Deck element calculation

Span		9.6			
Category C		Congregation areas			
Moveable partitions		gk=1,25kN (drywalls)			
Self-weight					
Self-weight on the element gk=		2.4	kN (10cm concrete casting)		
Imposed loads					
Imposed load	qk1=		2.5	Kn/m2	
Loads from moveable partitions	qk2=		0.8	kN/m2	gk=1,25kN/m
Sum of imposed loads		3.3	kN/m2		
Desgin load					
Index:		1	1.5		
qEd=		7.35			
Crack load					
qErev		5.7			
Balance load					
qEbal		2.4			

Load calculation

Ground Supported Slab							
Component	**Thickness (m)**	**Width (m)**	**Lenght (m)**	**Spacing y (m)**	**Spacing %**	**Density kN/m3**	**Load kN/m2**
Linoleum	0.002	1	1	1	1	1.20	0.0024
Plywood	0.018	1	1	1	1	7.00	0.126
Screed	0.070	1	1	1	1	12.00	0.84
Concrete	0.100	1	1	1	1	21.00	2.1
Polystyrene	0.300	1	1	1	1	0.25	0.075
Gravel	0.150	1	1	1	1	15.20	2.28
						Total:	**5.42**

Story Partition							
Component	**Thickness (m)**	**Width (m)**	**Lenght (m)**	**Spacing y (m)**	**Spacing %**	**Density kN/m3**	**Load kN/m2**
Ceramic tiles	0.010	1	1	1	1	23.60	0.236
Screed	0.060	1	1	1	1	12.00	0.72
Mineral wool	0.110	1	1	1	1	0.32	0.0352
Screed	0.260	1	1	1	1	12.00	3.12
Hollow core deck element	0.220	1	1	1	1	23.00	5.06
						Total:	**9.17**

Story Partition (Terrace)							
Component	**Thickness (m)**	**Width (m)**	**Lenght (m)**	**Spacing y (m)**	**Spacing %**	**Density kN/m3**	**Load kN/m2**
Concrete tiles	0.030	1	1	1	1	14.00	0.42
Hard insulation	0.200	1	1	1	1	0.25	0.05
Soft Insulation	0.180	1	1	1	1	0.32	0.0576
Hollow core deck element	0.220	1	1	1	1	23.00	5.06

						Total:	**5.59**

External Walls							
Component	**Thickness (m)**	**Width (m)**	**Lenght (m)**	**Spacing y (m)**	**Spacing %**	**Density kN/m3**	**Load kN/m2**
Concrete	0.150	1	1	1	1	23.00	3.45
Mineral wool	0.250	1	1	1	1	0.32	0.08
Concrete	0.070	1	1	1	1	14.00	0.98
						Total:	**4.51**

Internal Load bearing walls							
Component	**Thickness (m)**	**Width (m)**	**Lenght (m)**	**Spacing y (m)**	**Spacing %**	**Density kN/m3**	**Load kN/m2**
Concrete	0.200	1	1	1	1	23.00	4.6
						Total:	**4.6**

Roof							
Component	**Thickness (m)**	**Width (m)**	**Lenght (m)**	**Spacing y (m)**	**Spacing %**	**Density kN/m3**	**Load kN/m2**
Roofing felt							0

EPS insulation	0.500	1	1	1	1	0.24	0.1200
Vapor barrier							0
Hollow core deck elements	0.220	1	1	1	1	23.00	5.06
						Total:	**5.18**

Vertical load

Building component	Characteristic load				CC2		ψn	γ	Reduction factor for openings	Design load	Notes
	g[kN/m²]	q[kN/m²]	Tributary area span (m)	Load pr. meter [kN/m]	Consequence class fator	Category	Combination factor	Safety factor		Total load [kN/m]	
Dead load											
Roof	5.1		3.1	15.81	1		1	1	1	15.81	
Wall 1 floor	4.51		2	9.02	1		1	1	1	9.02	
1 floor flooring	9.17		3.1	28.427	1		1	1	1	28.427	
Wall groundfloor	4.51		1.9	8.569	1		1	1	1	8.569	
Groundfloor flooring	5.42		3.1	16.802	1		1	1	1	16.802	
Imposed load									**ΣGd =**	**78.628**	
Story partition		2.5	3.1	7.75	1	C	1	1.5	0.667	7.75	
Groundfloor slab		2.5	3.1	7.75	1	C	1	1.5	0.667	7.75	
Climatic loads											
Snow		0.80	1	0.8	1		0.6	1.5		0.72	
Wind		-1.20	1	-1.2	1		0.6	0		0	Wind upward is negative, the safety factor is 0 so the wind does not make the building lighter
									ΣSd =	**94.848**	Total load pr. meter (KN/m)

Dimension of foundation

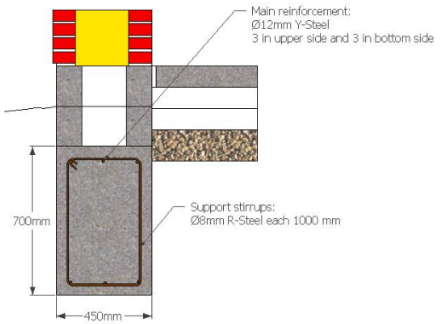
Foundations (clay - undrained conditions)

Soil informaitions			
Clay:	CV=	250	kN/m² from the geo-report
	γ=	18	kN/m3
Sand			
	Φ=	35	° (=friction number)
	γ/γ'=	18	kN/m3

Vertical load		
ΣSd =	94.8	kN/m

Necessary width of foundations		
B=	0,47	m

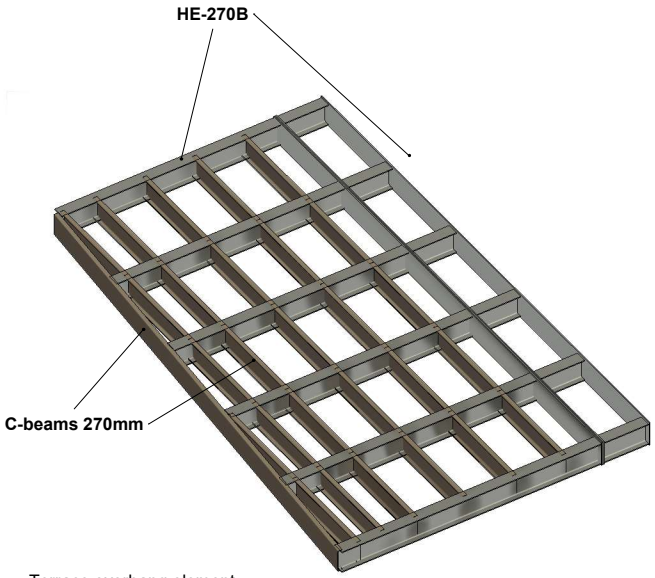
Calculation		
Minimum steel area:	Amin = 0,20·470mm·410mm/100 = 385mm2	
Ø12mm main reinforcement are chosen		
Number of steel bars needed:	N = 385mm2 /113 mm2 = 3,4 ⟶ 4	
Since there is placed the same quantity of reinforcement in the top and bottom side an even number of steel bars are chosen.		
4 Ø12mm Y-Steel main bars are used		
Support stirrups: Since the main bars are Ø12mm stirrups Ø8mm are placed each 1000mm		



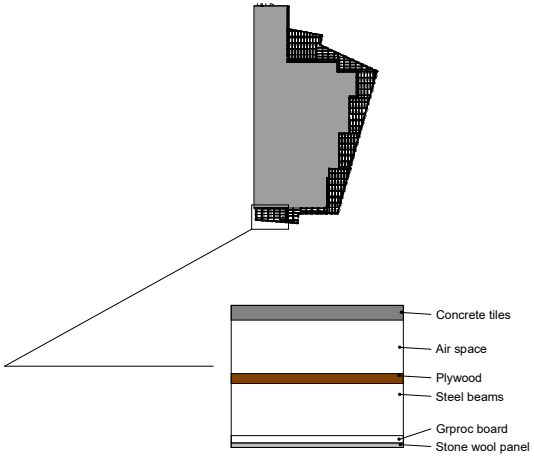
Cross section area – steel bars	
Dimension	Area [mm^2]
Ø8	50
Ø10	78
Ø12	113
Ø14	154
Ø16	201

Distance – support stirrups (Ø8mm)	
Dim- main bars	Distance [mm]
Ø8	500
Ø10	500
Ø12	1000
Ø14	1000
Ø16	1000

Main reinforcement:

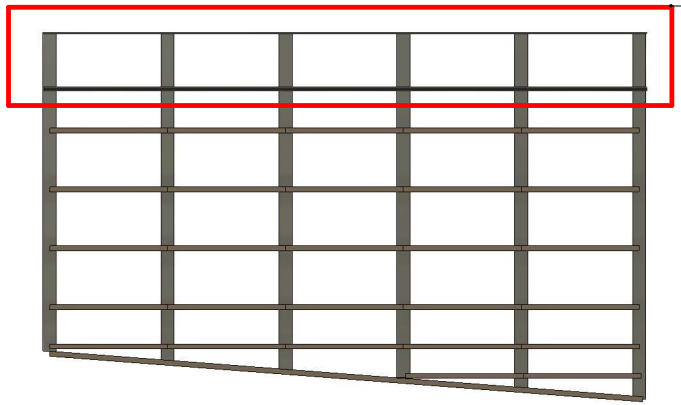


Terrace overhang element



Buildup above and under overhang element

K01_H8_N12



Overhang element "stop" is included in the production of sandwhich elements

Terrace overhang element top view

Biggest span of elements is 6m

Bring ideas to life
VIA University College

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Campus Horsens

BYGGESAG: LÖGTENGARDEN	DATO: 09/07/24	K01_H8_N12
EMNE: Terrace overhang structure	MÅL: As indicated	
UDFØRT AF: Ana Araújo	KLASSE:	