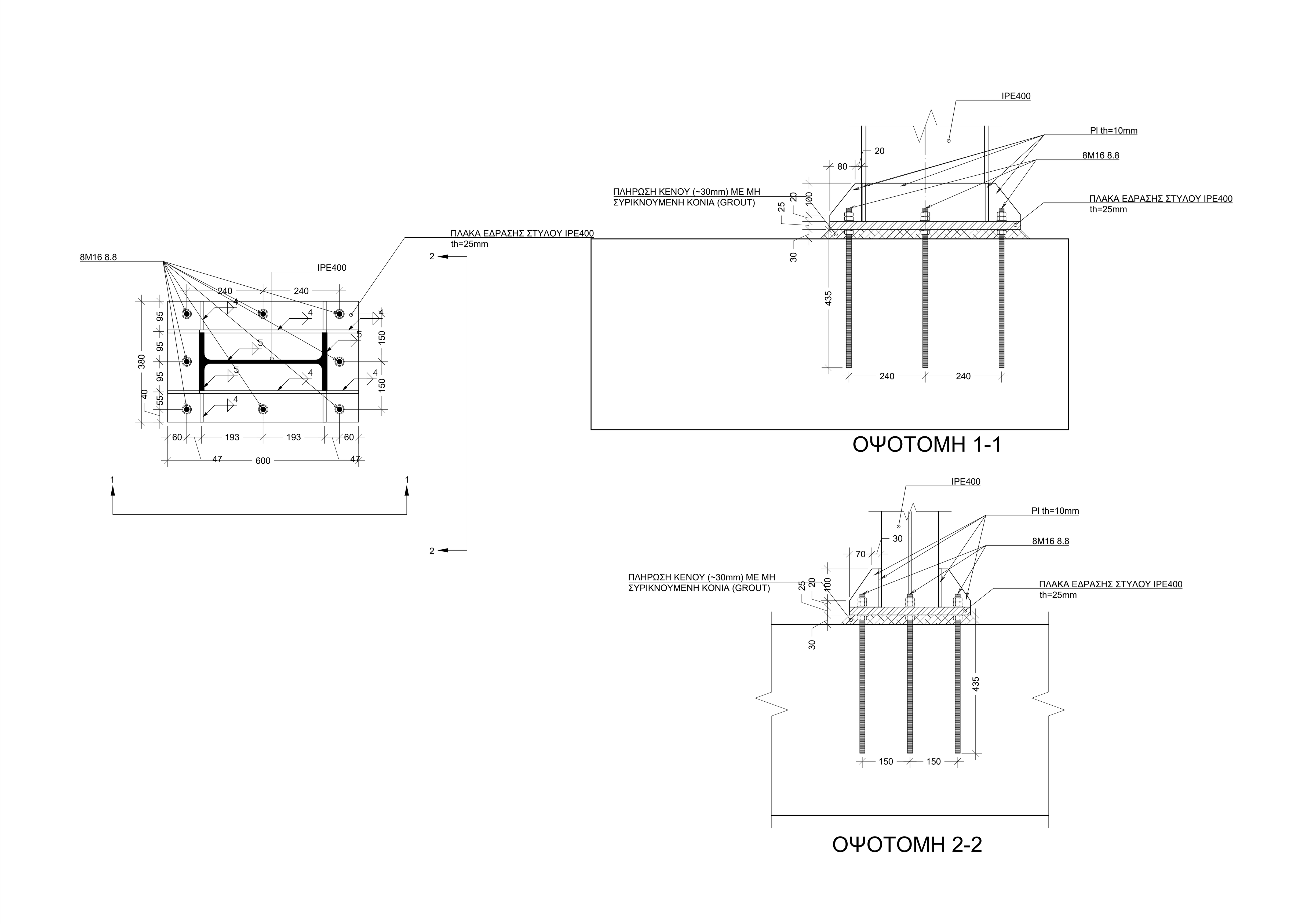
5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

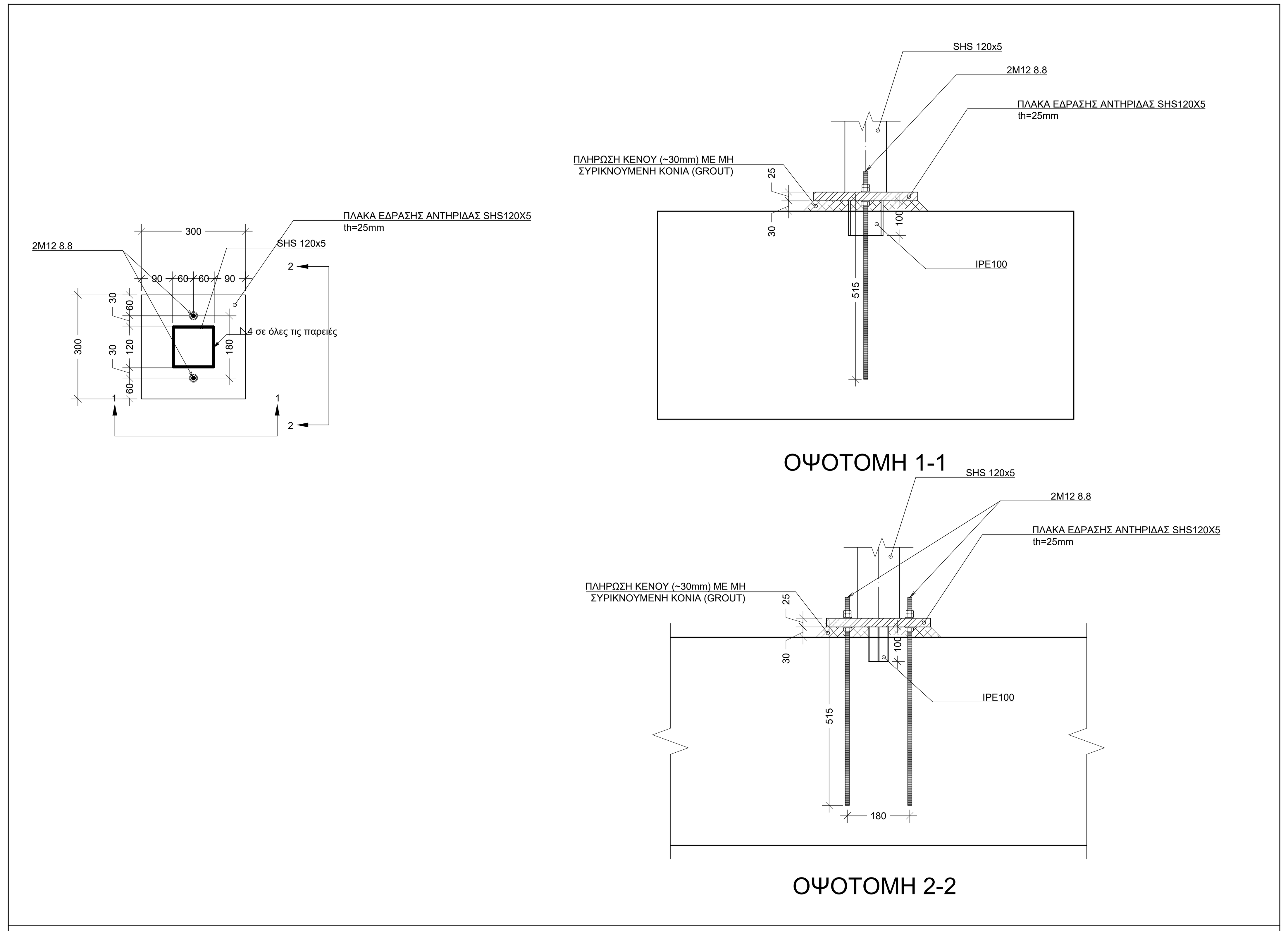
6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
- ΕΥΡΩΚΩΔΙΚΑΣ 3, ΕΝ 1993 : 2005, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΧΑΛΥΒΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ



ΛΕΠΤΟΜΕΡΕΙΑ 01: ΔΙΑΜΟΡΦΩΣΗ ΕΔΡΑΣΗΣ ΣΤΥΛΟΥ IPE400 1: 10



ΛΕΠΤΟΜΕΡΕΙΑ 02: ΔΙΑΜΟΡΦΩΣΗ ΕΔΡΑΣΗΣ ΑΝΤΗΡΙΔΑΣ SHS120X5 1: 10

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

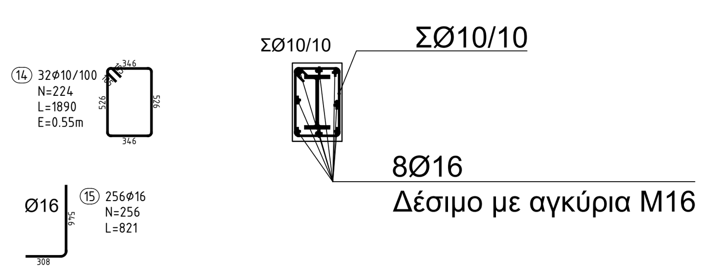
ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

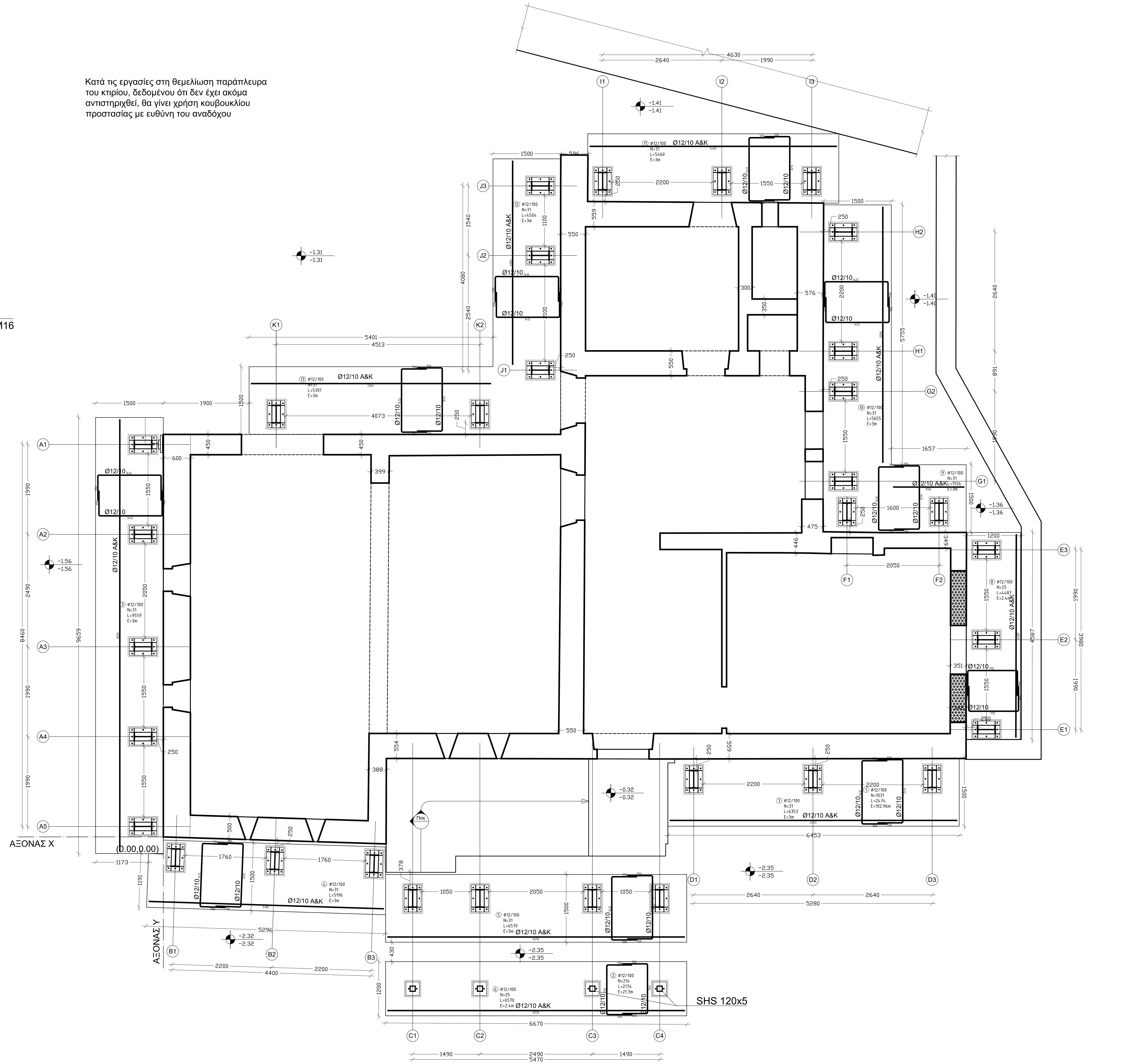
ΘΕΩΡΗΣΗ

Κατά τις εργασίες στη θεμελίωση παράπλευρα του κτιρίου, δεδομένου ότι δεν έχει ακόμα αντιστηριχθεί, θα γίνει χρήση κουβουκλίου προστασίας με ευθύνη του αναδόχου

Διαμόρφωση περίσφιξης στις εδράσεις των υποστυλωμάτων IPE400



Mark	ø [mm]	Shape [mm]	Length [mm]	QTY	Mass [kg]	% of total	Notes
1	ø12	556 / 1412 / 556	2474	1031	2264.77	46.3%	
2	ø12	556 / 1112 / 556	2174	214	413.09	8.4%	
3	ø12	9559	9559	31	263.1	5.4%	
4	ø12	5196	5196	31	143	2.9%	
5	ø12	6570	6570	31	180.82	3.7%	
6	ø12	6570	6570	25	145.82	3%	
7	ø12	6353	6353	31	174.85	3.6%	
8	ø12	4487	4487	25	99.6	2%	
9	ø12	1556	1556	31	42.84	0.9%	
10	ø12	5655	5655	31	155.65	3.2%	
11	ø12	5460	5460	31	150.27	3.1%	
12	ø12	4504	4504	31	123.97	2.5%	
13	ø12	5301	5301	31	145.9	3%	
14	ø10	526 / 346 / 526 / 346 / 105 / 105	1890	224	260.96	5.3%	
15	ø16	546 / 308	821	256	331.66	6.8%	
Total mass = 4896 kg							



Οπλισμός Θεμελίωσης

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	Β
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
- ΕΥΡΩΚΩΔΙΚΑΣ 3, ΕΝ 1993 : 2005, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΧΑΛΥΒΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ

ΕΦΑ Δωδεκανήσου

ΕΡΓΟ

T248

Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ

Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ

STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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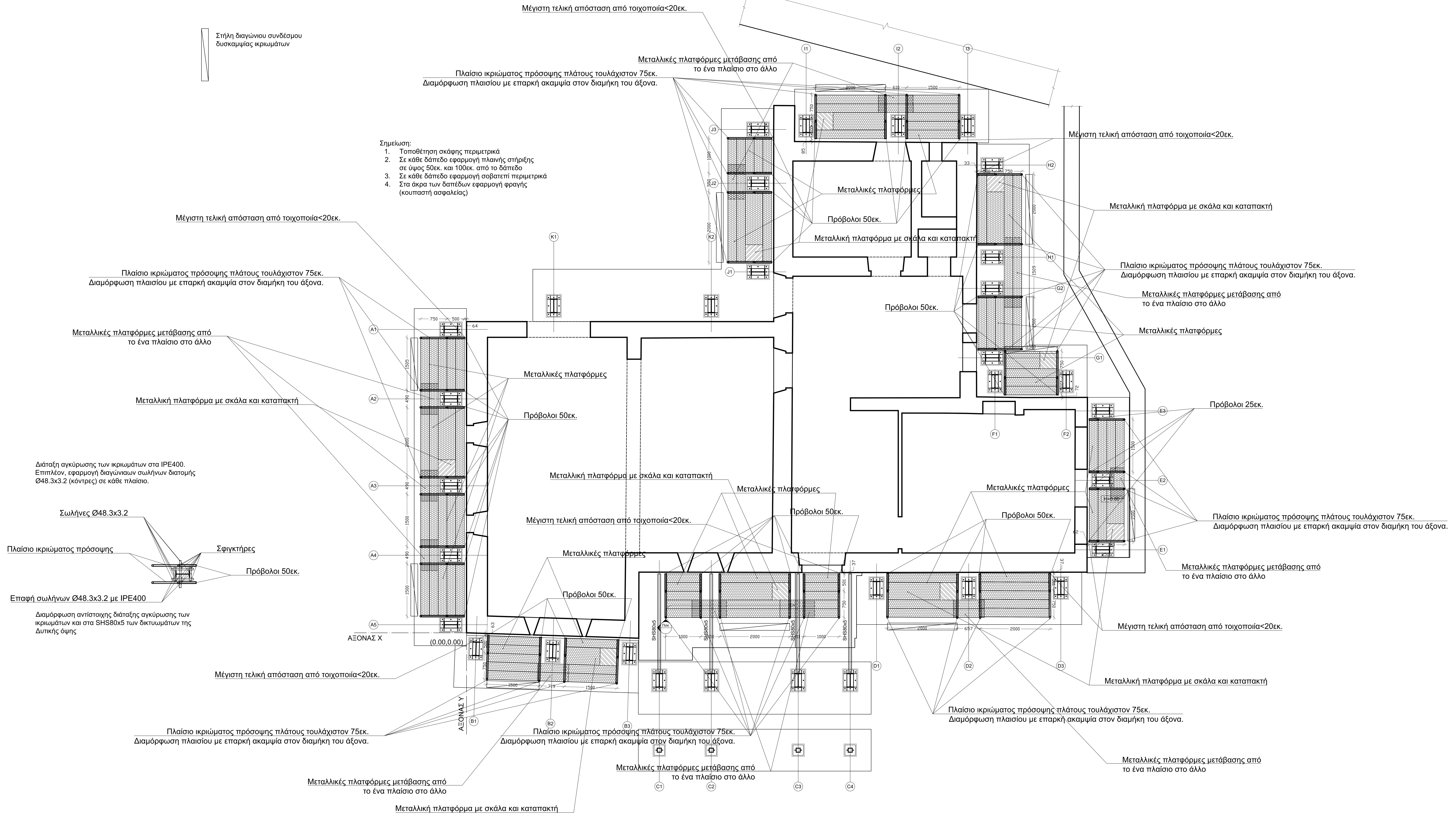
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ

ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



ΤΥΠΙΚΗ ΚΑΤΟΨΗ ΙΚΡΙΩΜΑΤΩΝ ΕΡΓΑΣΙΑΣ 1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	Β
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βo = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
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- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
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- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ
Διάταξη Ικριωμάτων Εργασίας
1:50
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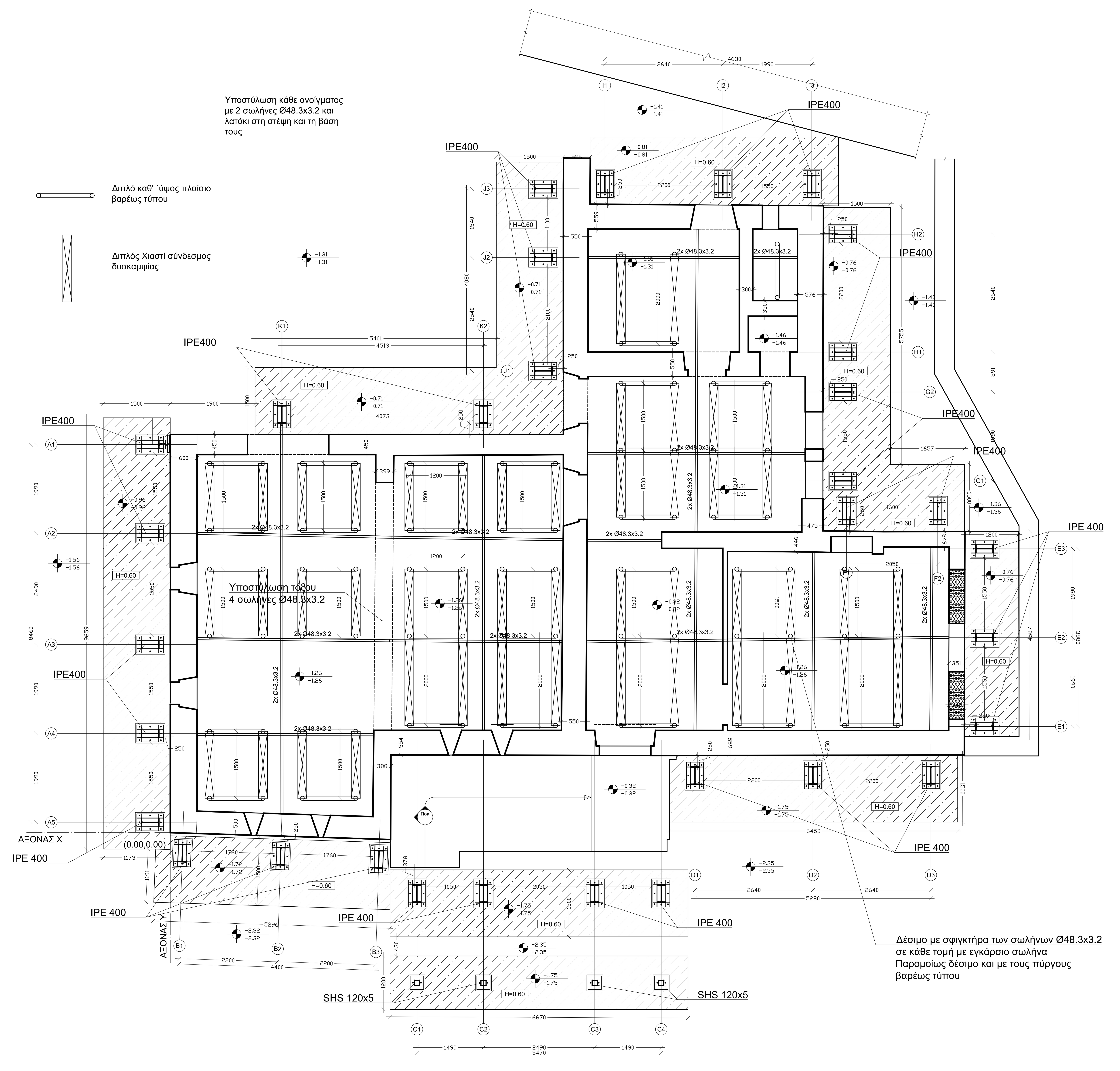
Πρόταση αντιστήριξης

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



Υποστύλωση Οροφής Ισογείου

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
- ΕΥΡΩΚΩΔΙΚΑΣ 3, ΕΝ 1993 : 2005, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΧΑΛΥΒΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ

ΕΦΑ Δωδεκανήσου

ΕΡΓΟ

T248

Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ

Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ

STRUSUS

ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ

ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ

ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

Υποστύλωση Ισογείου

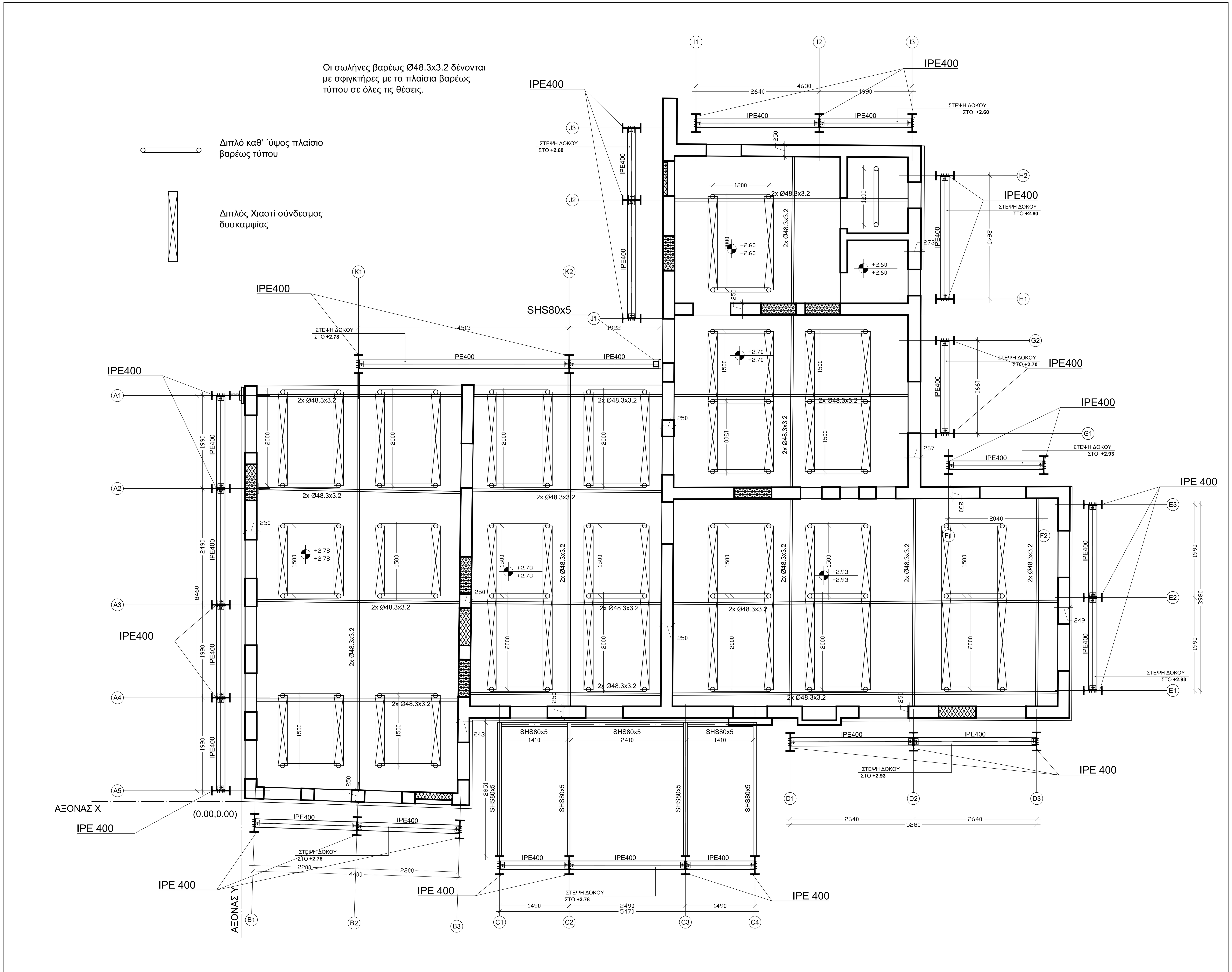
1:50

T248_02_S209

Πρόταση αντιστήριξης

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



Υποστύλωση Οροφής Α' Ορόφου | 1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
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- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
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- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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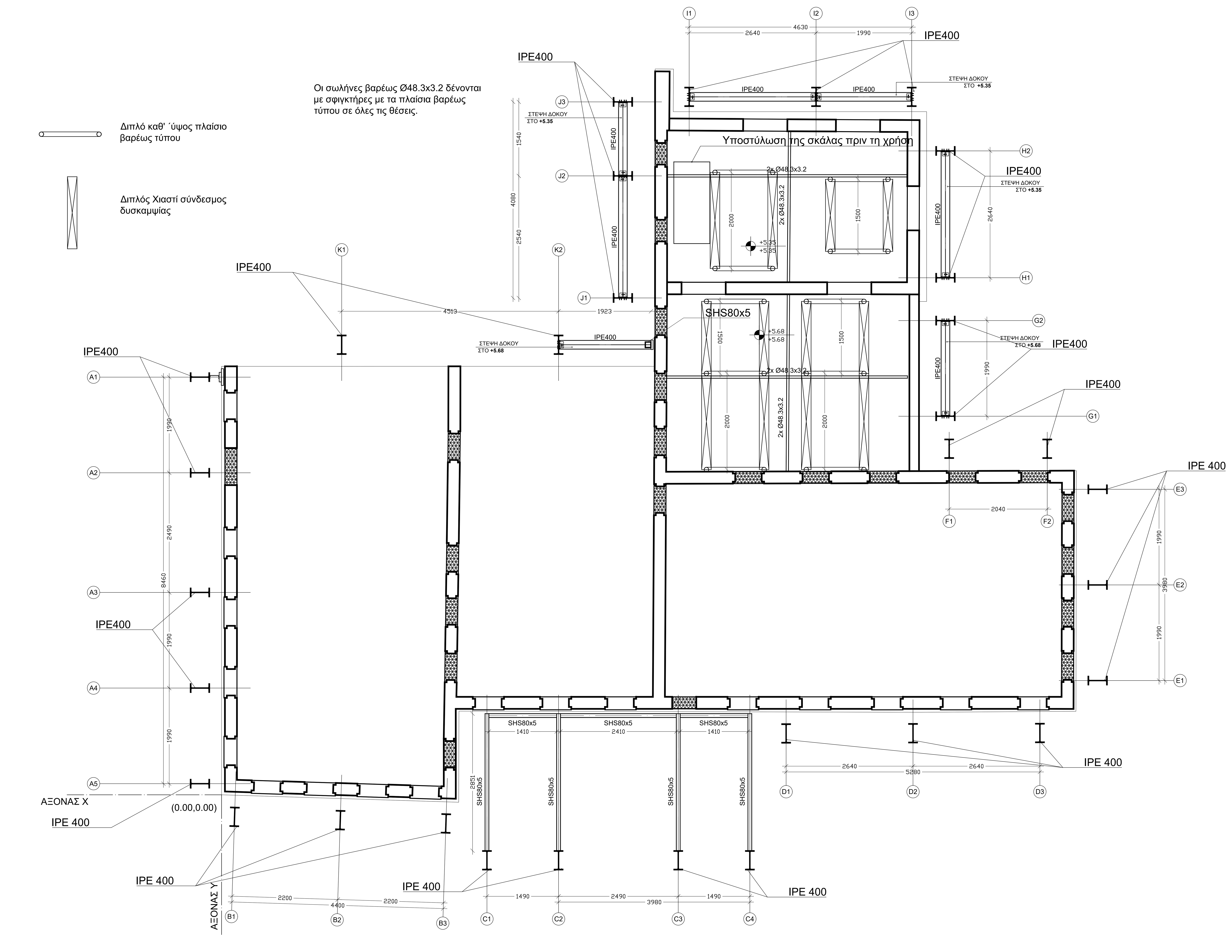
ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ
Υποστύλωση Α΄Ορόφου
1:50
T248_02_S210
Πρόταση αντιστήριξης

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



Υποστύλωση Οροφής Δώματος

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
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- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
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- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΪΙΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ

ΕΦΑ Δωδεκανήσου

ΕΡΓΟ

T248

Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ

Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ

STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ

ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

Υποστύλωση Δώματος

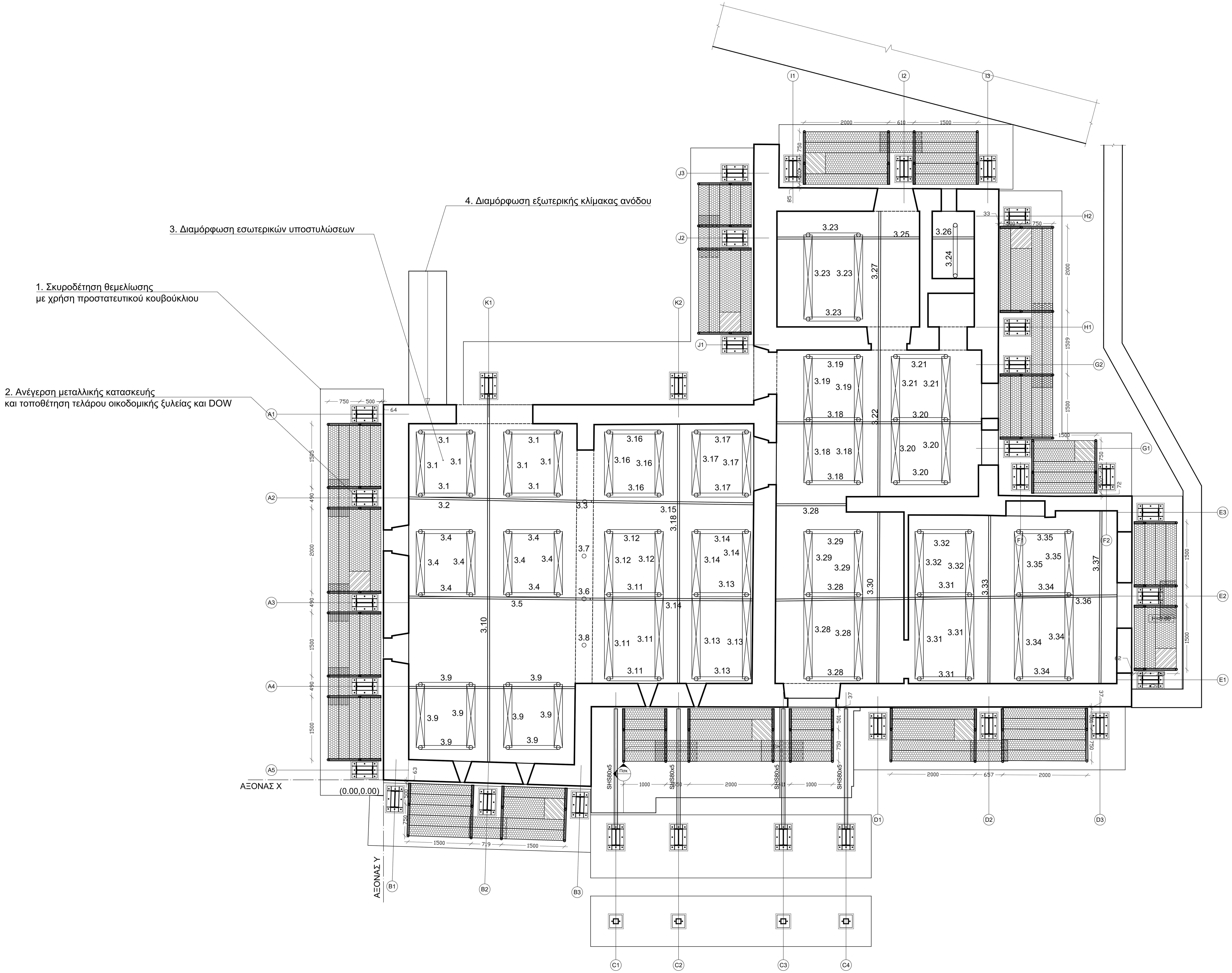
1:50

T248_02_S211

Πρόταση αντιστήριξης

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ



ΠΡΟΓΡΑΜΜΑ ΕΡΓΑΣΙΩΝ ΙΣΟΓΕΙΟ

1: 50

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΣΚΥΡΟΔΕΜΑΤΟΣ 1997,ΦΕΚ315/Β/17.04.1997, Δ14/19164
- ΚΑΝΟΝΙΣΜΟΣ ΤΕΧΝΟΛΟΓΙΑΣ ΧΑΛΥΒΩΝ ΣΚΥΡΟΔΕΜΑΤΟΣ 2008, ΦΕΚ 1416/Β/17-07-2088, ΦΕΚ 2113/Β/13-10-2008
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
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- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
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7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ

ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
STRUSUS
ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ
ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
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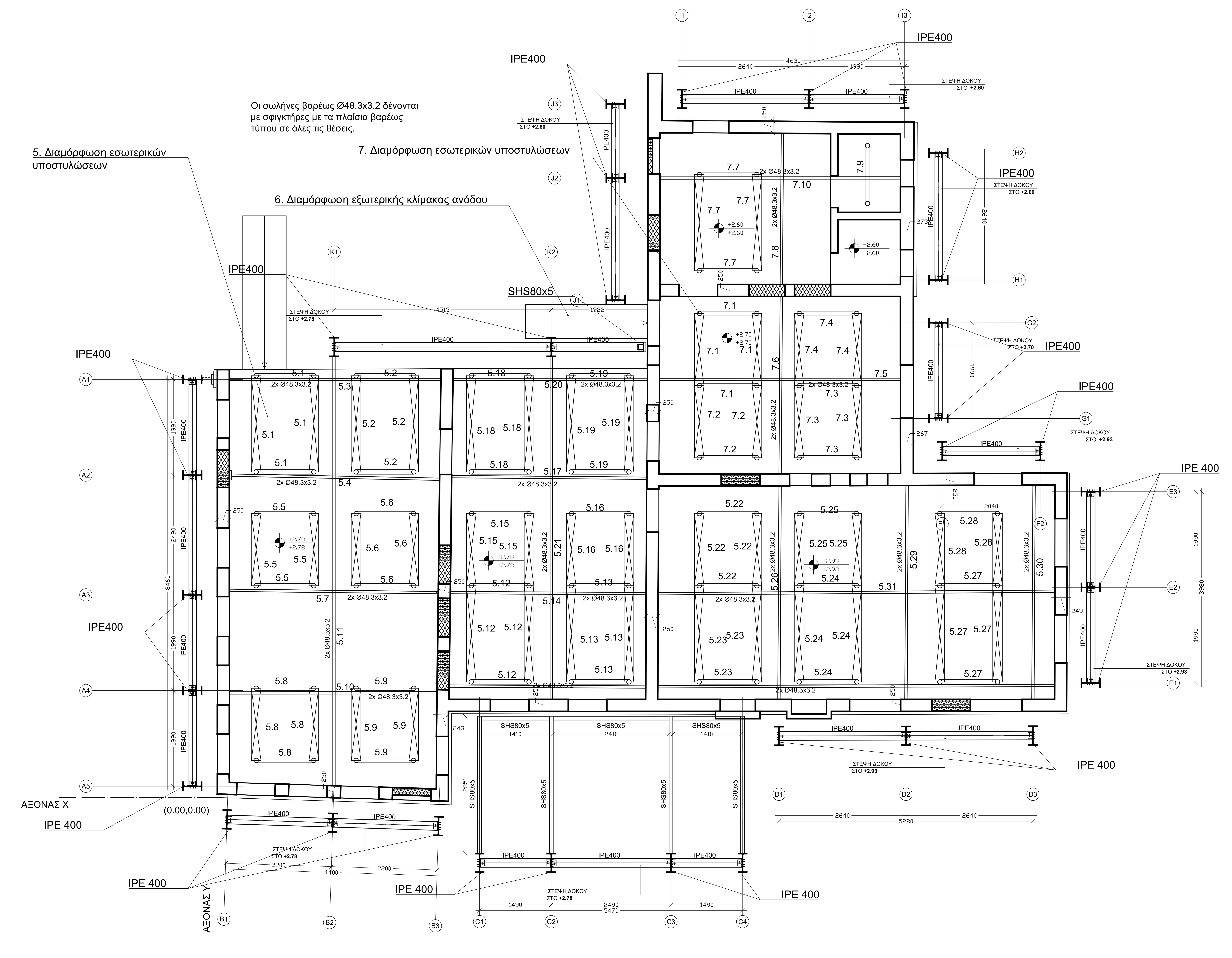
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ



ΠΡΟΓΡΑΜΜΑ ΕΡΓΑΣΙΩΝ Α' ΟΡΟΦΟΣ

1: 50

ΕΡΓΟΔΟΤΗΣ

ΕΦΑ Δωδεκανήσου

ΕΡΓΟ

T248

Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ

Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ

STRUSUS

ΤΕΧΝΙΚΗ ΕΤΑΙΡΕΙΑ

ΥΠΕΥΘΥΝΟΣ ΜΗΧΑΝΙΚΟΣ: ΑΘΑΝΑΣΙΟΣ ΠΑΠΑΓΕΩΡΓΙΟΥ

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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ

ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ

Πρόγραμμα εκτέλεσης εργασιών Α' Ορόφου

1:50

T248_02_S213

Πρόταση αντιστήριξης

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ

ΠΑΡΑΔΟΧΕΣ ΥΠΟΛΟΓΙΣΜΩΝ

1. ΥΛΙΚΑ ΦΕΡΟΝΤΩΝ ΣΤΟΙΧΕΙΩΝ

ΧΑΛΥΒΑΣ	S235 / S275
ΣΚΥΡΟΔΕΜΑ	C25/30
ΧΑΛΥΒΑΣ ΟΠΛΙΣΜΟΥ	B500C

2. ΜΟΝΙΜΑ ΦΟΡΤΙΑ

ΙΔΙΟ ΒΑΡΟΣ ΤΟΙΧΟΠΟΙΙΑΣ	20.00 kN/m3

3. ΚΙΝΗΤΑ ΦΟΡΤΙΑ

CAT H	0.10 kN/m2

4. ΣΕΙΣΜΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

ΖΩΝΗ ΣΕΙΣΜΙΚΗΣ ΕΠΙΚΥΝΔΥΝΟΤΗΤΑΣ	II
ΟΡΙΖΟΝΤΙΑ ΣΕΙΣΜΙΚΗ ΕΠΙΤΑΧΥΝΣΗ ΕΔΑΦΟΥΣ	αh = 0.24
ΣΠΟΥΔΑΙΟΤΗΤΑ ΚΤΙΡΙΟΥ	Σ2
ΣΥΝΤΕΛΕΣΤΗΣ ΣΠΟΥΔΑΙΟΤΗΤΑΣ	γ = 1.00
ΚΑΤΗΓΟΡΙΑ ΕΔΑΦΟΥΣ	B
ΣΥΝΤΕΛΕΣΤΗΣ ΣΕΙΣΜΙΚΗΣ ΣΥΜΠΕΡΙΦΟΡΑΣ ΟΡΙΖΟΝΤΙΩΝ ΣΥΝΙΣΤΩΣΩΝ	qh = 1.50
ΣΥΝΤΕΛΕΣΤΗΣ ΦΑΣΜΑΤΙΚΗΣ ΕΝΙΣΧΥΣΗΣ	βο = 2.50
ΣΥΝΤΕΛΕΣΤΗΣ ΣΥΝΔΥΑΣΜΟΥ ΔΡΑΣΕΩΝ	ψ2 = 0.30
ΣΥΝΤΕΛΕΣΤΕΣ ΧΩΡΙΚΗΣ ΕΠΑΛΛΗΛΙΑΣ	λ, μ = 0.30 και SRSS
ΠΟΣΟΣΤΟ ΚΡΙΣΙΜΗΣ ΑΠΟΣΒΕΣΗΣ	ζ = 5.00%
ΜΕΘΟΔΟΣ ΑΝΑΛΥΣΗΣ	ΔΥΝΑΜΙΚΗ ΦΑΣΜΑΤΙΚΗ
ΔΙΑΡΚΕΙΑ ΖΩΗΣ ΕΡΓΟΥ ΑΝΤΙΣΤΗΡΙΞΗΣ	3 ΕΤΗ

5. ΕΔΑΦΟΣ - ΘΕΜΕΛΙΩΣΗ

ΕΠΙΤΡΕΠΟΜΕΝΗ ΤΑΣΗ ΕΔΑΦΟΥΣ (ΣΥΜΦΩΝΑ ΜΕ ΓΕΩΤΕΧΝΙΚΗ ΜΕΛΕΤΗ)	σεπιτ = 300 kN/m2
ΔΕΙΚΤΗΣ ΕΔΑΦΟΥΣ	ks = 30000 kN/m3

6. ΚΑΝΟΝΙΣΜΟΙ - ΠΡΟΔΙΑΓΡΑΦΕΣ

- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΦΟΡΤΙΣΕΩΣ ΔΟΜΙΚΩΝ ΕΡΓΩΝ,ΦΕΚ 325/Α/45 ΚΑΙ ΦΕΚ 171/Α/16.05.1946
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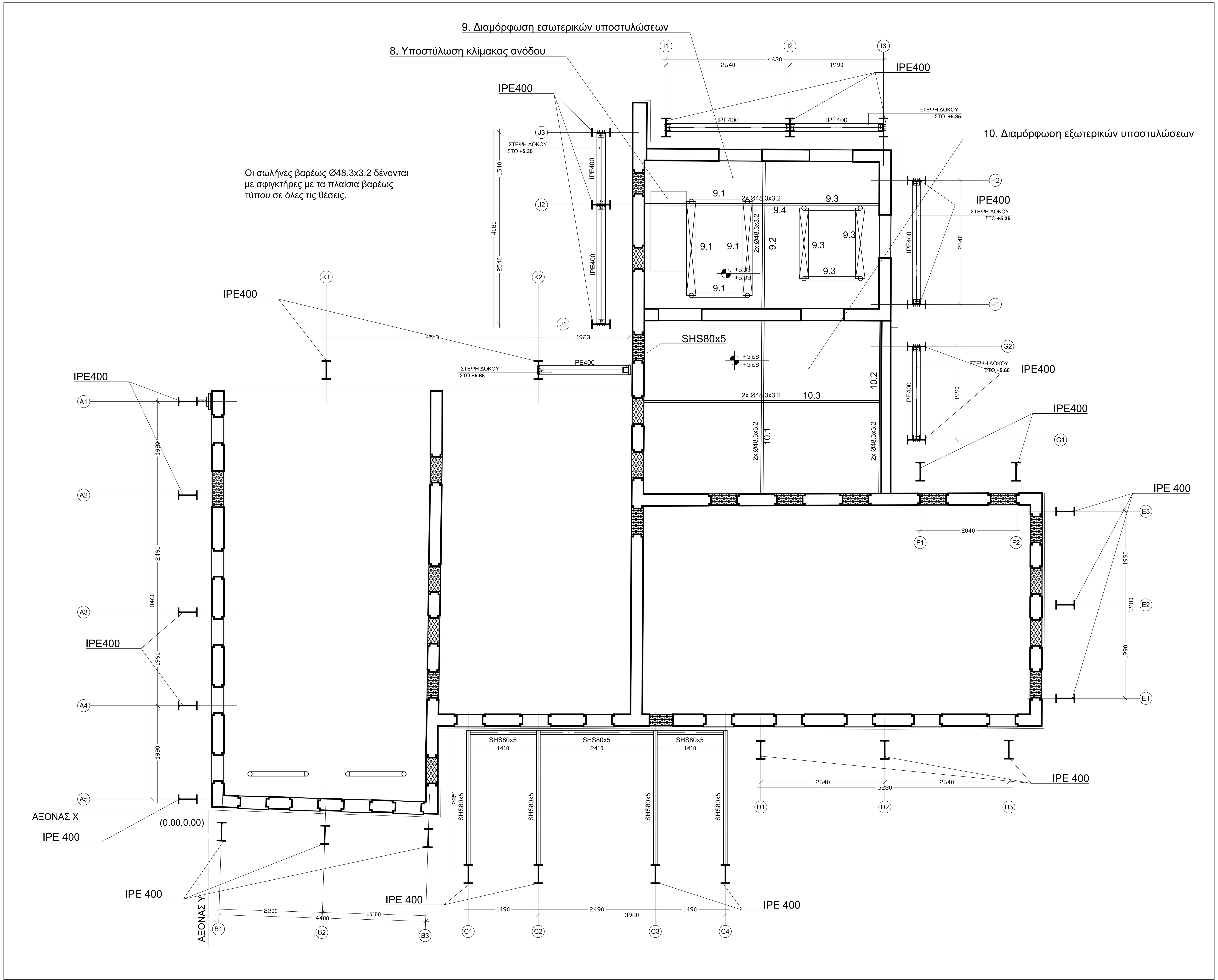
- ΚΑΝΟΝΙΣΜΟΣ ΓΙΑ ΤΗΝ ΜΕΛΕΤΗ ΚΑΙ ΚΑΤΑΣΚΕΥΗ ΕΡΓΩΝ ΑΠΟ ΣΚΥΡΟΔΕΜΑ,ΦΕΚ1329Β'/6.11.2000
- ΕΛΛΗΝΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ ΟΠΛΙΣΜΕΝΟΥ ΣΚΥΡΟΔΕΜΑΤΟΣ 2000 (ΕΚΩΣ 2000 ΚΑΙ ΦΕΚ Β' 1153/12.8.2003)
- ΕΛΛΗΝΙΚΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΚΑΝΟΝΙΣΜΟΣ, ΦΕΚ 2184Β'/20.12.1999, ΦΕΚ Β'781/18.6.2003
- ΕΥΡΩΚΩΔΙΚΑΣ 3, ΕΝ 1993 : 2005, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΧΑΛΥΒΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 4, ΕΝ 1994 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΣΥΜΜΙΚΤΩΝ ΚΑΤΑΣΚΕΥΩΝ
- ΕΥΡΩΚΩΔΙΚΑΣ 6, ΕΝ 1996 : 1992, ΥΠΟΛΟΓΙΣΜΟΣ ΚΑΤΑΣΚΕΥΩΝ ΑΠΟ ΤΟΙΧΟΠΟΙΪΑ
- ΕΥΡΩΚΩΔΙΚΑΣ 7, ΕΝ 1997 : 1992, ΓΕΩΤΕΧΝΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ
- ΕΥΡΩΚΩΔΙΚΑΣ 8, ΕΝ 1997 : ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ

7.ΠΡΟΒΛΕΨΗ ΟΡΟΦΩΝ ΔΕΝ ΥΠΑΡΧΕΙ



ΠΡΟΓΡΑΜΜΑ ΕΡΓΑΣΙΩΝ ΔΩΜΑ
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ΕΡΓΟΔΟΤΗΣ
ΕΦΑ Δωδεκανήσου

ΕΡΓΟ
T248
Αντιστήριξη αρχοντικού Χασάν Μπέη

ΘΕΣΗ
Μεσαιωνική Πόλη, Ρόδος

ΜΕΛΕΤΗ ΦΕΡΟΝΤΟΣ ΟΡΓΑΝΙΣΜΟΥ
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ΦΑΣΗ - ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ
ΟΡΙΣΤΙΚΗ ΜΕΛΕΤΗ 04.2023

ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΟΥ
Πρόγραμμα εκτέλεσης εργασιών Δώματος
1:50
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Πρόταση αντιστήριξης

ΣΦΡΑΓΙΔΑ - ΥΠΟΓΡΑΦΗ

ΘΕΩΡΗΣΗ