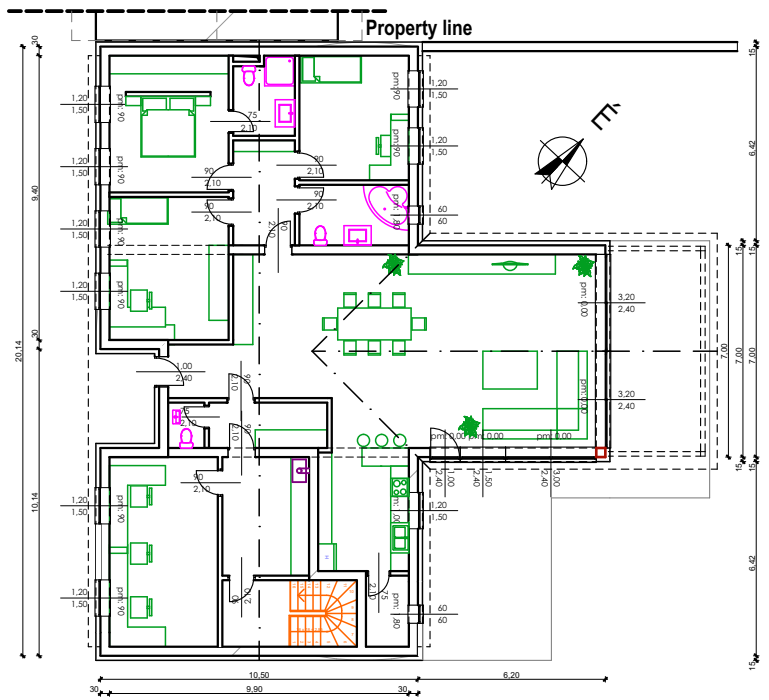
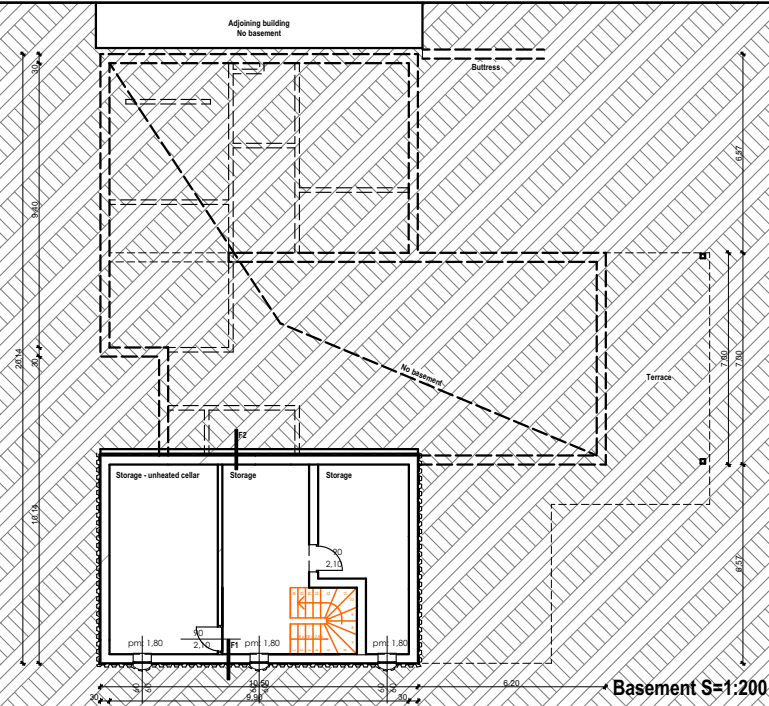


Layout sketches S=1:200



Ground Floor S=1:200

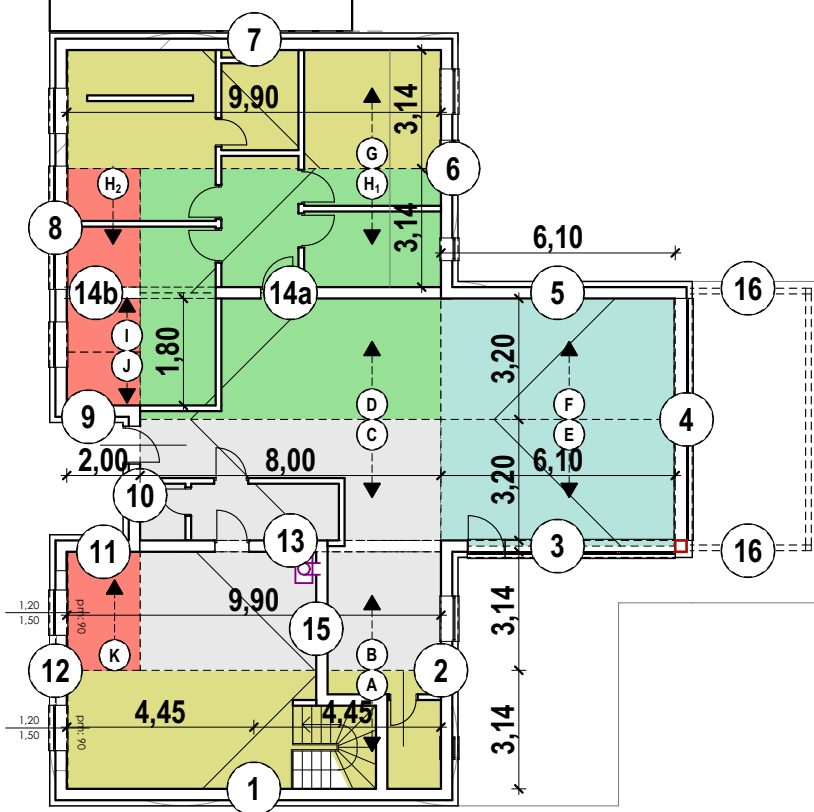


Basement S=1:200

Main steps of foundation desing

1. Design of the layers (decisions: waterproofing level, loadbearing structure of the basement)
2. Determining the width of the foundation strips (total thickness of the superstructure + overlappings of the waterproofing + 2*5 cm tolerance)
3. Determining the depth of the foundation strips (loadbearing soil -10 cm, at least 50 cm, geometry, frost level, neighbouring building, subsoil water)
4. Designing the individual situations (level change/steps of the foundation (max. 30 degree), level next to a neighbouring building)

Loading schemes



Calculation of the foundation

Loads:
floor slab 8 kN/m² / storey
roof 3 kN/m²
wall (aerated concrete) 7 kN/m/storey
wall (concrete wall) 12 kN/m/storey
Grouping the walls:
loadbearing walls: 1, 3, 5, 7, 9, 11, 13, 14
non loadbearing walls: 2, 4, 6, 8, 10, 12
heavy partition walls: 15
others: 16

Loads of the foundation (listed, grouped)

- 1: basement wall, groundfloor wall, verge walls, floor slab zone A
- 2: basement wall, groundfloor wall, roof
- 3: GF wall, roof, floor slab zone E
- 4: - (doors, windows)
- 5: groundfloor wall, roof, floor slab zone F
- 6: groundfloor wall, roof
- 7: groundfloor wall, fire wall, floor slab zone G
- 8: groundfloor wall, roof
- 9: groundfloor wall, floor slab zone J
- 10: groundfloor wall
- 11: BM + GF wall, floor slab zone K
- 12: basement wall, groundfloor wall (pier), roof
- 13: BM + GF wall, floor slab zone B+C
- 14a: groundfloor wall, floor slab zone H1+D
- 14b: - (beam), floor slab zone H2+I
- 15: groundfloor wall
- 16: - (piers)

Foundation units with the same load

same load	b _{min}
00 cm: 4, 16	0 cm
05 cm: 10, 15	5 cm
10 cm: 3, 5, 9	10 cm
15 cm: 6, 8	15 cm
20 cm: 2, 7, 11, 12, 14b	20 cm
25 cm: 1	25 cm
30 cm: 14a	30 cm
35 cm: 13	35 cm

Basic data
there is only one floor + basement (partly)
 $\sigma_{SL} = 200 \text{ kN/m}^2$

$$\sigma = F / A$$

Calculation of the loads to 1 meter:

- Similar floor slab zones:
1. 3,14 m : A, B, H, G, K -> 3,14x8=25,12 kN/m
2. 3,20 m : C, D, E, F -> 3,20x8=25,6 kN/m
3. 90 cm : I, J -> 0,90x8=7,20 kN/m
Roofs: 4,45x3= 13,35 kN/m ; 3,20x3=9,60 kN/m

Specific loads to 1 m

- > 12+7+3,5+25,12= 47,62 kN/m
-> 12+7+13,35= 32,35 kN/m
-> 7+9,60= 16,60 kN/m
-> 0 kN/m
-> 7+9,60= 16,60 kN/m
-> 7+13,35= 20,35 kN/m
-> 7+3,5+25,12= 35,62 kN/m
-> 7+13,35= 20,35 kN/m
-> 7+7,20= 14,20 kN/m
-> 7 kN/m
-> 12+7+25,12= 37,82 kN/m
-> 12+7+13,35= 32,35 kN/m
-> 12+7+25,12+25,6 = 69,72 kN/m -> **0,3486 m -> 35 cm**
-> 7+25,12+25,6= 57,72 kN/m
-> 0+25,12+7,20= 32,32 kN/m
-> 7 kN/m
-> 0

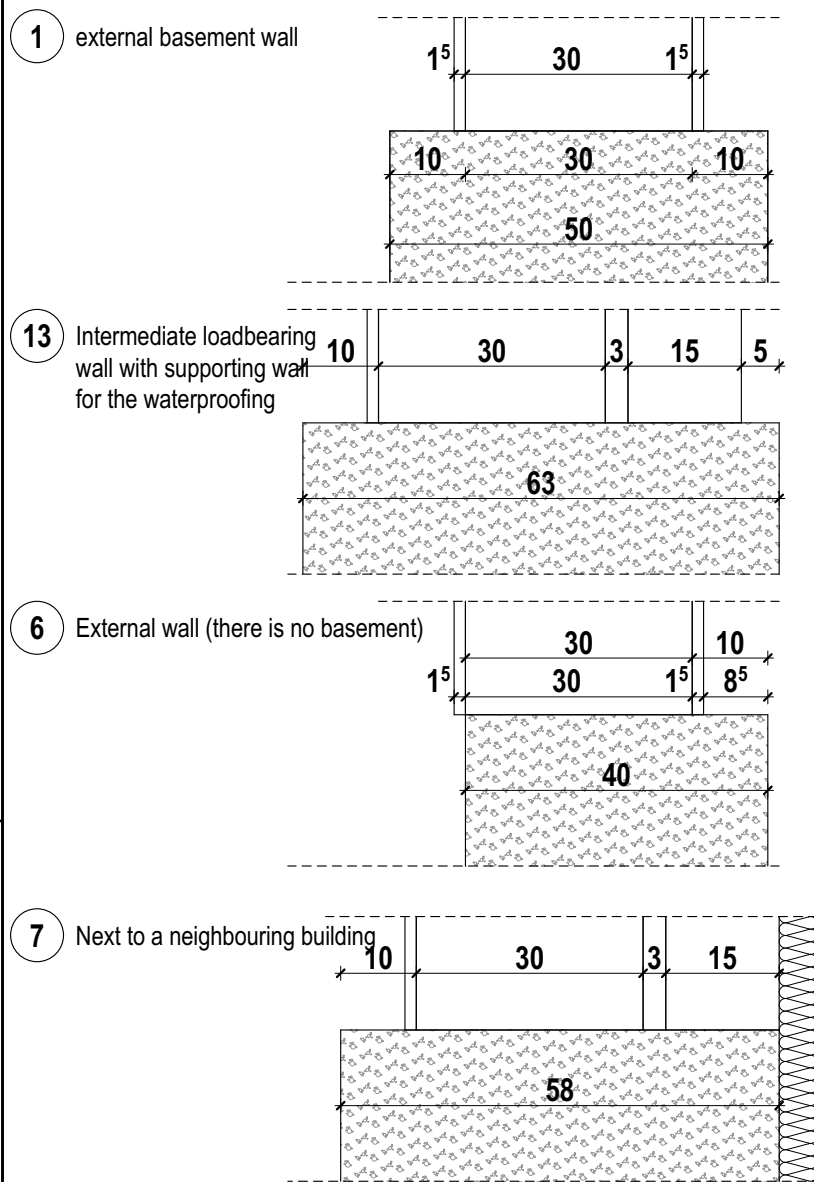
Foundation units with the same wall layers

same wall layers	b _{design}
40 cm: 3,4,5,6,8,9,10	50 cm
min. 50: 16	50 cm
50 cm: 1,2,11,12,14a,14b	60 cm
58 cm: 7	60 cm
63 cm: 13	75 cm

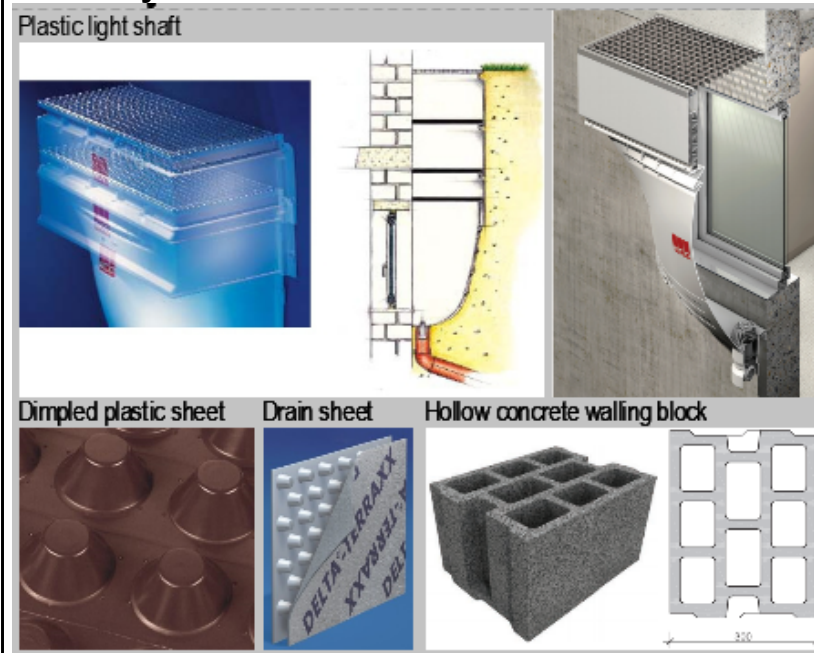
Width of foundation strips (theoretical) (a)

- > 0,2381 m -> 25 cm
-> 0,1618 m -> 20 cm
-> 0,083 m -> 10 cm
-> 0 -> 0 cm
-> 0,083 m -> 10 cm
-> 0,1018 m -> 15 cm
-> 0,1781 m -> 20 cm
-> 0,1018 m -> 15 cm
-> 0,071 m -> 10 cm
-> 0,035 m -> 5 cm
-> 0,1891 m -> 20 cm
-> 0,1618 m -> 20 cm
-> 0,2886 m -> 30 cm
-> 0,1616 m -> 20 cm
-> 0,035 m -> 5 cm
-> 0 -> 0 cm

Minimal width of foundation (b_{min})



Auxiliary structures

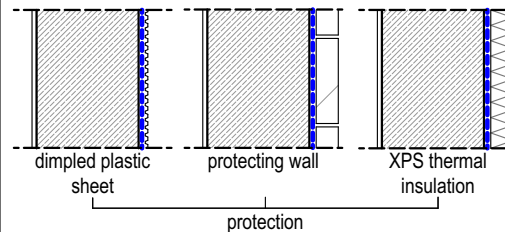


Principal layers

Basement wall

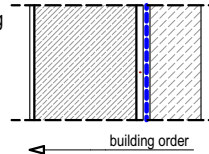
W1 - general basement wall

protection
waterproofing
basement wall
internal plaster



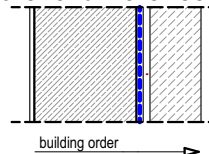
W2a - basement wall at level difference

supporting wall for the waterproofing
base plaster (smoothing)
waterproofing
backfill mortar
basement wall
internal plaster



W2b - basement wall at level difference

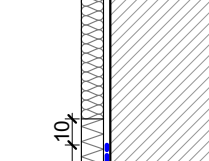
protecting wall for the waterproofing
backfill mortar
waterproofing
base plaster (smoothing)
basement wall
internal plaster



Aboveground walls

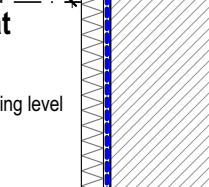
W3 - General wall

thin base plaster and render system
thermal insulation
airtight base plaster
walling
internal plaster



F4 - Hőszigetelt lábazat

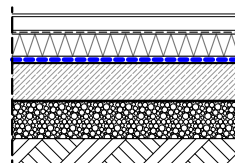
thin base plaster and render system
thermal insulation (XPS)
waterproofing 30 cm over the adjoining level
base plaster
walling
internal plaster



Floor layers

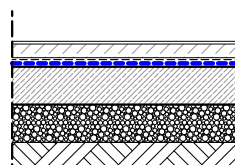
F1 - Floor with thermal insulation

floor covering (f.i. gres tiles)
adhesive
screed
technological foil
thermal insulation
waterproofing
RC screed
gravel bed
subsoil

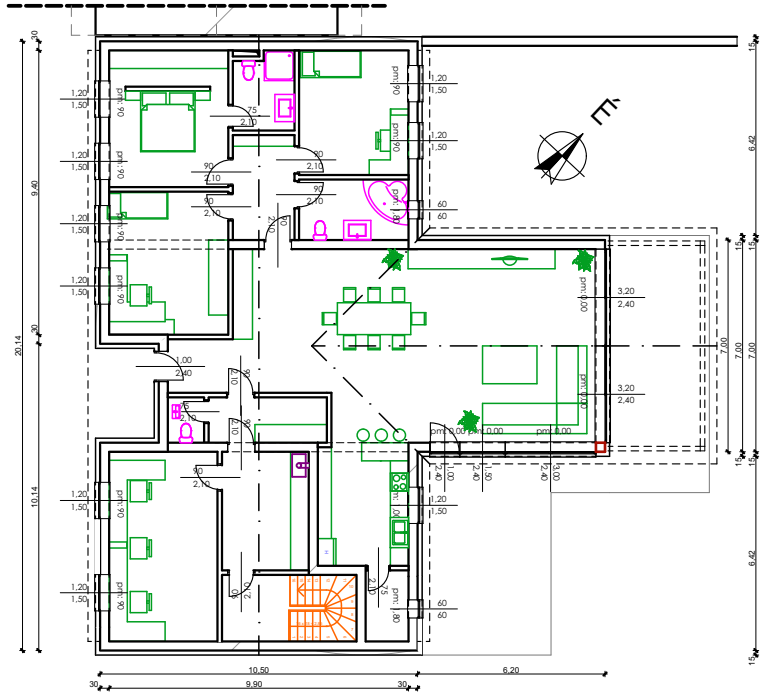


F2 - Floor without thermal insulation

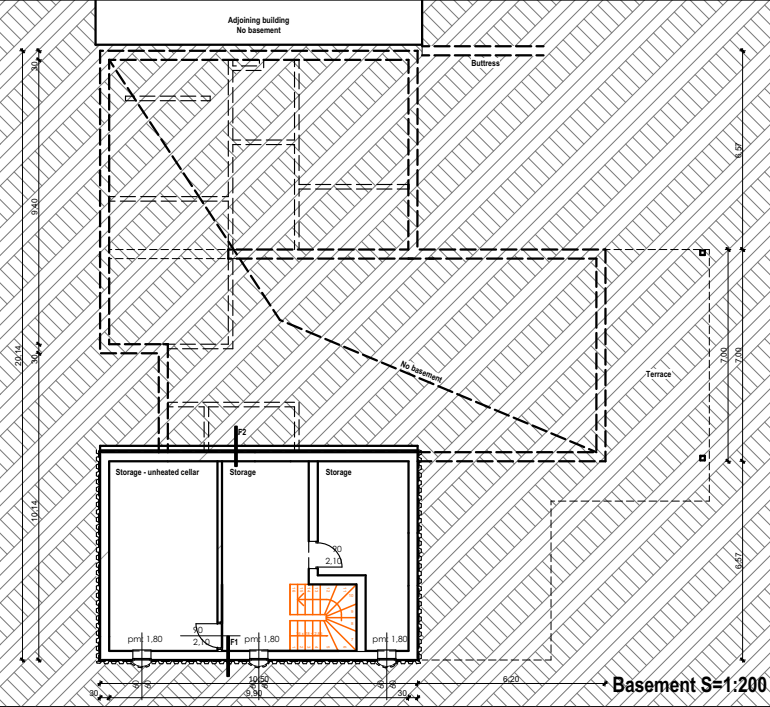
floor covering (f.i. gres tiles)
adhesive
screed
technological foil
waterproofing
RC screed
gravel bed
subsoil



Layout sketches S=1:200



Ground Floor S=1:200

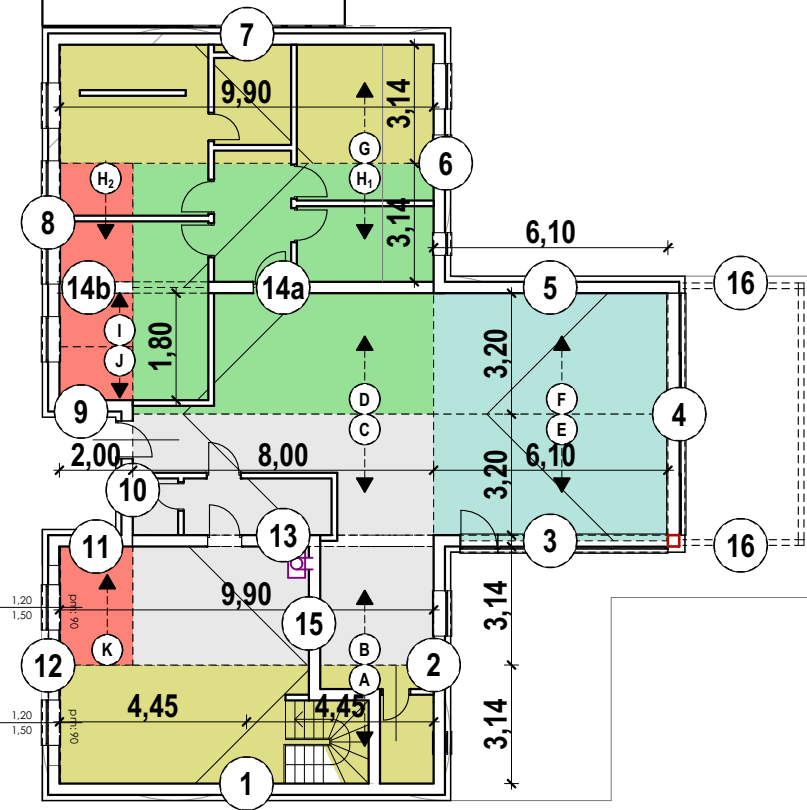


Basement S=1:200

Main steps of foundation desing

1. Design of the layers (decisions: waterproofing level, loadbearing structure of the basement)
2. Determining the width of the foundation strips (total thickness of the superstructure + overlappings of the waterproofing + 2*5 cm tolerance)
3. Determining the depth of the foundation strips (loadbearing soil -10 cm, at least 50 cm, geometry, frost level, neighbouring building, subsoil water)
4. Designing the individual situations (level change/steps of the foundation (max. 30 degree), level next to a neighbouring building)

Loading schemes



Calculation of the foundation

Loads:
floor slab 8 kN/m² / storey
roof 3 kN/m²
wall (aerated concrete) 7 kN/m/storey
wall (concrete wall) 12 kN/m/storey

Grouping the walls:
loadbearing walls: 1, 3, 5, 7, 9, 11, 13, 14
non loadbearing walls: 2, 4, 6, 8, 10, 12
heavy partition walls: 15
others: 16

Basic data
there is only one floor + basement (partly)
 $\sigma_{SL} = 200 \text{ kN/m}^2$

$\sigma = F / A$

Calculation of the loads to 1 meter:
Similar floor slab zones:
1. 3,14 m : A, B, H, G, K -> 3,14x8=25,12 kN/m
2. 3,20 m : C, D, E, F -> 3,20x8=25,6 kN/m
3. 90 cm : I, J -> 0,90x8=7,20 kN/m
Roofs: 4,45x3= 13,35 kN/m ; 3,20x3=9,60 kN/m

Width of foundation strips (theoretical) (a)
-> 12+7+3,5+25,12= 47,62 kN/m -> 0,2381 m -> 25 cm
-> 12+7+13,35= 32,35 kN/m -> 0,1618 m -> 20 cm
-> 7+9,60= 16,60 kN/m -> 0,083 m -> 10 cm
-> 0 kN/m -> 0 -> 0 cm
-> 7+9,60= 16,60 kN/m -> 0,083 m -> 10 cm
-> 7+13,35= 20,35 kN/m -> 0,1018 m -> 15 cm
-> 7+3,5+25,12= 35,62 kN/m -> 0,1781 m -> 20 cm
-> 7+13,35= 20,35 kN/m -> 0,1018 m -> 15 cm
-> 7+7,20= 14,20 kN/m -> 0,071 m -> 10 cm
-> 7 kN/m -> 0,035 m -> 5 cm
-> 12+7+25,12= 37,82 kN/m -> 0,1891 m -> 20 cm
-> 12+7+13,35= 32,35 kN/m -> 0,1618 m -> 20 cm
-> 12+7+25,12+25,6 = 69,72 kN/m -> 0,3486 m -> 35 cm
-> 7+25,12+25,6= 57,72 kN/m -> 0,2886 m -> 30 cm
-> 0+25,12+7,20= 32,32 kN/m -> 0,1616 m -> 20 cm
-> 7 kN/m -> 0,035 m -> 5 cm
-> 0 -> 0 -> 0 cm

Loads of the foundation (listed, grouped)
1: basement wall, groundfloor wall, verge walls, floor slab zone A
2: basement wall, groundfloor wall, roof
3: GF wall, roof, floor slab zone E
4: - (doors, windows)
5: groundfloor wall, roof, floor slab zone F
6: groundfloor wall, roof
7: groundfloor wall, fire wall, floor slab zone G
8: groundfloor wall, roof
9: groundfloor wall, floor slab zone J
10: groundfloor wall
11: BM + GF wall, floor slab zone K
12: basement wall, groundfloor wall (pier), roof
13: BM + GF wall, floor slab zone B+C
14a: groundfloor wall, floor slab zone H1+D
14b: - (beam), floor slab zone H2+I
15: groundfloor wall
16: - (piers)

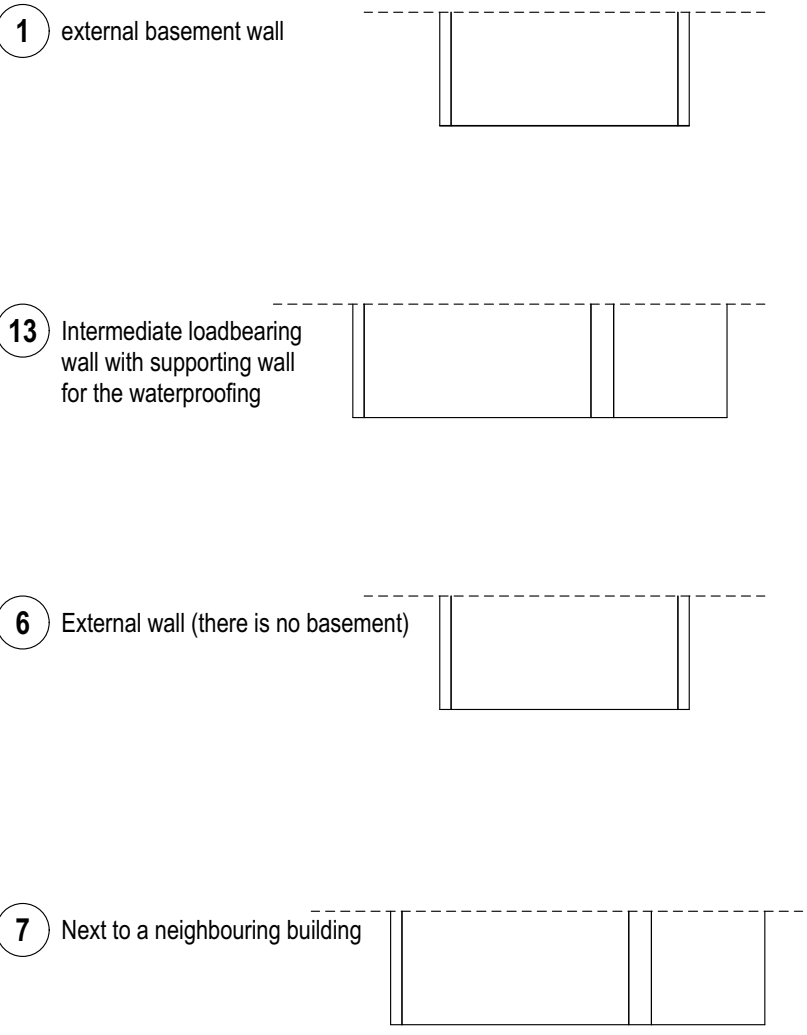
Foundation units with the same load

b _{min}	b _{design}
00 cm: 4, 16	50 cm
05 cm: 10, 15	50 cm
10 cm: 3, 5, 9	60 cm
15 cm: 6, 8	60 cm
20 cm: 2, 7, 11, 12, 14b	75 cm
25 cm: 1	
30 cm: 14a	
35 cm: 13	

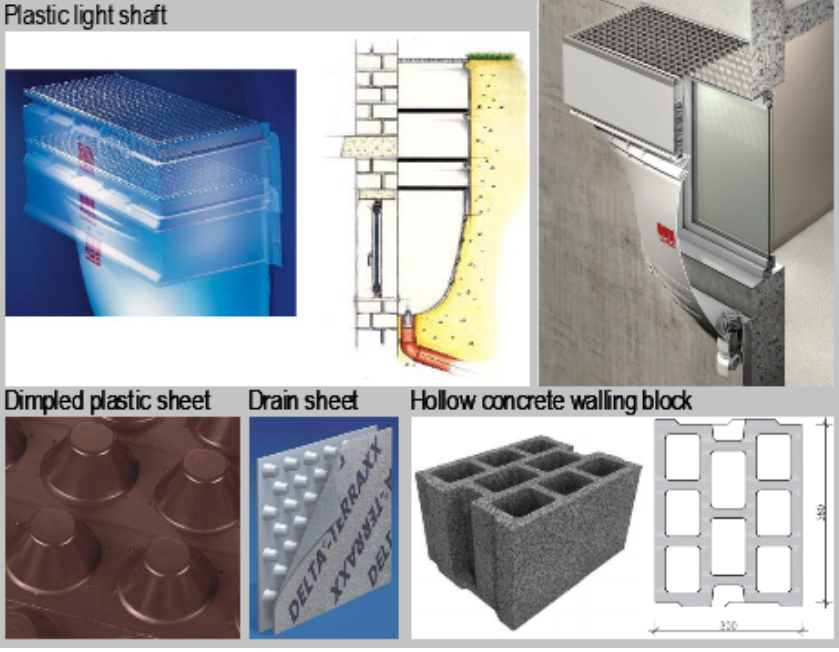
Foundation units with the same wall layers

b _{min}	b _{design}
40 cm: 3, 4, 5, 6, 8, 9, 10	50 cm
min. 50: 16	50 cm
50 cm: 1, 2, 11, 12, 14a, 14b	60 cm
58 cm: 7	60 cm
63 cm: 13	75 cm

Minimal width of foundation (b_{min})



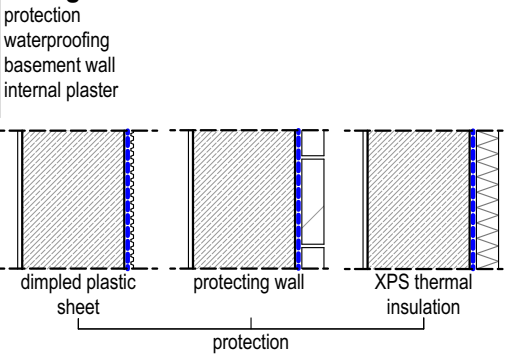
Auxiliary structures



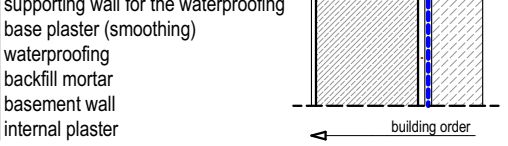
Principal layers

Basement wall

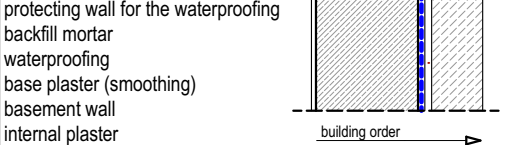
W1 - general basement wall



W2a - basement wall at level difference

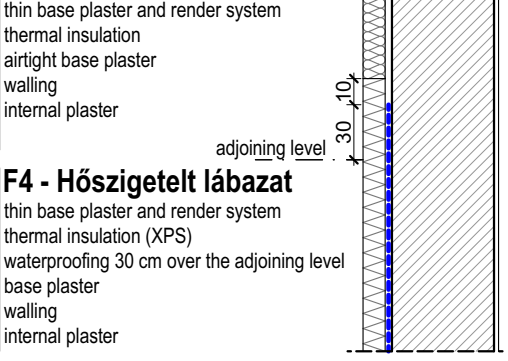


W2b - basement wall at level difference



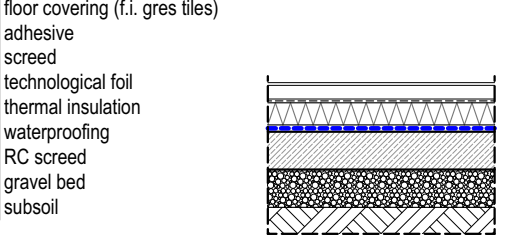
Aboveground walls

W3 - General wall

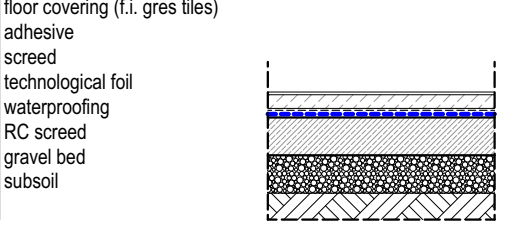


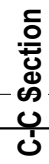
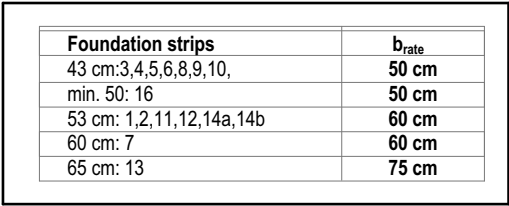
Floor layers

F1 - Floor with thermal insulation



F2 - Floor without thermal insulation





Layers

W1 - basement wall	
soil backfill	
1 lyr	dimpled plastic sheet protection
1 lyr	4 mm SBS modified bituminous sheet
	waterproofing
1 lyr	cold bituminous grounding
1 cm	base plaster
30 cm	hollow concrete basement wall
1 cm	internal plastering

F1 - floor layers (basement)

2 cm	gres tiles + adhesive
6 cm	screed
1 rtg	PE foil technological layer
15 cm	EPS thermal insulation
1 rtg	4 mm SBS modified bituminous sheet
	waterproofing
1 rtg	cold bituminous grounding
10 cm	RC screed
	gravel bed
	subsoil

W2 - basement wall

soil backfill	
15 cm	hollow concrete protecting wall
2 cm	infill mortar
1 lyr	4 mm SBS modified bituminous sheet
	waterproofing
1 lyr	cold bituminous grounding
1 cm	base plaster
30 cm	hollow concrete basement wall
1 cm	internal plastering

F2 - floor layers (groundfloor)

2 cm	gres tiles + adhesive
6 cm	screed
1 ritg	PE foil technological layer
15 cm	EPS thermal insulation
1 ritg	4 mm SBS modified bituminous sheet
	waterproofing
1 ritg	cold bituminous grounding
15 cm	RC screed
	gravel bed
	subsoil

W3 - footing

0,5 cm	thin base plaster and render system on the footing (ETICS)
8 cm	extruded polystyrene foam thermal insulation
1 lyr	4 mm SBS modified bituminous sheet waterproofing
1 lyr	cold bituminous grounding
1 cm	base plaster
30 cm	burned clay block wall
1 cm	internal plastering

F3 - basement floor slab

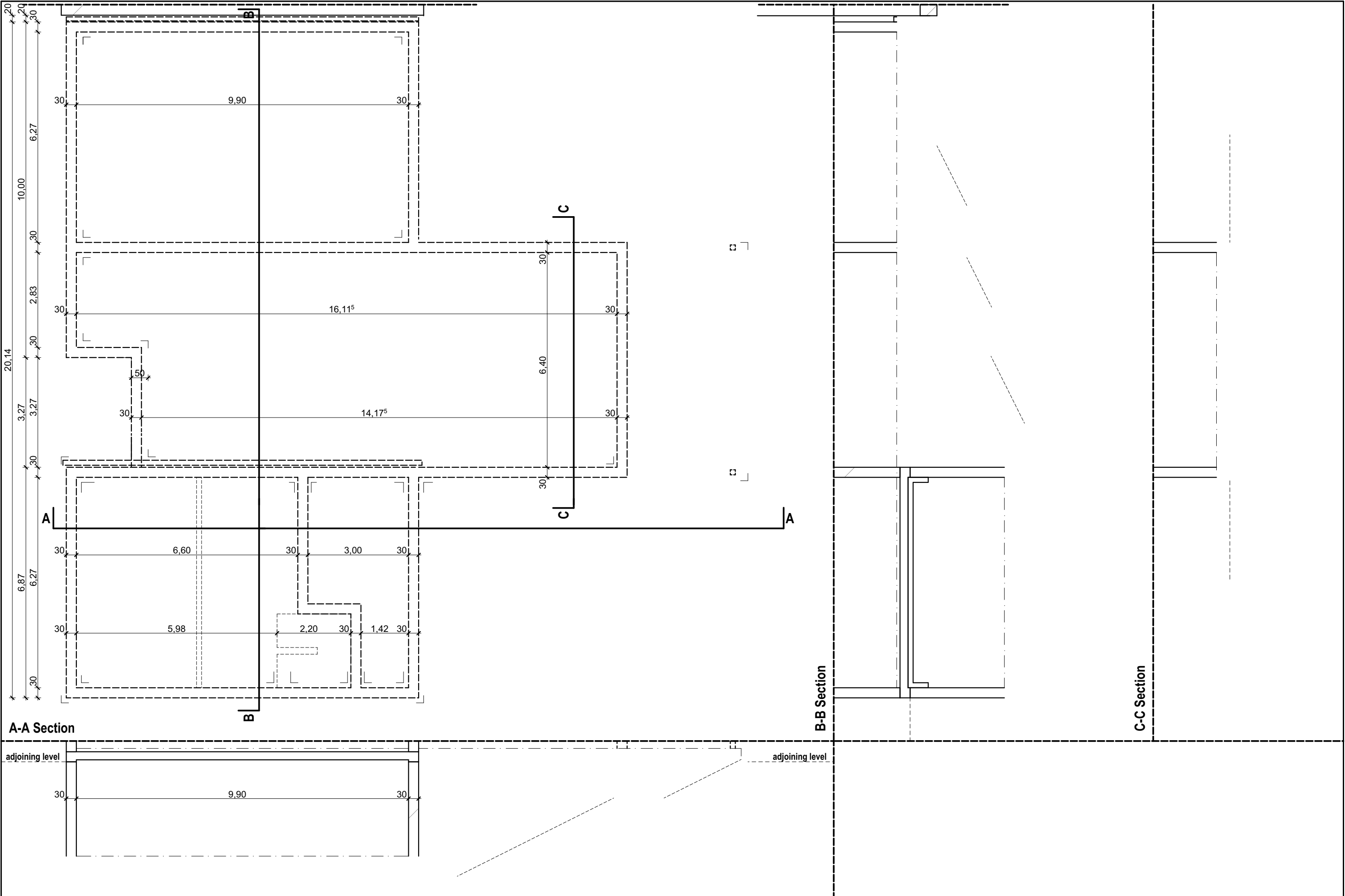
2 cm	gres tiles + adhesive
6 cm	screed
1 rtg	PE foil technological layer
2 cm	mineral wool acoustic insulation
24 cm	prefabricated RC floor slab
1 cm	plaster
14 cm	mineral wool thermal insulation and
0,5 cm	thin base plaster and render system (ETICS)

W4 - groundfloor wall

0,5 cm	thin base plaster and render system (ETICS)
15 cm	mineral wool thermal insulation
1,5 cm	base plaster
30 cm	burned clay block wall
1 cm	internal plaster

F4 - terrace

2 cm	gres tile + adhesive (frostproof)
20 cm	RC screed in 1% inclination
	gravel bed
	subsoil

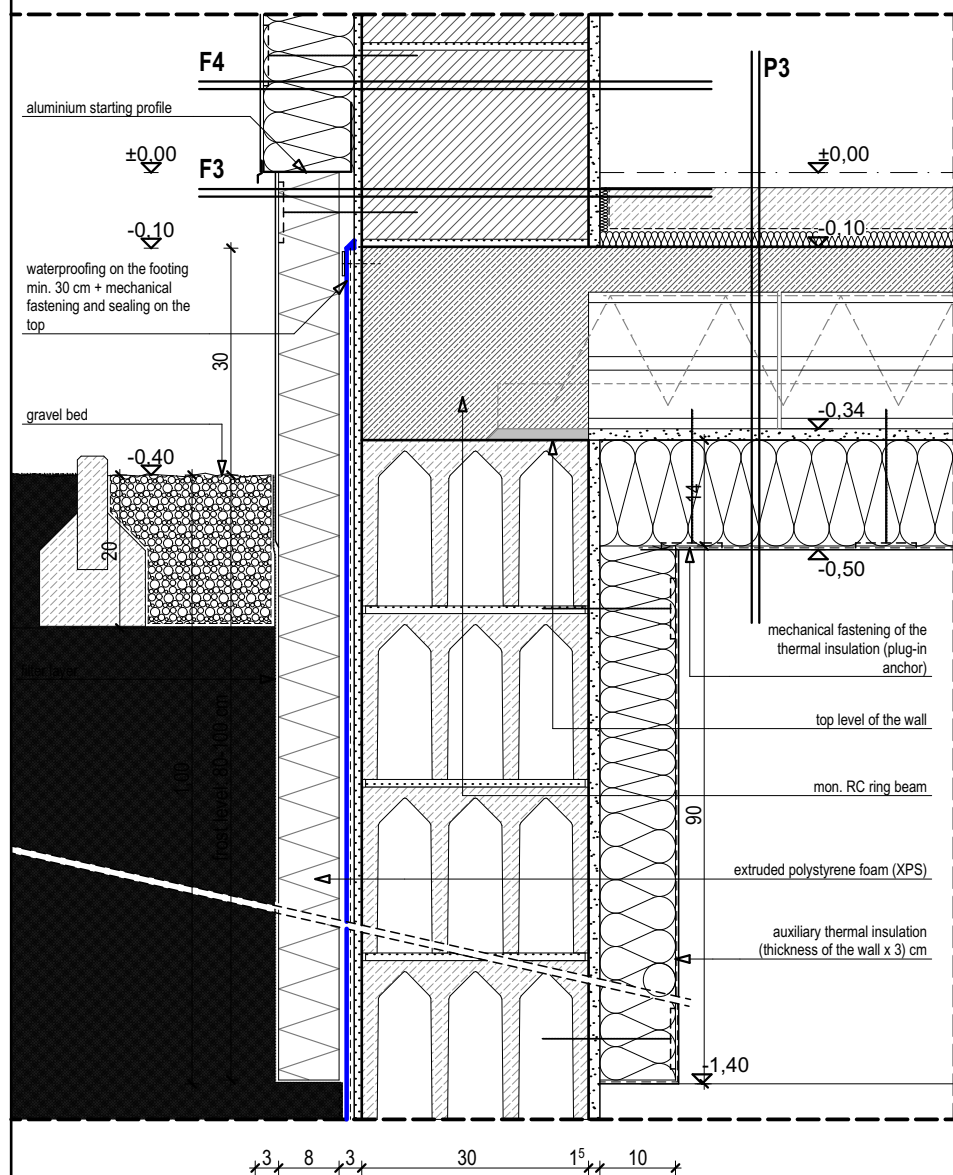


A-A Section

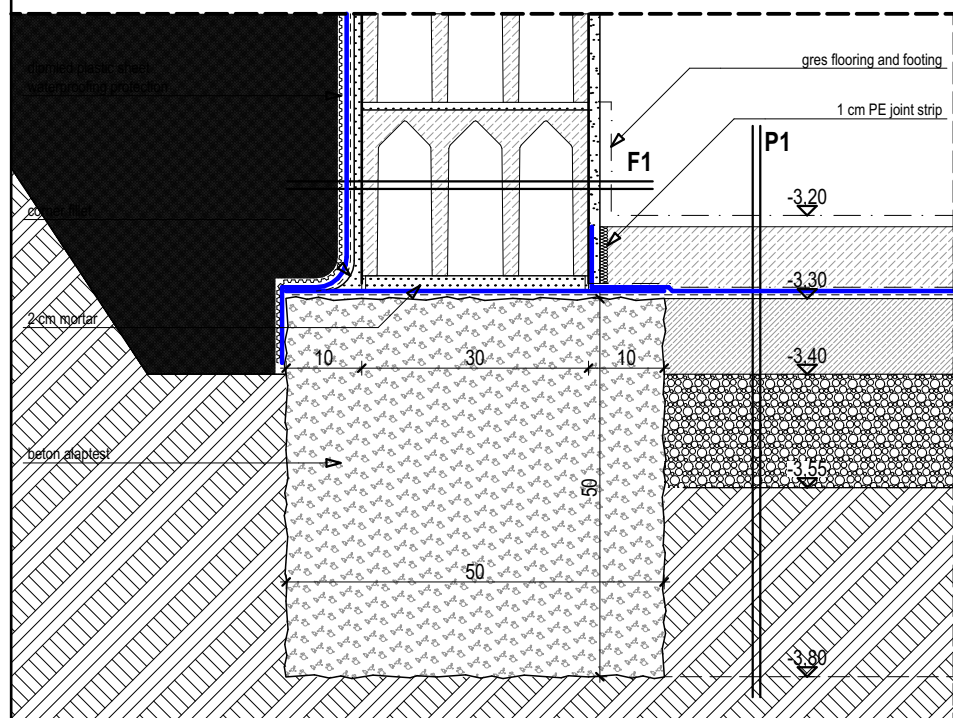
B-B Section

C-C Section

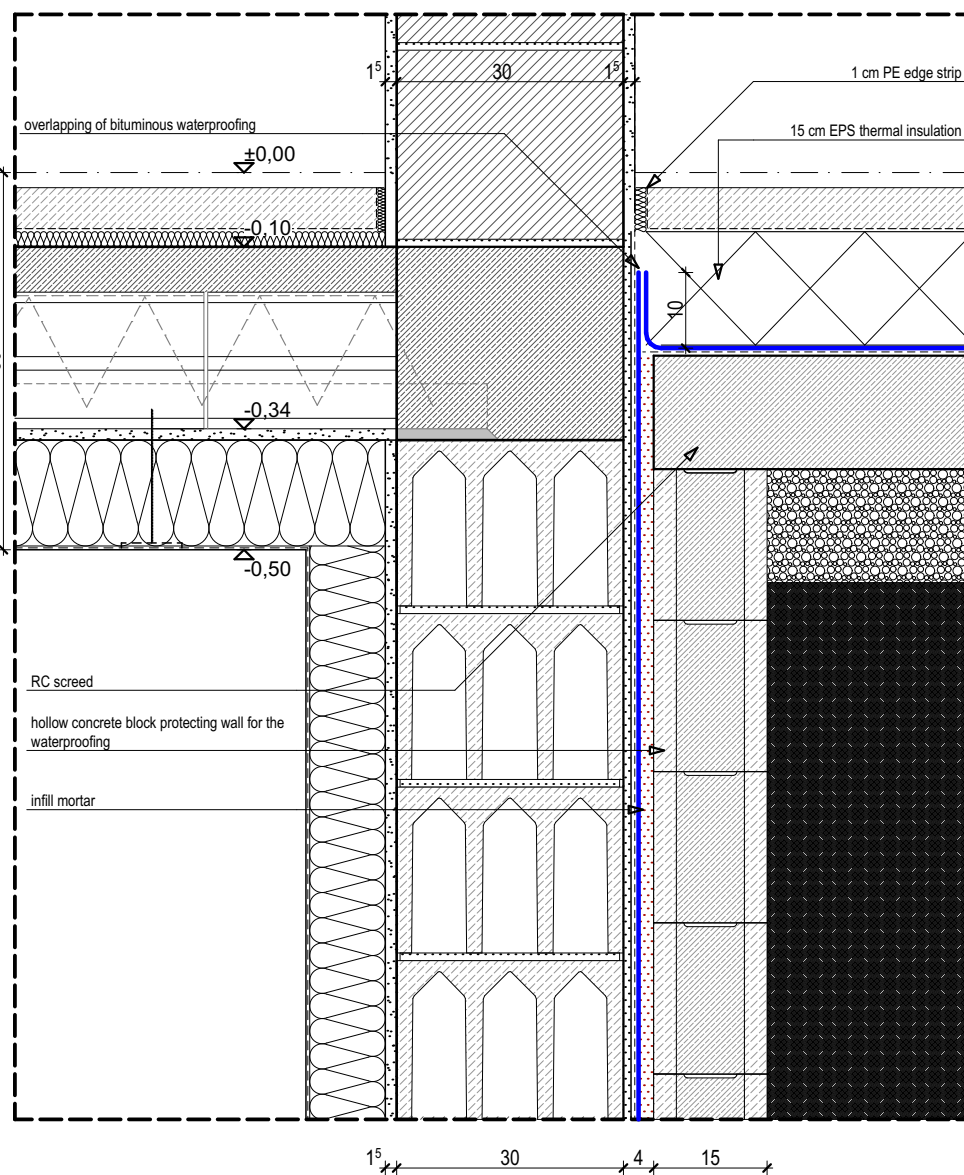
D1 Footing



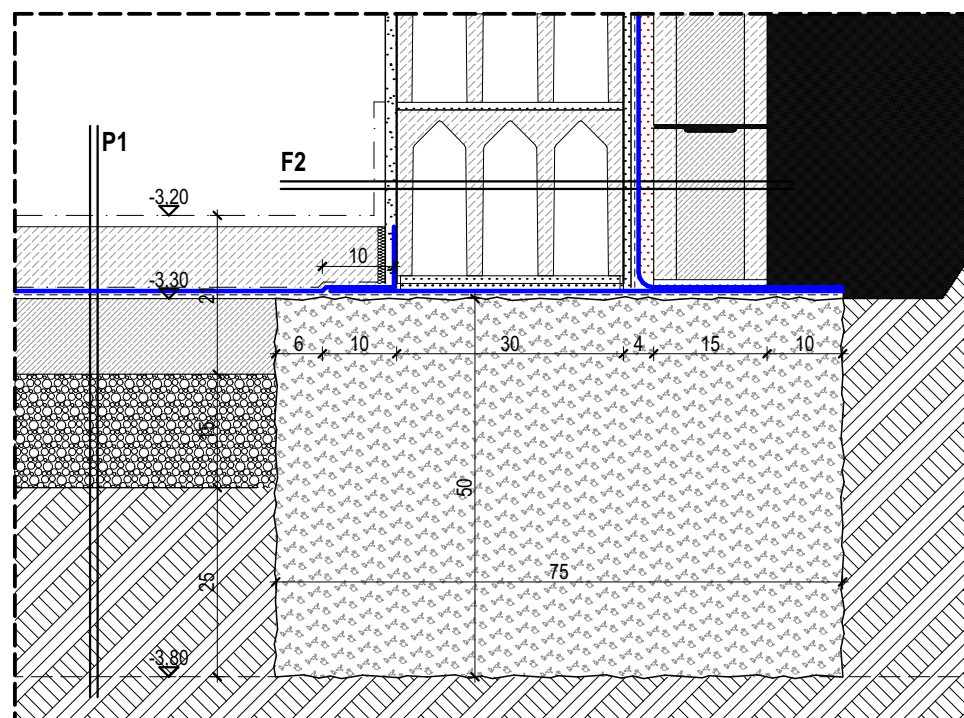
D2 - Foundation under external wall



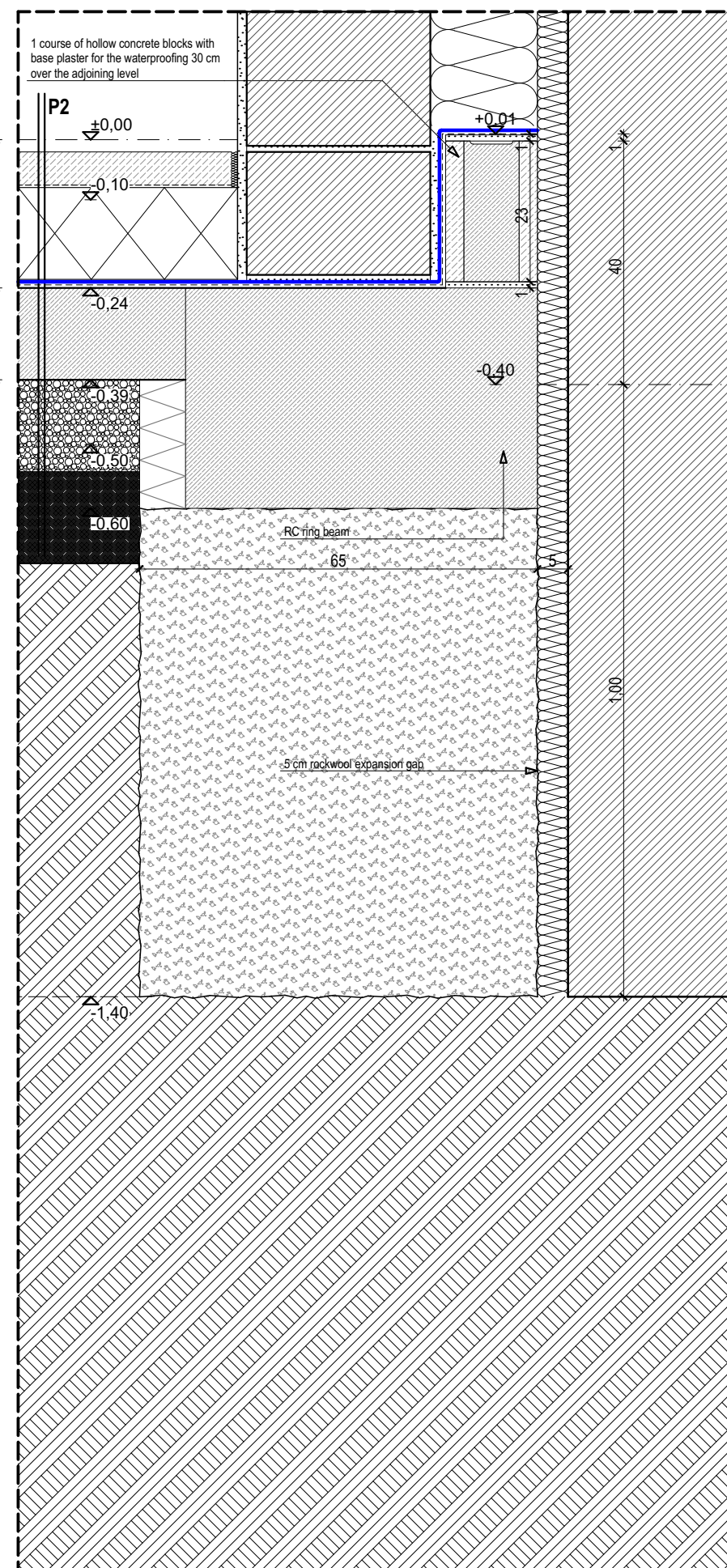
D3



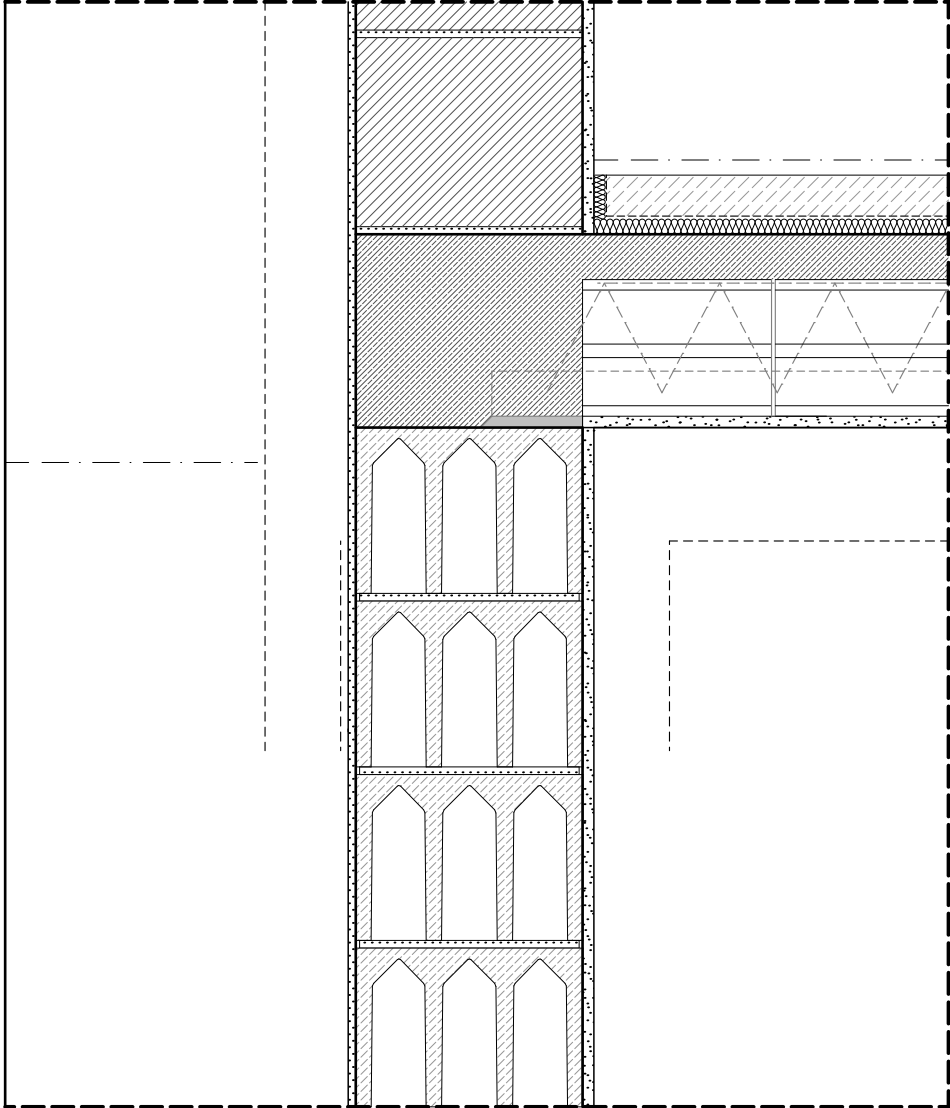
D4



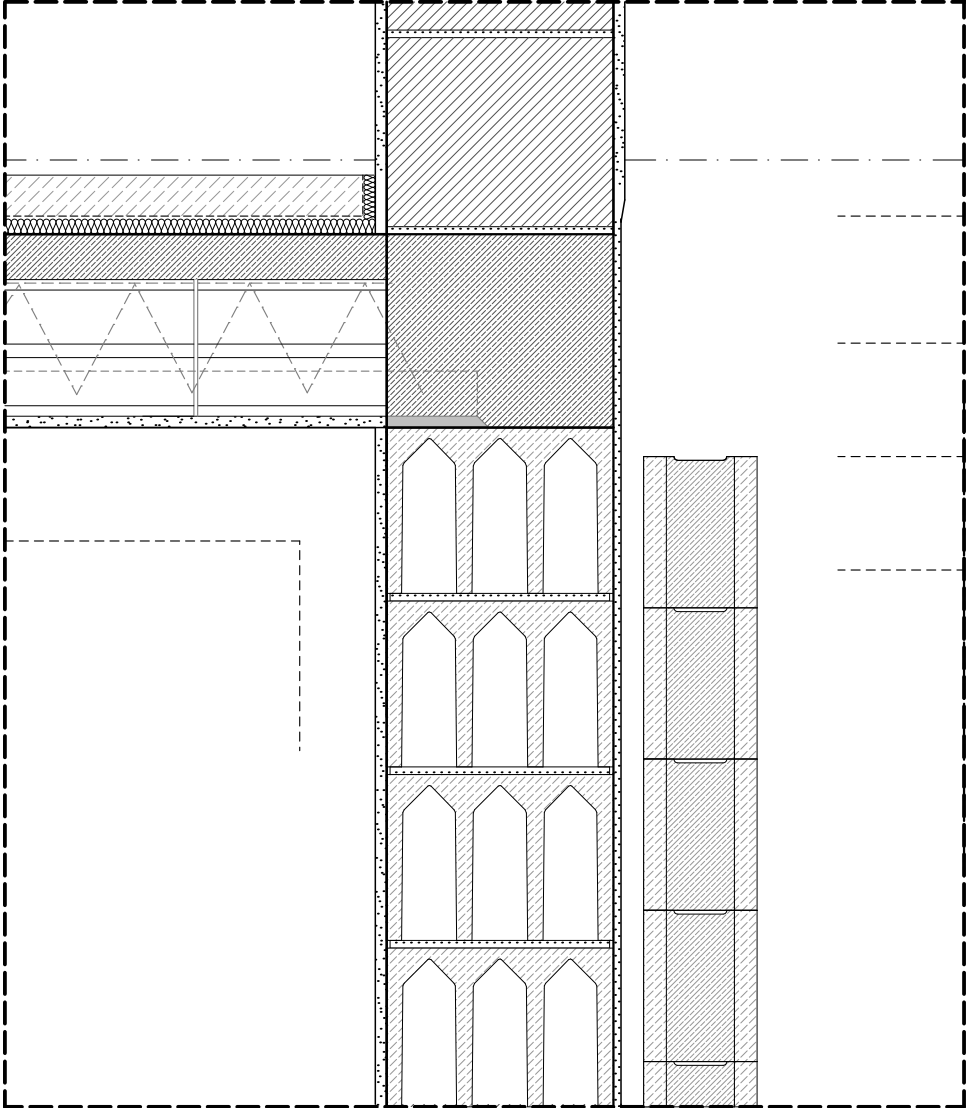
D5 - Connection to the neighbouring building



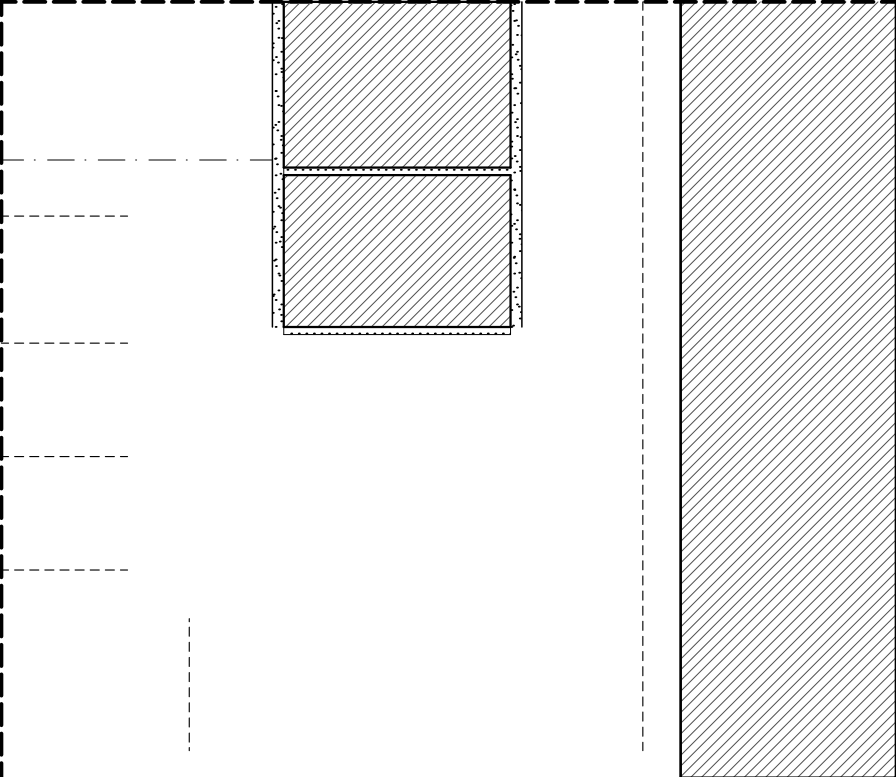
D1 Footing



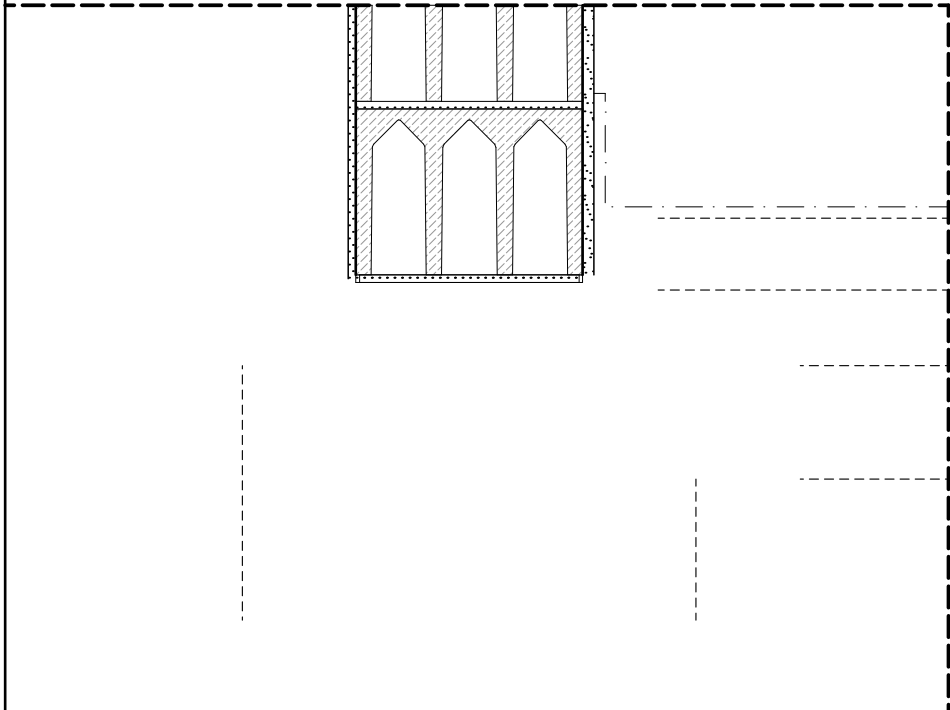
D3



D5 - Connection to the neighbouring building



D2 - Foundation under external wall



D4

