

Assignment

As an extension of an industrial plant a new production hall is to be constructed. The building has more bays with one or two floors. Main elements (foundation blocks, piers, beams, panels) of the reinforced concrete frame structure are manufactured at a company referred as "ÁÉV N°31".

Your job is to elaborate estimates for accomplishment (schedule, bill of quantities, cost estimate) and to describe your ideas in a written form detailed as listed below:

- Bill of quantities, Bill of works (See: technical specifications)
- Periodic layout of site
(preparatory works, foundation works, erecting structure, internal and external finishes)
- Master schedule of performance (PERT + Bar chart) indicating tasks of great importance
- Detailed schedule of erecting the structure (with sequencing elements for positioning)
- Technical Report
- Suggested changes of original plan - if considerable

For to elaborate Detailed- and Master schedules you may accept traditional principles of building structures of this kind (See: Phases of construction).

Documents to be elaborated	Responsible	Assessed
Bill of quantities, bill of works		
Site layout		
Master schedule		
Detailed schedules		
Technical Report		
Introduction / Performance		

Phases of construction :

If soil conditions necessiated foundation works are started with piling or with soil improvement under each foundation block. For piling they drive 0.30 x 0.30 x 6.00 m sized reinforced concrete piles, more pieces at each block. It is followed by topsoil excavation (10 cm thick a layer), and by excavating ditches (including extra excavations due to pile-cap construction or soil improvement) or trenches. Before positioning sleeve foundation blocks (after piling or soil improvement - if needed) concrete blinding of 10 cm is needed. When sleeve foundation blocks positioned trenches of strip foundations can be concreted. After refilling ditches overburden earth should be spread under the building for to provide correct floor level.

Before erecting prefabricated frame structure (applying wheel- or truck-mounted cranes for moving and fixing elements) main sewers and hardcore layer should be constructed. Roof panels are to be positioned directly from haulers, while other elemenst may be stored on site until erected according to delivery system contracted. Frame posts needed for horizontal panels must be erected together with main piers of the structure. Vertical panels are to be joint to footings and to roof panels directly. When structural frame erected damaged hardcore layer must be reconditioned.

For to protect internal working place against rainfall, next step is constructing breeze concrete layer, heat insulation and water proofing on the roof, together with assembling downpipes and joining them into main sewers. Edging strips are to be constructed together with roof insulation. That time fill-in brickworks, masonry of partition walls and works of monolithic stair-case could be started.

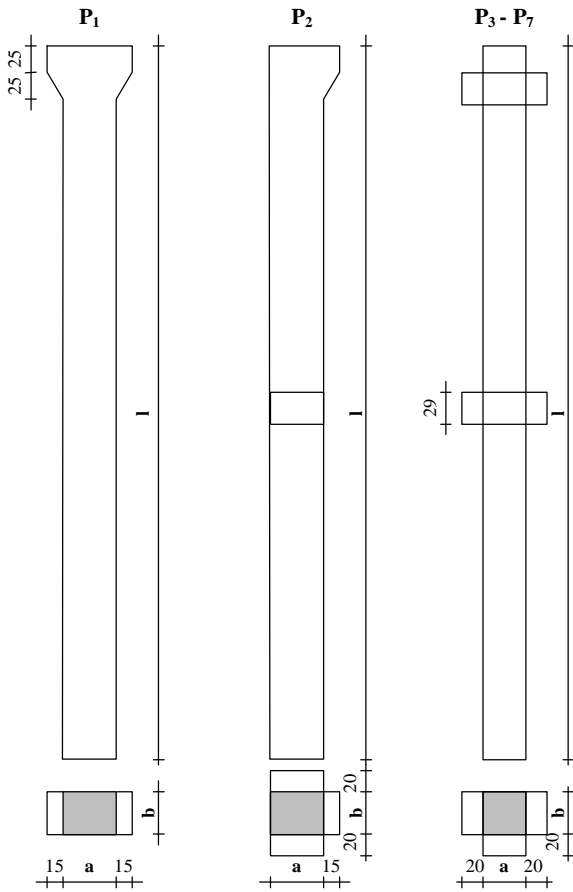
Gates, external windows (together with tie-beams and glass planks - if needed) are built-in after completion of assembling prefabricated structural frame. During that floor structures, partition walls and plumbing systems are constructed inside the building. Internal doors and windows are built-in when partition walls and fill-in brick walls are constructed. (One half of them into partition walls and the other half into fill-in walls.) Internal masonry will get plaster on it, after which lime-wash is needed throughout the whole internal surface (walls and ceilings). Finally pave-ways around the building are to be constructed.

Budapest

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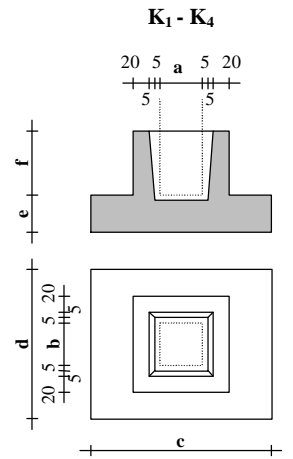
Supervisor

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N ^o	a [cm]	b [cm]	l [cm]	W [Ton]
P ₁	50	40	822	4.24
P ₂	50	40	822	4.24
P ₃	50	40	822	4.11
P ₄	50	40	908	4.54
P ₅	40	40	908	3.63
P ₆	40	40	488	1.95
P ₇	35	35	828	2.54

Piers



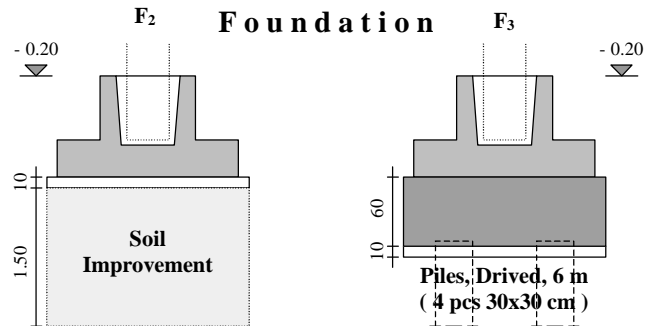
Sleeve Foundation Blocks

N ^o	a [cm]	b [cm]	c [cm]	d [cm]	e [cm]	f [cm]	W [Ton]
K ₁	50	40	240	180	42	83	6.08
K ₂	50	40	220	240	42	83	7.08
K ₃	35	35	200	160	22	63	2.79
K ₄	40	40	220	160	32	68	4.00
K ₅	40	40	200	220	32	68	4.78

Vertical P.



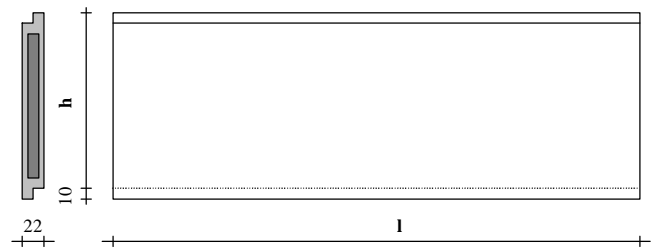
Flat Foundation

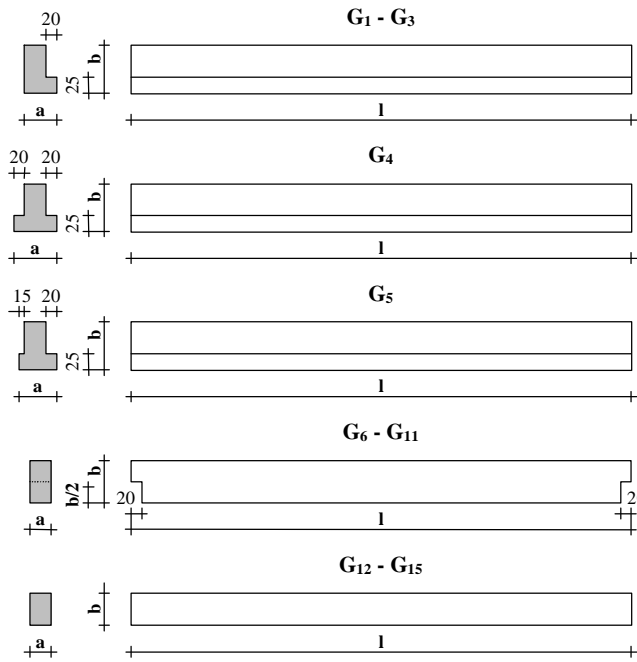


N ^o	h [cm]	l [cm]	W [Ton]
FP ₁	120	598	3.59
FP ₂	120	718	4.31
FP ₃	140	598	4.19
FP ₄	140	718	5.03

FP₁ - FP₄

Horizontal Panels



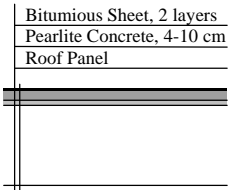


Beams

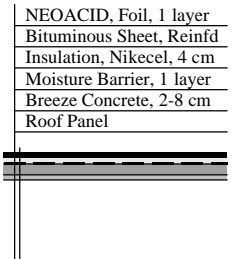
N°	a [cm]	b [cm]	l [cm]	W [Ton]
G ₁	50	80	598	4.34
G ₂	50	80	556	4.03
G ₃	50	80	536	3.89
G ₄	80	80	598	6.28
G ₅	65	80	598	4.90
G ₆	50	60	676	4.92
G ₇	50	60	656	4.77
G ₈	40	60	676	3.94
G ₉	40	60	656	3.82
G ₁₀	40	60	556	3.22
G ₁₁	40	60	536	3.10
G ₁₂	35	50	598	2.62
G ₁₃	35	50	576	2.52
G ₁₄	20	60	718	2.15
G ₁₅	20	60	598	1.79

Roof Structures

RS₁

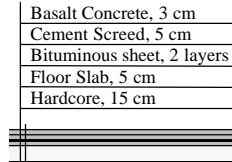


RS₂

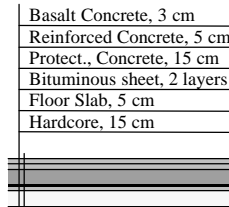


Floor Structures

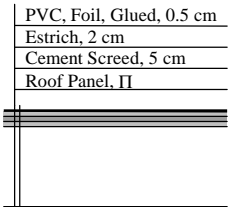
FS₁



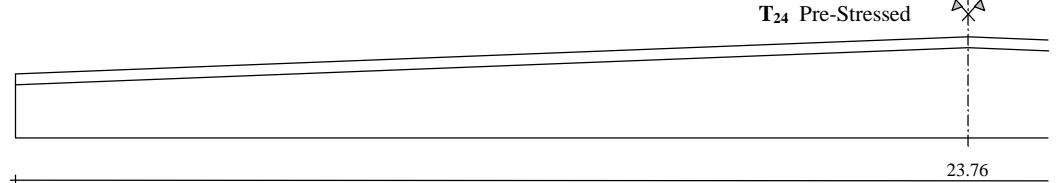
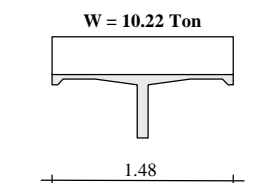
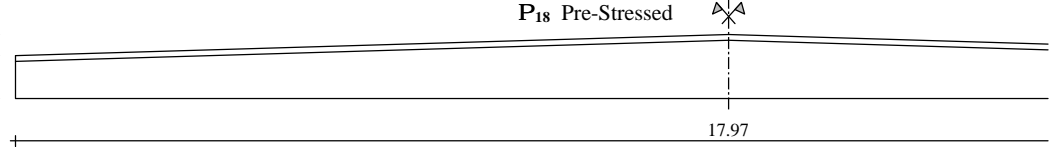
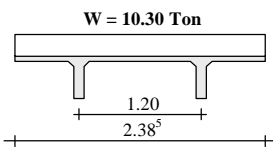
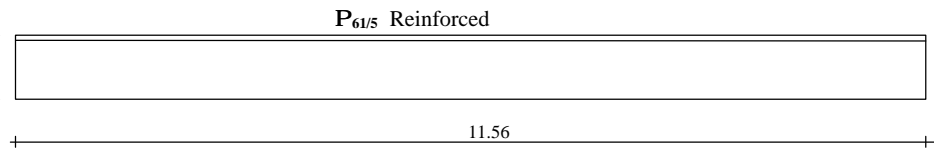
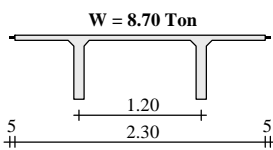
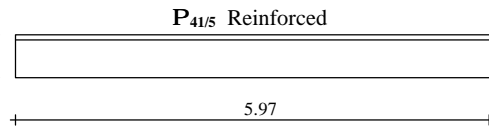
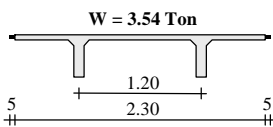
FS₂



FS mezzanine

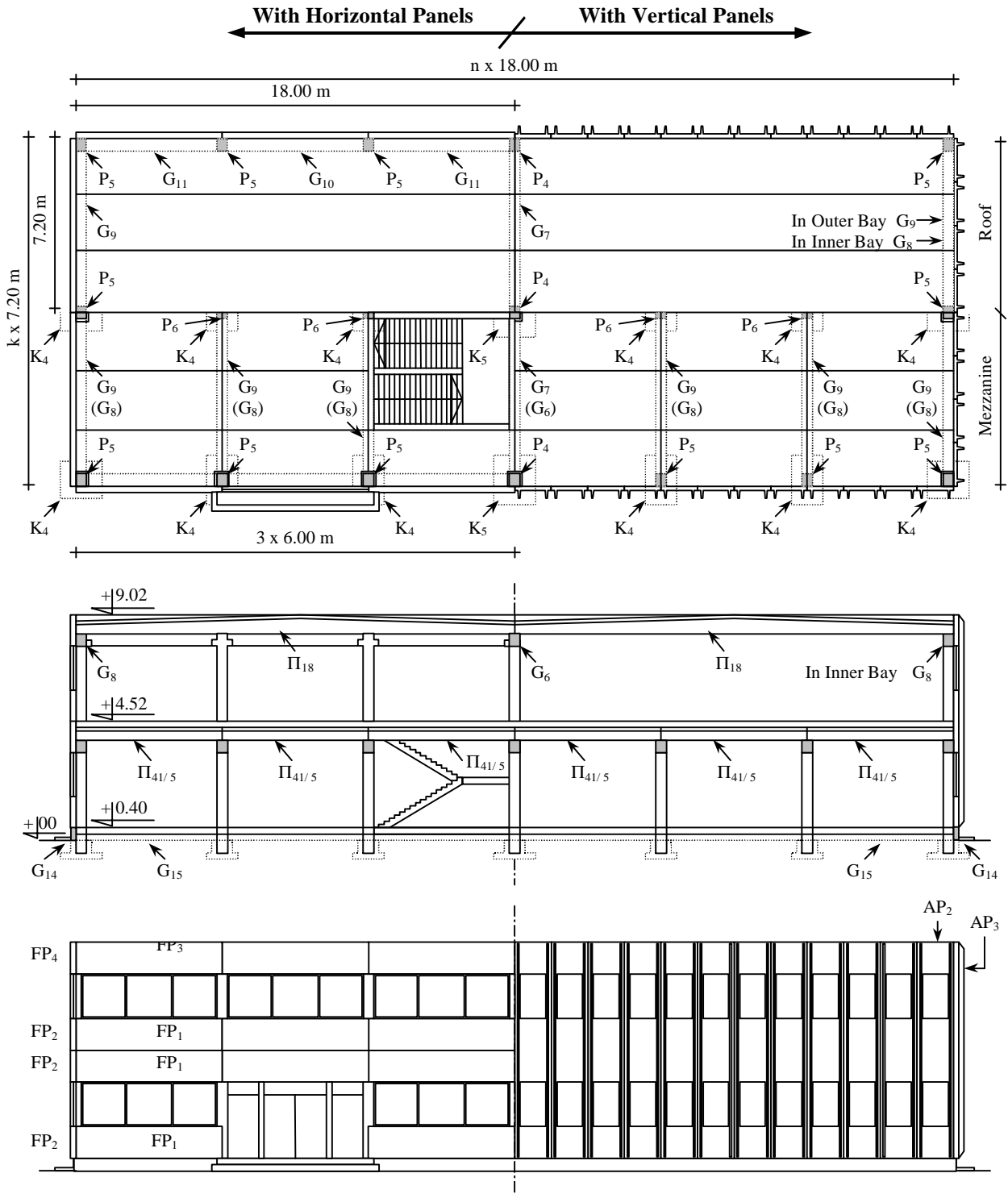


Roof Panels



Floor Structure FS ₁ , FS ₂ Roof Structure RS ₁ , RS ₂ , RS ₃ , RS ₄	Building																							
	A												B											
	Foundation						Foundation						Perimeter Wall						Perimeter Wall					
	F ₁	F ₂	F ₃	F ₁	F ₂	F ₃	AP	FP	AP	FP	AP	FP	AP	FP	AP	FP	AP	FP	AP	FP	AP	FP		
	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3		
	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6		
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X

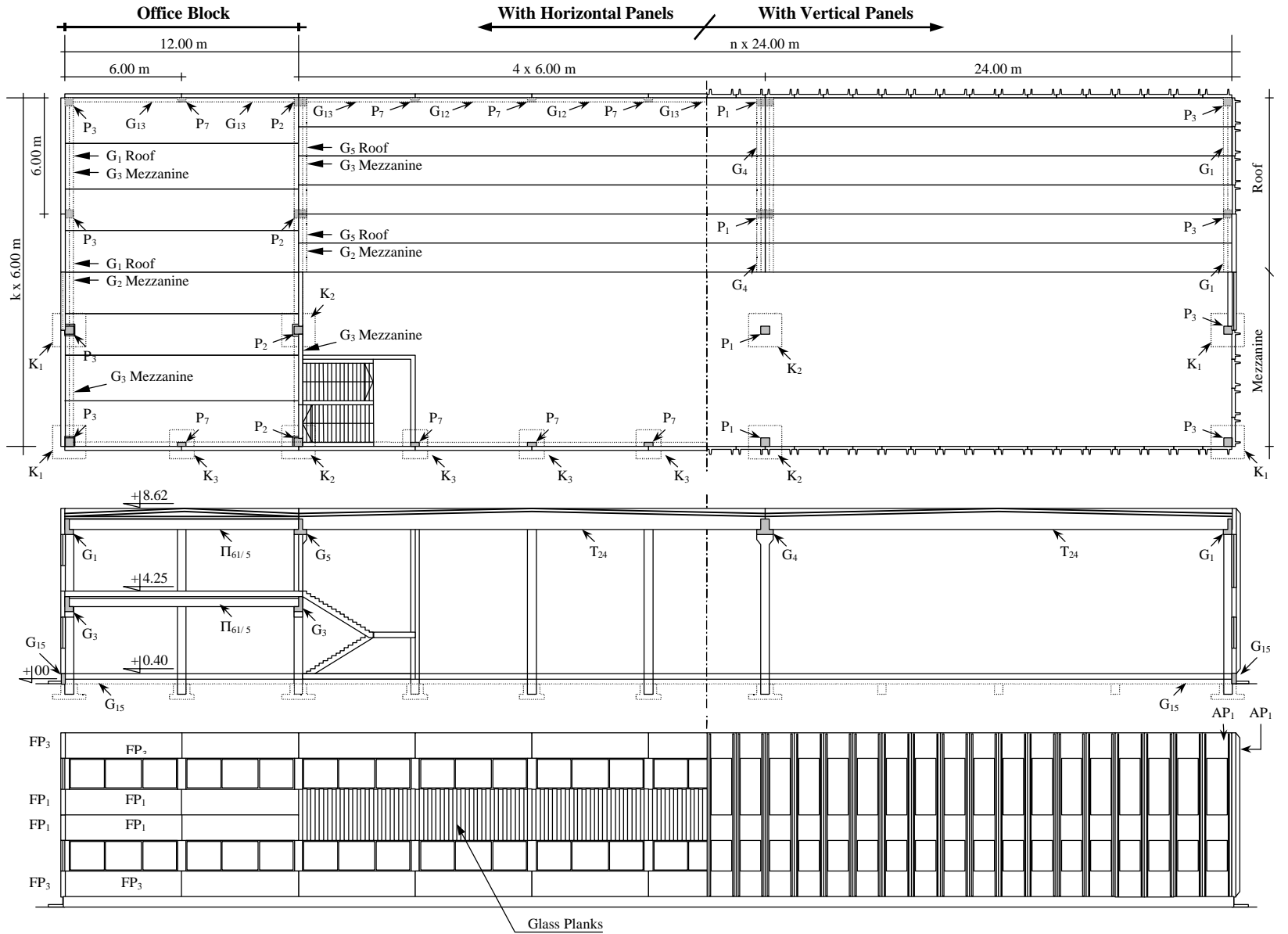
Building " B "



Expectations declared by the Client

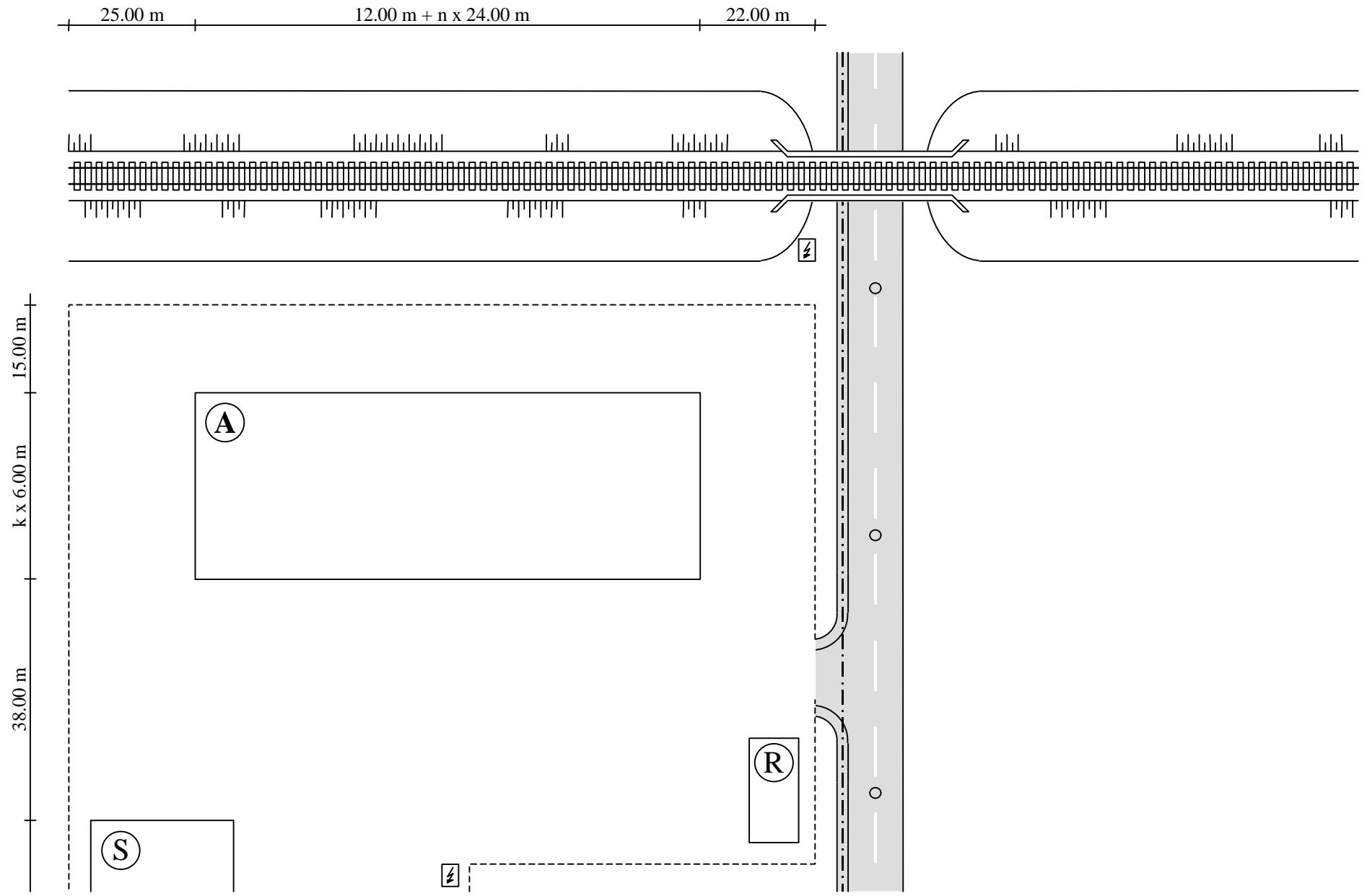
- The earliest handover of the first bay has great importance, while extensions (construction of other bays) can be scheduled later.
- Though whole foundation works and basic supplies can be constructed in the first phase, handover of at least one bay as soon as possible is favoured. Structural works of extensions (other bays) can be scheduled later.
- After completing structural works, the earliset handover of the first bay is desired, while finishes of other sections can be scheduled later.

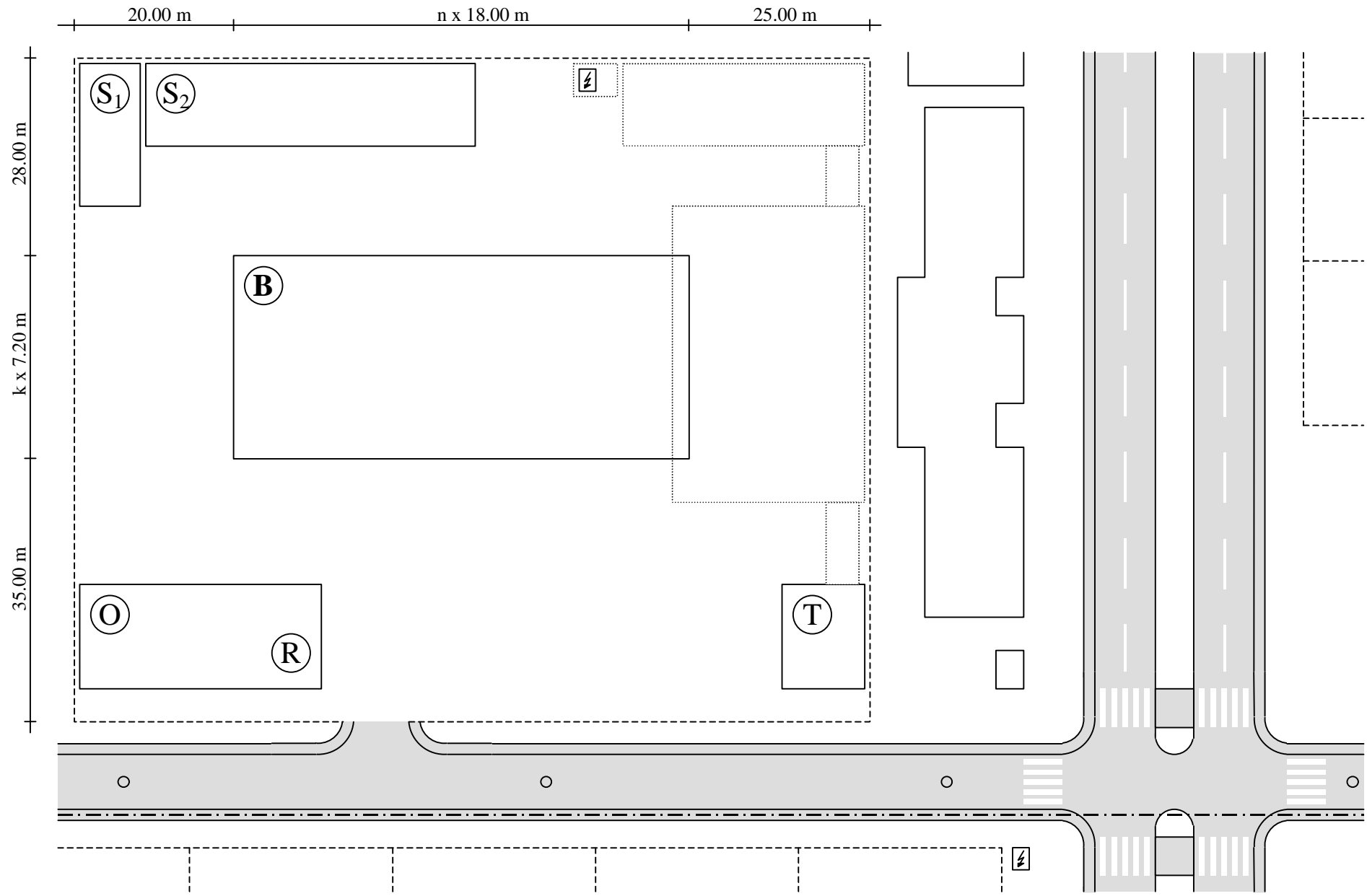
Building " A "



Expectations declared by the Client

- The earliest handover of production hall (single-storey sections) has great importance. Construction of office block can be scheduled later.
- Office block and one bay of production hall must be constructed first, while extension (other bays) of production hall can be constructed later.
- After completing structural works, the earliest handover of office block is favoured, while finishing other sections can be scheduled later.





ID	Name	Unit	Building							
			"A"				"B"			
			2		3		2		3	
			4	6	4	6	4	6	4	6
Sleeve Foundation										
K ₁		K ₂		K ₃		K ₄		K ₅		
1	Excavation, Topsoil, 10 cm	m ²	1612	2356	2236	3268	1170	1718	1725	2531
2	Piling, Driven, (per foundation block)	m	24,0	24,0	24,0	24,0	24,0	24,0	24,0	24,0
3	Excavation, Ditch, (per foundation block)	m ³	23,5	25,9	11,5	15,3	16,9			
4	Excavation, Trench	m ³	38,6	44,2	49,7	55,2	29,8	38,4	38,1	44,7
5	Soil Improvement, (per foundation block)	m ³	7,8	9,4	5,9	6,5	7,9			
6	Excavation, Pile-Cap, (per foundation block)	m ³	3,1	3,7	2,4	2,6	3,2			
7	Chisel-off, Pile-Cap, (per foundation block)	m ³	0,18	0,18	0,18	0,18	0,18	0,18		
8	Excavation, Refinery, (per foundation block)	m ²	5,2	6,2	4,0	4,3	5,3			
9	Blinding, (per foundation block)	m ³	0,52	0,62	0,40	0,43	0,53			
10	Strip Foundations, Footings, Cast-In Concrete	m ³	33,6	38,4	43,2	48,0	25,9	31,7	33,1	38,9
11	Refill + Spread	m ³	Total volume assigned to items 3 and 4							
12	Grading	m ²	1612	2356	2236	3268	1170	1718	1725	2531
13	Hardcore	m ³	241,8	353,4	335,4	490,2	175,6	257,6	258,7	379,7
14	Erecting Structure, Pre-Fabricated	pcs	As in specifications							
15	Roof Insulation, Concrete, Pearlite	m ³	100,8	151,2	141,1	211,7	72,6	108,8	108,8	163,3
16	Roof Sealing, Bitumious Sheet, 2 layers	m ²	1440	2160	2020	3020	1040	1560	1560	2340
17	Breeze Concrete	m ³	72,0	108,0	100,8	151,2	51,8	77,8	77,8	116,6
18	Roof Sealing, Neoacid, Insulated	m ²	1440	2160	2020	3020	1040	1560	1560	2340
19	Flashing, Edging Strips	m	168,0	192,0	216,0	240,0	129,6	158,4	165,6	194,4
20	In-Fill Brick Works	m ³	79,8	91,2	102,6	114,0	64,8	79,2	82,8	97,2
21	Stormwater Drainage, Downpipes, Internal	m	65,6	98,4	82,0	123,0	51,6	77,4	68,8	103,2
22	Hardcore, Reconditioning	m ³	48,4	70,7	67,1	98,0	35,1	51,5	51,7	75,9
23	Drainage, Water Supply, Main Pipes									
24	Floor Slab / Screeding	m ³	72,0	108,0	100,8	151,2	51,8	77,8	77,8	116,6
25	Damp Proofing, Bitumious Sheet, 2 layers	m ²	1440	2160	2020	3020	1040	1560	1560	2340
26	Protective Layer, Concrete	m ³	72,0	108,0	100,8	151,2	51,8	77,8	77,8	116,6
27	Reinforcement, Floor Slab	Ton	8,6	13,8	12,1	18,1	6,2	9,3	9,3	14,0
28	Concreting, Floor Slab	m ³	216,0	324,0	302,4	453,6	155,5	233,3	233,3	349,9
29	Floor Topping, Basalt Concrete	m ²	1440	2160	2020	3020	1040	1560	1560	2340
30	Expansion Joints, Cutting + In-Fill, Bitumin	m	600	300	840	1260	432	648	648	972
31	Cement Screed, Mezzanine	m ³	14,4	21,6	14,4	21,6	51,8	77,8	77,8	116,6
32	Formwork, Stair-Case	m ²	34,6				69,2			
33	Reinforcement, Stair-Case	Ton	0,55				1,11			
34	Concreting, Stair-Case	m ³	6,92				13,84			
35	Masonry, Partition Walls	m ²	319,2	364,8	410,4	456,0	259,2	316,8	331,2	388,8
36	Plumbing & HVAC System									
37	Plasterwork, Internal	m ²	1277	1459	1642	1824	1037	1267	1325	1555
38	Lime Wash	m ²	3780	4930	4940	6380	3680	5070	5160	7070
39	Doors & Windows, Internal, Build-In	pcs	24	32	28	36	24	32	28	36
40	Windows, External, Build-In	Horizontal Panel	162	186	210	234	130	162	166	198
		Vertical Panel	216	248	280	312	152	184	200	232
41	Flashing, Sills	Horizontal Panel	324,0	372,0	420,0	468,0	247,2	304,8	319,2	376,8
		Vertical Panel	216,0	248,0	280,0	312,0	152,0	184,0	200,0	232,0
42	Tie Beams, under glass planks	Ton	2,30		3,45					
43	Glass Planks	m ²	230,4		245,6					
44	Gates, External, Built-In	pcs	2				2			
45	Paving, External, Around	m ²	172,0	196,0	220,0	244,0	133,6	162,4	169,6	198,4
46	Scaffolding	m ²	10248	11712	13176	14640	8035	9821	10267	12053

Volumes & quantities at items 2, 3, 5, 6, 7, 8, 9, 11, 14 are to be identified according to specifications.