

INTERACTION ZONES OF STUDENT HOUSING

DIPLOMA PROJECT

POURIA PAIDAR - EVSDFT

DEPARTEMENT OF BUILDING CONSTRUCTION

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Introduction

The function of the project is student housing. The main concept behind this project is to go against the radical and old-fashioned design of student housing. To achieve this goal several types of spaces have been provided in this project such as public zones, semi-private and private spaces. Having these zones together with in-door spaces, outdoor spaces and intermediate spaces gives the project more flexibility in terms of usage for its users and residents.

Location

This project is in Czuczor utca in the 9th district of Budapest, Hungary. It is relatively close to several universities in Budapest specially Corvinus. It has a central location, and it is close to the main transportation routes such as tram 47,48 & 49 and Metro line M4. There was a competition held in 2017, on this site with the topic of student housing but, today it serves as a parking lot. The area of the site is 842 m².

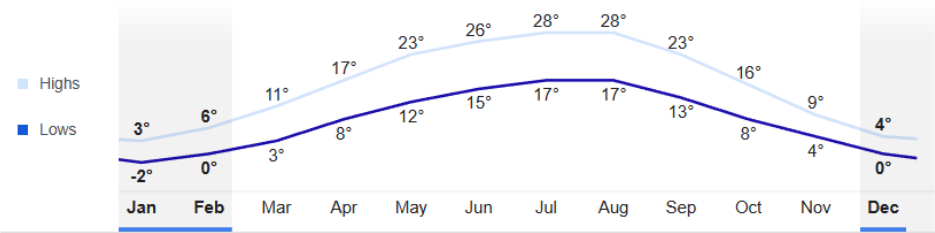




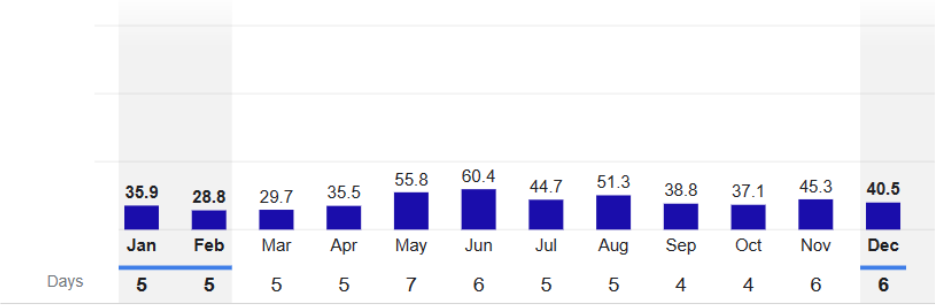
Climate

The climate of Hungary can be known as a typical European continental-influenced with dry and warm summers and cold winters. January is usually the coldest month and daytime temperatures usually around zero. Sometimes the temperature can go below zero due to northeasterly winds this is more typical in the higher site levels such as mountains. Snowstorms and heavy snow can be also possible on some days. The average snow days are between 40 to 120. Usually, the temperature for daytime summer doesn't exceed 30° C. Mostly this temperature is between 20°C and 25°C. July is the warmest month with an average temperature of 22°C. The average annual precipitation is about 400-600 mm in lowland areas.

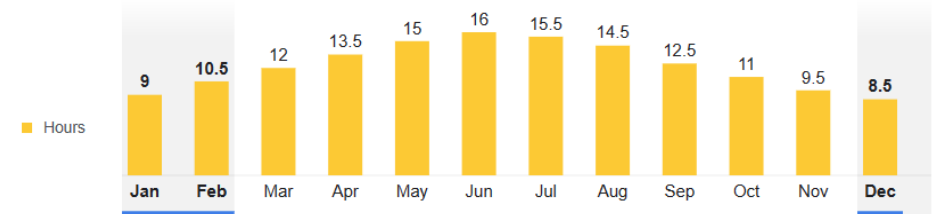
Temperatures (°C)



Rainfall (millimeters)



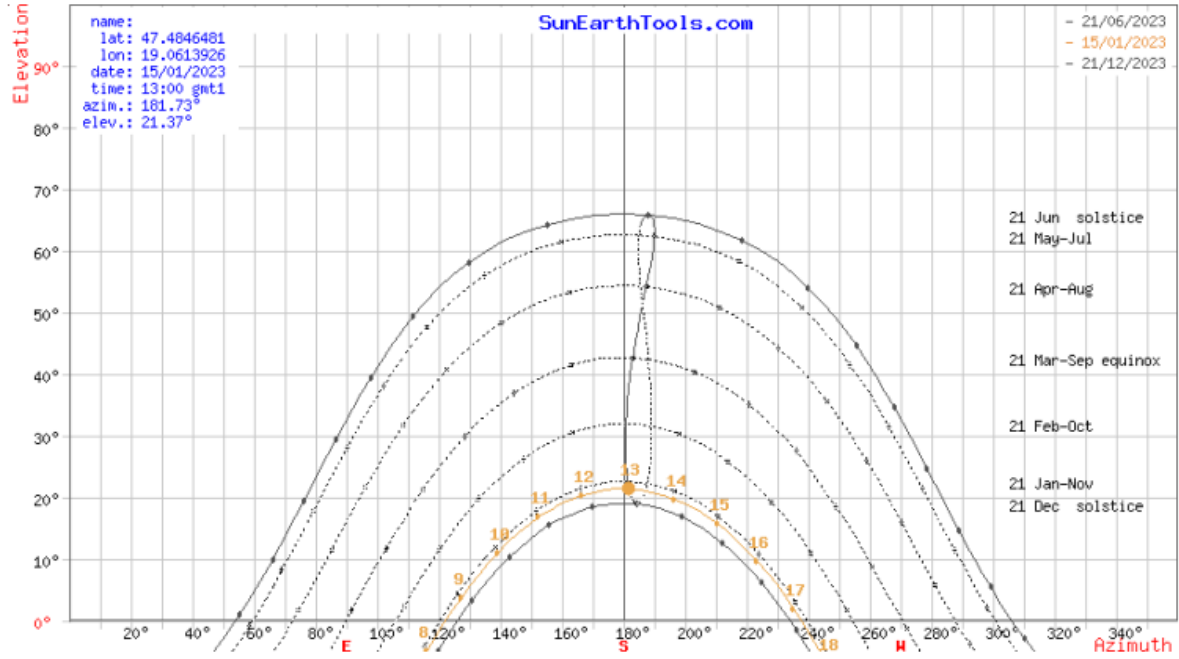
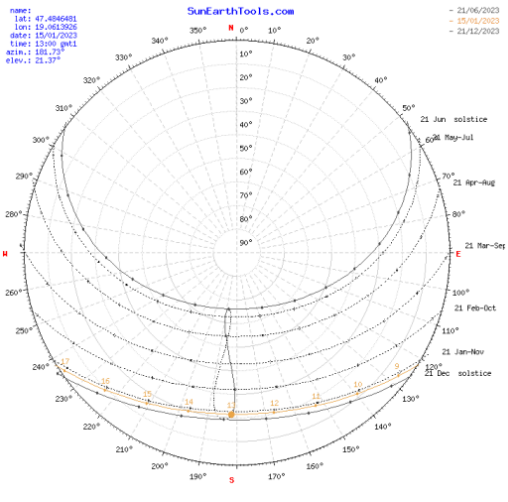
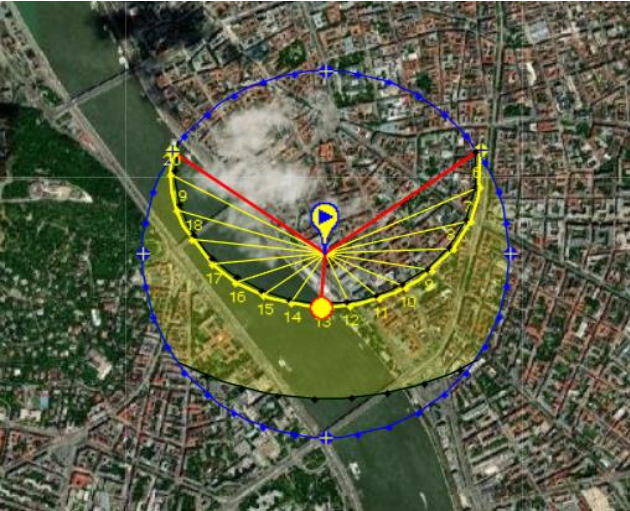
Daylight



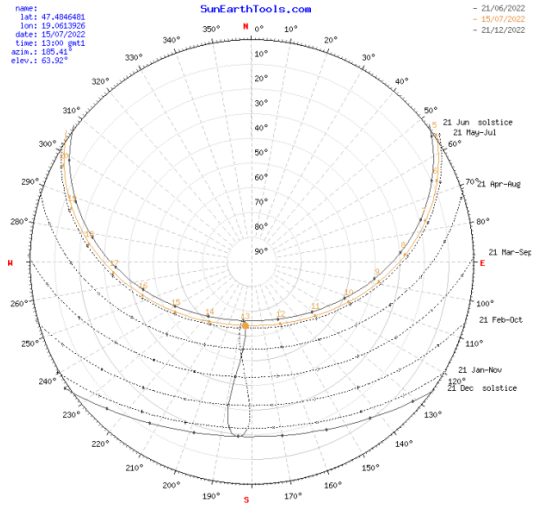
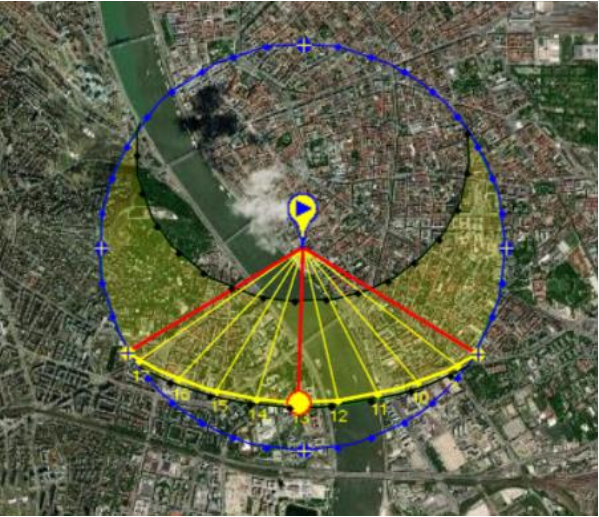
Sun Study

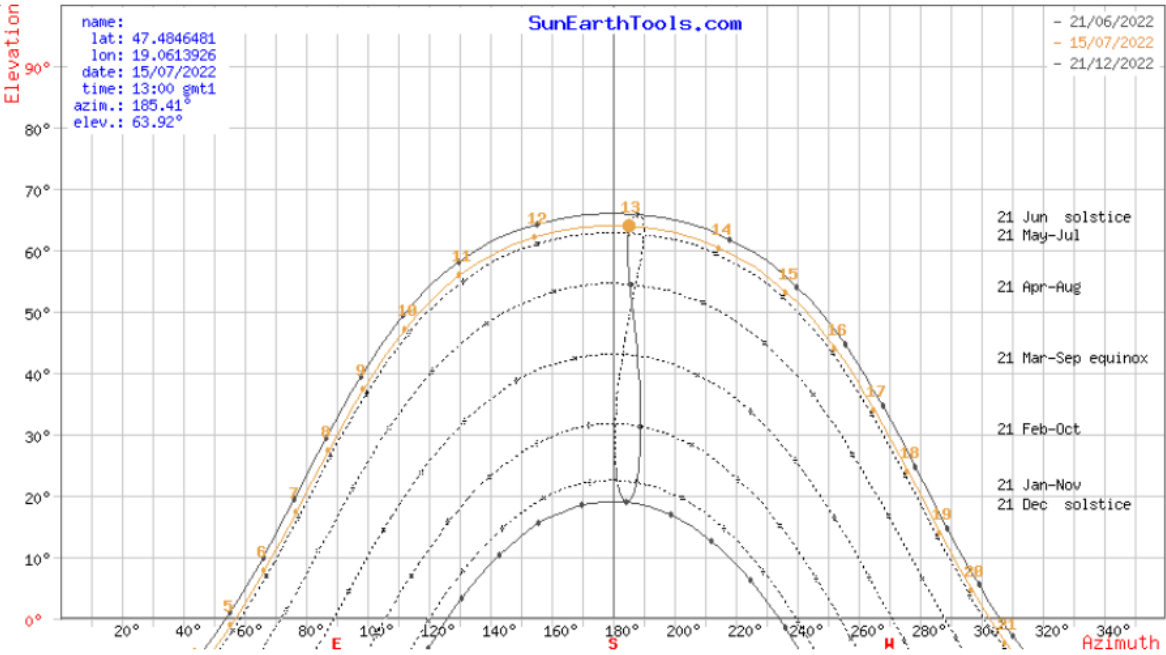
The site is enclosed with the neighboring buildings. The main façade of the project is facing north. Besides the street side which is fully open there are 2 courtyards of the neighboring building which can help in terms of sunshine. The first consideration of the mass development was to extend the boundary of neighboring buildings courtyard to gain more sunshine.

Sun path during winter



Sun path during summer





Main programs and function of the project

Basement & Ground floor:

Basement and ground floor have functions which can be used by public and residents of the building. The zones closer to the street is accessible for both group and the zones located at the back of site is dedicated for residents.

General floor:

General floor of this project is more private since it contains functions for the use of students only. The layout of this floors is identical. In each floor 10 private rooms have been provided facing to street and two studio apartments. Each of these studios is ideal for two people. These studios are facing both to courtyard and the courtyard of the neighboring building at the back. Having this feature is advantageous in terms of natural day light.

Beside the rooms this floor has an intermediate corridor which is wide and contains common spaces such as kitchen, seating space and outdoor terrace.

There is a library in each floor which is a common space for students, and it is located beside the circulation unit.

Roof:

Terrace roof have been planned for this project which is usable by all the residents, and it acts as a gathering area. Also, the renewable energy system has been installed on roof.

Building Function Factors

Thermal Envelope of the Building

The climate in Budapest is cold in winter and moderate in summer, maintaining the thermal mass and transmittance requirements is crucial.

The thermal envelope of the building is the for the building which has heated ground floor is enveloped by ground, external walls and roof.

- Thermal transmittance and mass:

	MSZ 04-140 1979	MSZ 04-140 1985	MSZ 04-140 1991	7/2006. TNM regulation 2006	recommended value	passive house recommendation
U wall [W/m ² K]	0,85	0,70	requirements for construction average k- value	0,45	0.24	0,15 appr. 20-30 cm thermal insulation
U roof [W/m ² K]	0,40 appr. 10 cm thermal insulation	0,40 appr. 10 cm thermal insulation	appr. 12-14 cm thermal insulation	0,25 appr. 16 cm thermal insulation	0.17 appr. 20 cm thermal insulation	0,12 appr. 40 cm thermal insulation

table 3. U value changes in the regulations

Thermal transmittance hungarian regulations (source LOW ENERGY BUILDINGS AND PASSIVE HOUSE CONSTRUCTIONS, BME faculty of architecture)

	Externally exposed horizontal and inclined border structures	External wall	Basement slab	Doors and windows	Ventilation
U _R [W/m ² K]	0,20	0,25	0,30	0.17	0,55 regulated
thermal insulation thickness d [cm]	20	16	12	Dual layer glass, with Low-e coating	

table 4. Low energy building design, recommended U values (source: BME Faculty of Architecture, Department of Building Constructions 2012)

Acoustic Regulations

For buildings, the MSZ 15601-1-2007 standard lists required transmitted and radiated sound insulation values in relation to functional use of the space.

Sound insulation requirements in multi-apartment residential houses, at horizontally adjacent room units:

Connecting rooms	Number	Noisy apartment or room, structure exposed to the acoustic load	The area to be protected from noise	Airborne noise protection				Structure borne noise protection	
				Base requirement		Heightened requirement		Base req.	Heightened req.
				R' C	R C	R' C	R C	L'	L'
Neighbouring apartments	1.	any area within the apartment	any area within neighbouring apartments	51	-	54	-	-	-
Apartment and traffic areas (corridor, stairwell, hanging corridor)	2.	Stairwell, corridor, traffic area wall	any area within neighbouring apartments	-	51	-	54	-	-
	3.	Stairwell, corridor, traffic area floor	any area within the apartment	-	-	-	-	55	52
	4.	Entrance door of the apartment that opens into the noise protected living room or living area	living room of the apartment	-	33	-	36	-	-
	5.	Entrance door of the apartment that opens into the foyer	front room, traffic areas of the apartment	-	25	-	28	-	-
	6.	Any space within the apartment, there is no door within the wall adjacent to the protected room	to be protected living room of the apartment	-	-	39	-	-	-
Apartment and basement, attic, storage and common areas	7.	Attic, basement, storage, common space wall	any area within the apartment	-	51	-	54	-	-
	8.	Attic, basement, storage, common space floor	any area within the apartment	-	51	-	54	55	52

Sound insulation requirements in multi-apartment residential houses, at vertically adjacent room units:

Connecting rooms	Number	Noisy apartment or room, structure exposed to the acoustic load	The area to be protected from noise	Airborne noise protection				Structure borne noise protection	
				Base requirement		Heightened requirement		Base req.	Heightened req.
				R' C	R C	R' C	R C	L'	L'
Neighbouring apartments	1.	any area within the apartment	any area within neighbouring apartments	51	-	54	-	55	52
	2.	Kitchen, bathroom, storage, toilet, front room of the apartment	Kitchen, bathroom, storage, toilet, front room of the neighbouring apartment	49	-	51	-	55	52
Apartment and traffic areas	3.	Stairway, landing of the stairway, corridor, hanging corridor floor	any area within the apartment	-	51	-	54	55	52
Apartment and basement, attic, storage and common areas	4.	Attic, basement, storage	any area within the apartment	-	51	-	54	55	52
within an apartment	5.	Multi story apartment, any area	Multi story apartment, living area	-	*	45	*	55	52

Site Preparation

The preparation and planning the site organization is fundamental since this task happens in the beginning of the construction process. There should be cleaning and isolation after having the site plan for the construction. The perimeter of the construction site should be isolated by a 2-meter high fences. Then the pavement and finishing of the site will be removed by a hydraulic excavator and the unused part will be stored in the waster storages. Meanwhile temporary water access and electric box should be provided with organization of the support containers. Every room should be planned, and access as shown in the site plan. Rooms such as WCs, storages, offices, changing rooms and security which will be organized with 2.5*6 meter. When everything is settled the earthworks and substructures can be started, followed by the other steps.

Earthworks

Beginning with a rubble for the trench for the load bearing part of a foundation (with the instructions from the engineer), gravel can be more economical solution than using the crushed stone. The excavated topsoil is placed and collected in the designed place with waterproof covering to act as a trap against being washed away. The excavator will remove the earth in the basement of the designed building until 1.1 meter below the floor level of the basement. This process can be done with the use of a ton wheel excavator. The excavation shall be measured with the accuracy of one centimeter to be the product of exact length and width of the lowest step of footing.

Foundation

To begin the construction of the foundation process we need a drainage trench, with pipe work to be connected to a sump pump.

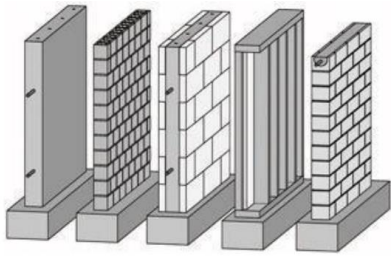
The drain should be covered with a layer of a crushed stone and then geotextile foil prevents the accumulation of preparation of the slab foundation. A permeable backfill material should be used to and then compacted with the vibratory plater compactors.

To level the ground and provide a smooth surface for the waterproofing a 5 cm layer of concrete is poured using the pump attached to the concrete mixer. After this layer is poured the 15cm concrete supporting wall will be built up. Then the waterproofing will be installed. Two layers of 4mm bituminous member will be installed in cold bitumen grounding and patching layer.

After the installation of the waterproofing the welded steel reinforcement mesh will be placed according to the engineer's specifications. The sharp tips should be kept away from the waterproofing member. To prevent the crack of the slab the contractor should use support chairs that keep the mesh at the correct height during the pouring the concrete.

Once the rebars has been placed the poring of the foundation can begin. It is important to ensure that contractor waits for the proper weather conditions before pouring the concrete slab. The concrete will be mixed in the mixer truck and poured with a pump. The concrete should be kept moist for at least three days because it needs to cure.

Basement wall construction



Load Bearing Structure

Due to the dimension of the site and its compact location there would be a difficulty for the transportation in case of prefabricated load bearing elements. So, in - situ type of load bearing structures are chosen.

After pouring the foundation the waterproofing should be continued along with the thermal insulation and supporting wall. The next step is placing the rebars of the basement walls. This process is placed by the mounting panel formwork for the outer basement walls. Then the basement walls are poured.

Here are the main steps for In - situ RC technology:

Check the existing structures (if there are any), defining the layout of the planned structure, preparation of the formwork, concrete and reinforcement assembling the formwork, placing the reinforcement, pouring the concrete, consolidating, and curing the concrete, striking, and finally removing the props.

These steps will be repeated for seven floors. (Construction of RC Slab, RC columns, RC beams and RC walls around staircase or ramp. Because of the different in the height of first two floors in comparison with the rest of the building the formwork should be adjusted. For the roof level 15 cm of RC parapet wall is constructed with the height of 1 meter.

The tower crane should be used to complete and install the load bearing formwork and move them to correct story. There should be 1 meter clearance distance around the tower crane. The assembly, cutting and binding of the reinforcement will happen on site since there is space for it and some reinforcement lengths are larger than average. The formwork and reinforcement will be delivered to the site via trucks.

For the walls, columns and slabs panel formwork will be used. However, the fire wall construction is completed by using the prefabricated elements on both slides form work and then the pouring of concrete will be started.

The formwork of slabs should be given 9 days and then removed while for vertical elements 2-3 days is enough. The structure will be totally dried in about 28 days and then the props can be removed. To properly consolidate and cure the concrete vibration is an important step, also keeping it under controlled temperature & humidity. The same process is repeated for stairs.

Thermal Break Unit

SCHÖCK ISOKOB XT

It is a load bearing thermal insulation element with 120 mm insulation thickness for connecting cantilevered reinforced concrete balconies to a reinforced concrete slab. It makes it easy to solve the technical, thermal and structural issues of designing modern balconies.

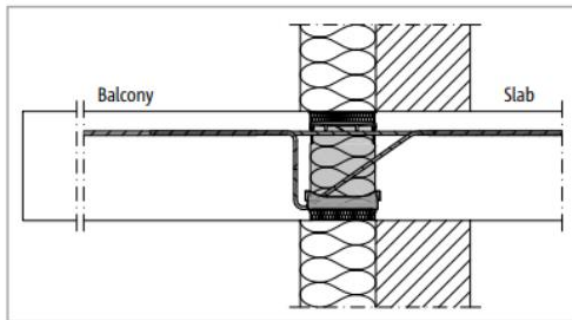


Fig. 24: Schöck Isokorb® XT type K: Connection with thermal insulation composite system (TICS)

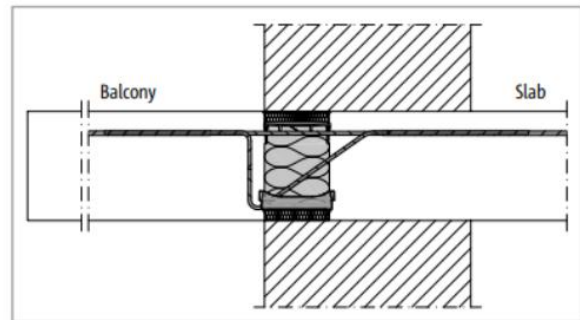


Fig. 25: Schöck Isokorb® XT type K: Connection with single-leaf masonry

Exterior Finishing Work

The infilling was made of a porotherm 30 n+f walling block. The thermal insulation is chosen as 18 cm mineral wool insulation on the street side since the building have a ventilated facade and 18 cm of XPS when it is adjoining the neighboring buildings. The facade system has two different parts based on the materials.

Façade Subsystem:

Street façade consists of two parts. On the ground floor curtain wall system is built to allow the most natural light in the building. Using two different system provide more contemporary look to the building and adds contrast to street elevation.

The curtain wall system consists of transoms and mullions with glass-built panel. The glass panel is triple glazed to have the best thermal conductivity. This system is also used in inner courtyard to make the corridor an appealing space for students since in addition to circulation system also, common kitchen, dining area and study area is also placed there. The rest of the inner façade is completed by plaster on the solid parts of elevation.

Installation Examples



Curtain wall connection installed to the top of a floor slab using a HALFEN HTA Anchor Channel



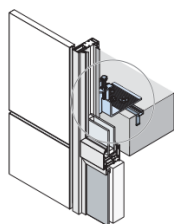
Edge of slab connections with HALFEN HTA Anchor Channels and HALFEN HCW Curtain Wall Brackets



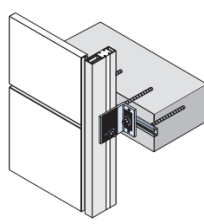
HALFEN Curtain Wall Brackets fitted to the top of a floor slab using HALFEN HTA Anchor Channels



HALFEN Curtain Wall Brackets fitted to the edge of a thin post-tensioned slab using a HALFEN Anchor Channel



HALFEN Anchor Channels – top of slab application



HALFEN Anchor Channels – edge of slab application



Window to sill-panel connection using a HALFEN Anchor Channel



Window to sill-panel connection using a HALFEN Anchor Channel

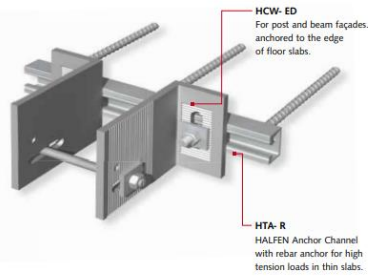
HALFEN Anchor Channels and HCW Brackets

Edge of slab connections

Modern buildings require façades of the highest quality that can be installed quickly and safely. This is why the HALFEN Curtain Wall System is chosen more and more frequently by architects, engineers, and investors.

Safe and reliable

- no damage to the reinforcement
- suitable for use in concrete pressure and tensile stress zones
- suitable for dynamic loads



Quick and economical

- adjustable when used in combination with HALFEN Curtain Wall Brackets
- T-bolts instead of welding
- maximum efficiency when installing matrices and rows
- cost effective installation using standard tools
- optimized pre-planning reduces construction time
- wide range of channels and T-bolts available for various requirements
- no noise, no vibration during installation, therefore, no health hazards



Top of slab connections

Modern buildings require façades of the highest quality that can be installed quickly and safely. This is why the HALFEN Curtain Wall System is chosen more and more frequently by architects, engineers, and investors.

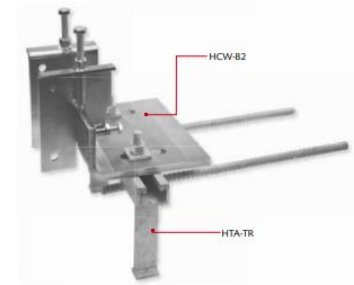
Safe and reliable

- HTA-TR special embeds for the special requirements of top of slab connections (not suitable for longitudinal loads)
- HZA-TR special embeds are used if additional loads in longitudinal direction are present
- capacities based on independent testing



Quick and economical

- cost effective installation using standard tools
- adjustable in all three planes when used with HALFEN Curtain Wall Brackets
- T-bolts instead of welding
- no damage to the reinforcement
- no on-site welding required

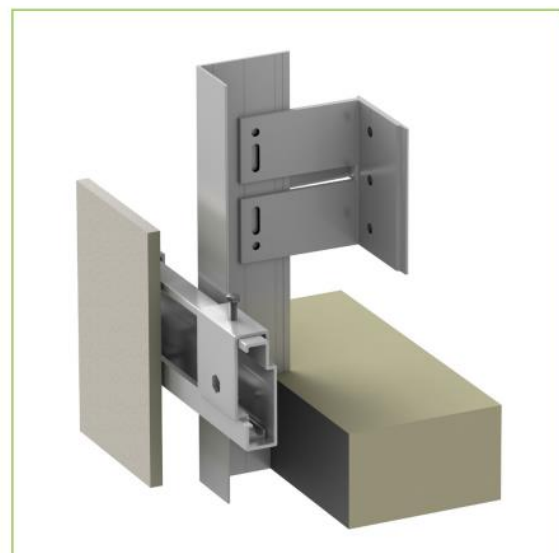


The fiber cement cladding is installed with vertical and horizontal aluminum profile for supporting. This system allows ventilation with 4 cm air gap. The horizontal C rails are fixed to L shaped vertical profile which is fixed to another L (double L profile) at the top and bottom of each fiber cement board. Fiber cement has a variety of colors and sizes with aesthetic texture on finishing which can make it an optimal choice for contemporary buildings' façade. Fiber cement board is durable has a low maintenance requirement. It is resistant to insects, bugs and rot. It is also resistant to weathering, discoloration and fading.

PANELS: FIBER CEMENT / FIBER CONCRETE-UHPC / HPL / STONE

Building designers and owners want a complete, cost-effective wall where all components work together to maximize the wall's performance. ECO Cladding provides a full "system" approach to address all of the requirements of the wall design and ensure maximum performance for the façade panel.

- ✓ ENGINEERED DESIGN
- ✓ THERMALLY EFFICIENT
- ✓ BRACKET ADVANTAGES
- ✓ EXCELLENT MATERIAL PROPERTIES
- ✓ MINIMIZED BREACH OF AIR BARRIER
- ✓ DESIGN AND CONSTRUCTION SUPPORT



Fire safety:

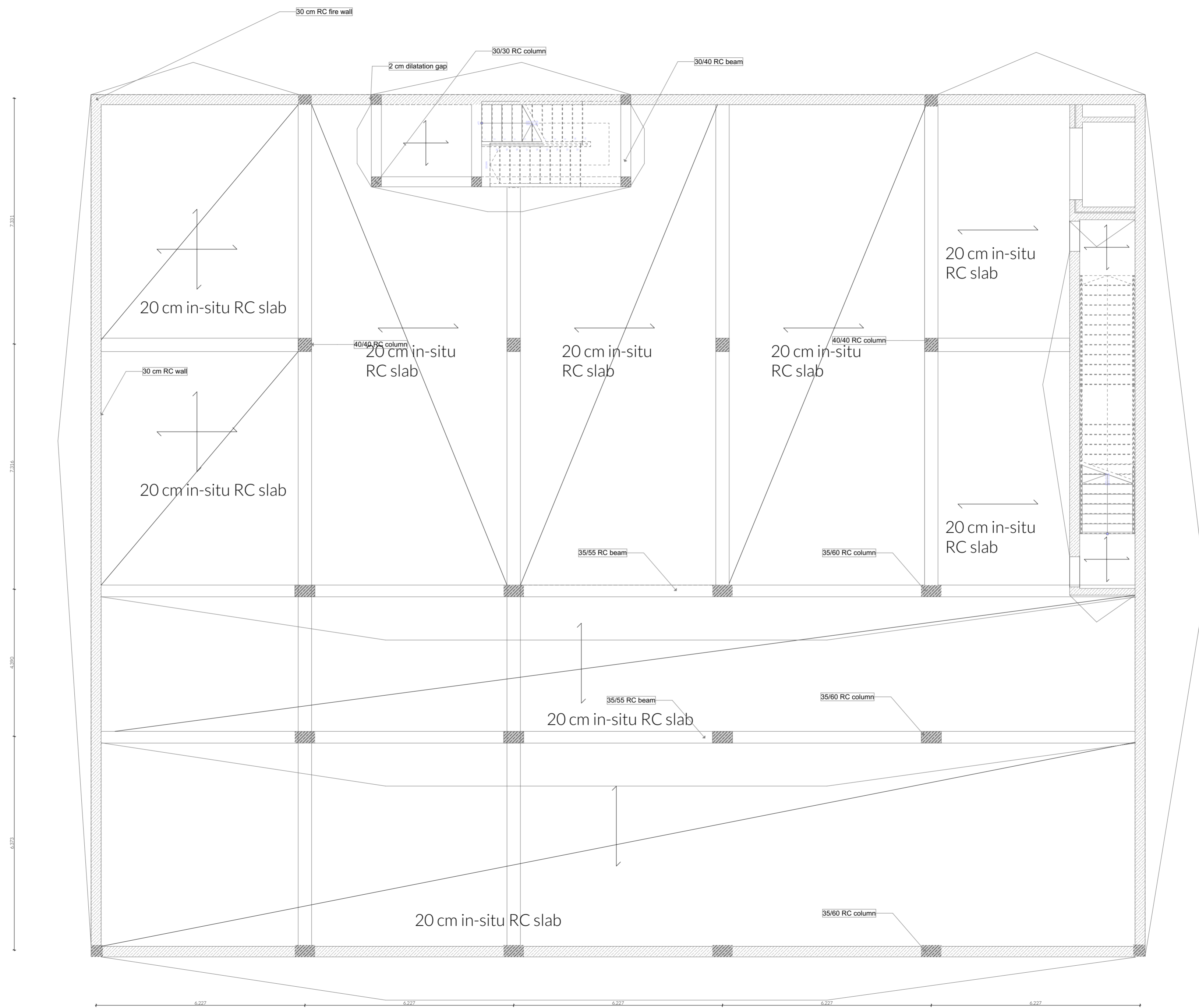
The fire safety of building is completed with different systems. On the perimeter of the site when the building is adjacent to the neighboring 30 cm fire wall made with in situ technology was built to prevent the fire spreading from one building to another.

Every residential unit is reachable to a staircase within 30 meters of distance. The indoor staircase is separated from corridor with fire resistant door opening to outside to allow the maximum space for escape during a fire accident. The outdoor staircase doesn't need to be separated with door in terms of fire safety reasons and use natural air flow.

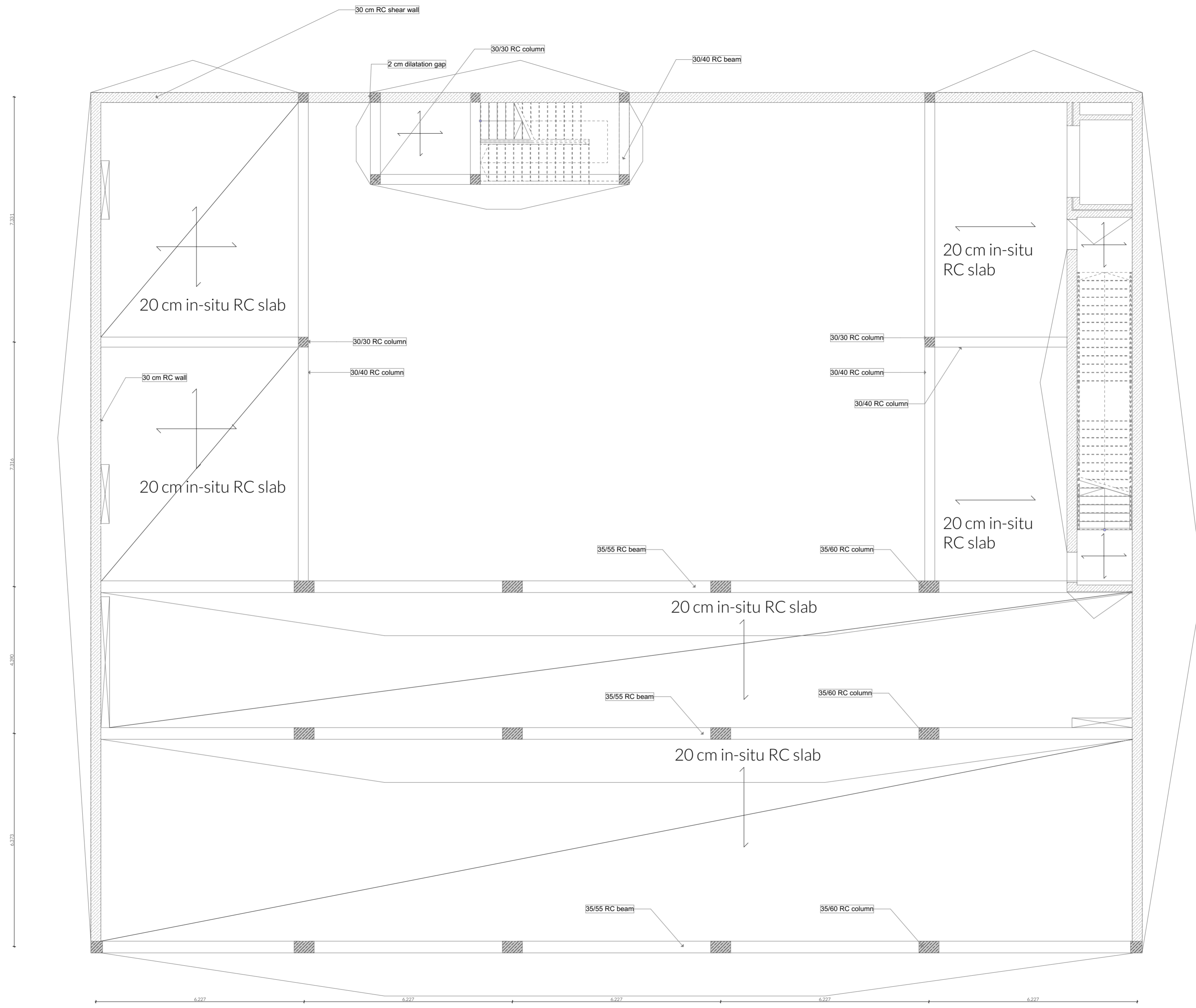
In addition to the fire-resistant door which is installed in the key areas, fire and smoke detection is installed which is a crucial for early fire spreading. This allows the users for quicker evacuation during incidents. The elements of these systems are smoke detectors, fire detectors and fire alarm systems. Furthermore, the clear path for fire evacuation exits and lighting can lead to safe evacuation in time during an incident.

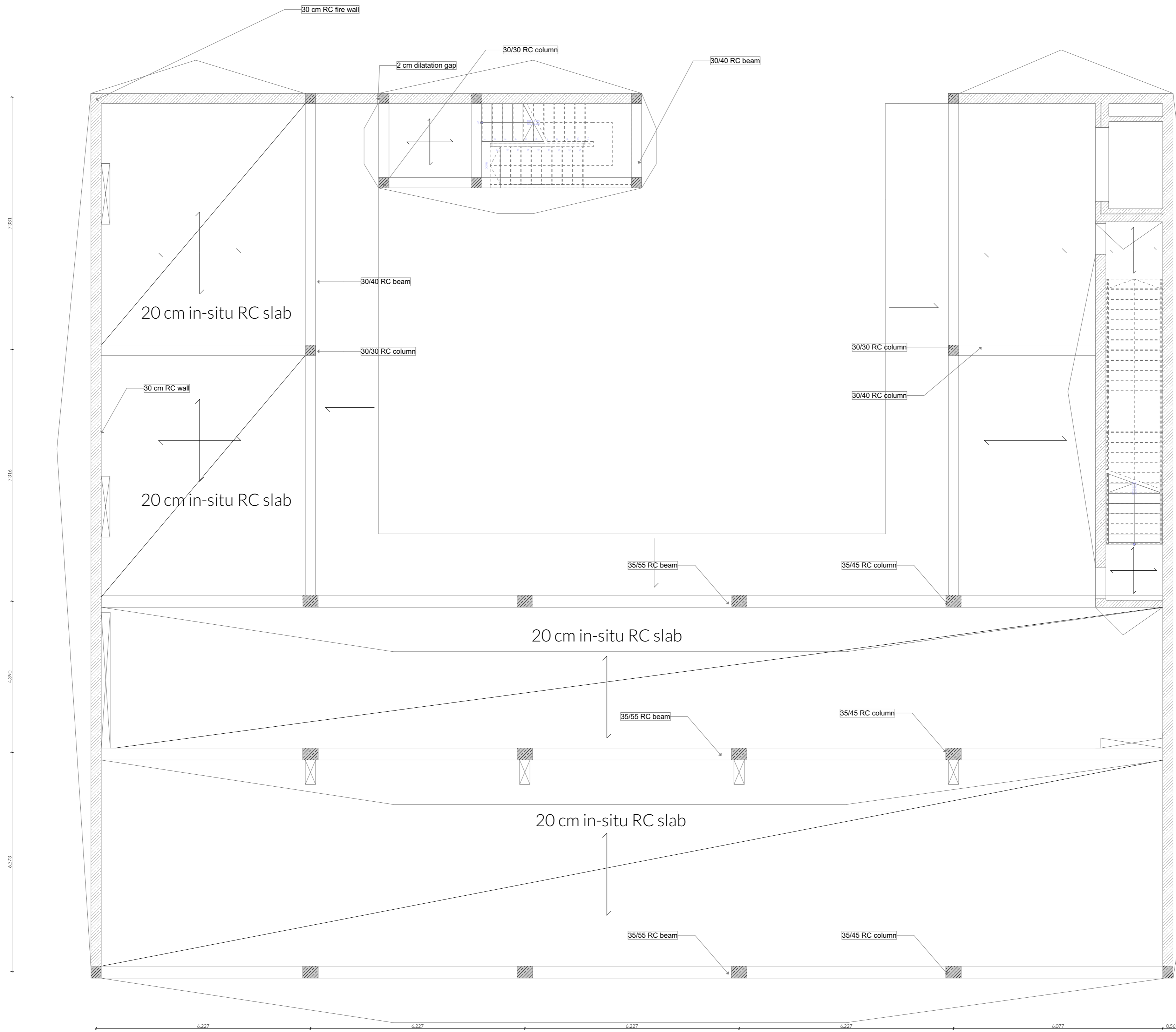
Fire-resistant doors and windows is used in crucial areas such as staircases and openings of corridors.

<p>L1: External wall (Courtyard Elevation)</p> <p>1 cm interior plaster 30 cm protherm n+f infill block 0.5 cm plaster 18 cm mineral wool thermal insulation 1 cm external plaster</p>	<p>L5: Drywall Party wall (Seprating rooms)</p> <p>2 lyr of rigips gypsum plasterboard 8 cm mineral wool sound insulation 2 cm air gap 8 cm mineral wool sound insulation 2 lyr of rigips gypsum plasterboard</p>	<p>L9: Ground floor (Cafe)</p> <p>07 ceramic tiles 03 mm self-levelling smoothing compound 67 mm concrete screed 1 ly. PE foil 25 mm mineral wool (floating layer) 50 mm EPS foam (layer for installation) 20 cm in-situ made reinforced concrete slab</p>	<p>L13: Non - trafficed roof</p> <p>5 cm Ø 16-32 mm gravel ballasting and protecting layer 1 lyr synthetic filter layer, loose laid 1 lyr (1.2 mm) pvc water proofing 1 lyr installation for pvc 1 lyr fleece sepration layer 25 cm extruded polystyrene foam thermal insulation with staggered joints 1 lyr thick vapour barrier 4 - cm Concrete inclination layer 20 cm in-situ made reinforced concrete slab</p>
<p>L2: Facade wall</p> <p>1 cm interior plaster 30 cm protherm n+f infill block 0.5 cm plaster 18 cm mineral wool thermal insulation 4 cm air gap 1 cm fiber cement board cladding</p>	<p>L6: Basement layers</p> <p>3 mm resin flooring 6 cm screed 15 cm XPS thermal insulation 6 cm screed 85 cm RC slab foundation 2 lyrs Bituminous water proofing 1 lyr Bituminous grounding 10 cm screed 15 cm gravel Load bearing soil</p>	<p>L10: Residential floor layers</p> <p>22 mm parquet with adhesive 5 mm self-levelling smoothing compound 50 mm concrete screed 1 ly. PE foil 25 mm mineral wool (floating layer) 50 mm EPS foam (layer for installation) 20 cm in-situ made reinforced concrete slab</p>	<p>L14: Outdoor Corridor</p> <p>1 cm resin concrete flooring 75 mm concrete screed (inclination layer) 1 ly. PVC waterproofing 50 mm EPS foam 20 mm closed cell type insulation 20 cm in-situ made reinforced concrete slab</p>
<p>L3: Fire wall</p> <p>1 cm interior plaster 30 cm Rc wall 18 cm XPS 07 cm RC precast panel 15 cm air gap between neighboring building</p>	<p>L7: Terrace roof</p> <p>4 cm granite stone paving 4 cm Ø 8 - 15 mm stone chipping and drainage layer 1 lyr synthehic filter 25 cm XPS insulation 2 lyr 4 mm SBS Bitumen membrane waterproofing 1 lyr cold Bitumen patching and grounding 4 - cm Concrete inclination layer 20 cm in-situ made reinforced concrete slab</p>	<p>L11: Basement wall</p> <p>1 cm interior plaster 30 cm Rc wall 18 cm XPS thermal insulation 2 lyr SBS Bitumen water proofing 1 lyr Bitumen grounding 12 cm RC self supporting blocks (protection of water proofing) 15 cm air gap dilatation of separate buildings</p>	<p>L15: Drywall Party wall (Seprating rooms & corridor)</p> <p>2 lyr of rigips gypsum plasterboard 12 cm mineral wool sound insulation 1 lyr of rigips gypsum plasterboard 35 mm air gap 1 lyr of rigips gypsum plasterboard 12 cm mineral wool sound insulation 2 lyr of rigips gypsum plasterboard</p>
<p>L4: Drywall partition wall</p> <p>2 lyr of rigips gypsum plasterboard 5 cm mineral wool infill 2 lyr of rigips gypsum plasterboard</p>	<p>L8: Terrace(In-door courtyard)</p> <p>3 cm concrete paving tiles 5 cm screed 1 lyr synthetic filter 25 cm extruded polystyrene foam thermal insulation with staggered joints 6 cm thick drainage sheet 2 lyr SBS Bitumen water proofing 1 lyr bitumen grounding (installation of water proofing) 4 - cm Concrete inclination layer 20 cm in-situ made reinforced concrete slab</p>	<p>L12: General floor layer (In-door corridor)</p> <p>1 cm resin concrete flooring 67 mm concrete screed (reinforced) 1 ly. PE foil 25 mm mineral wool (floating layer) 50 mm EPS foam (layer for installation) 20 cm in-situ made reinforced concrete slab</p>	

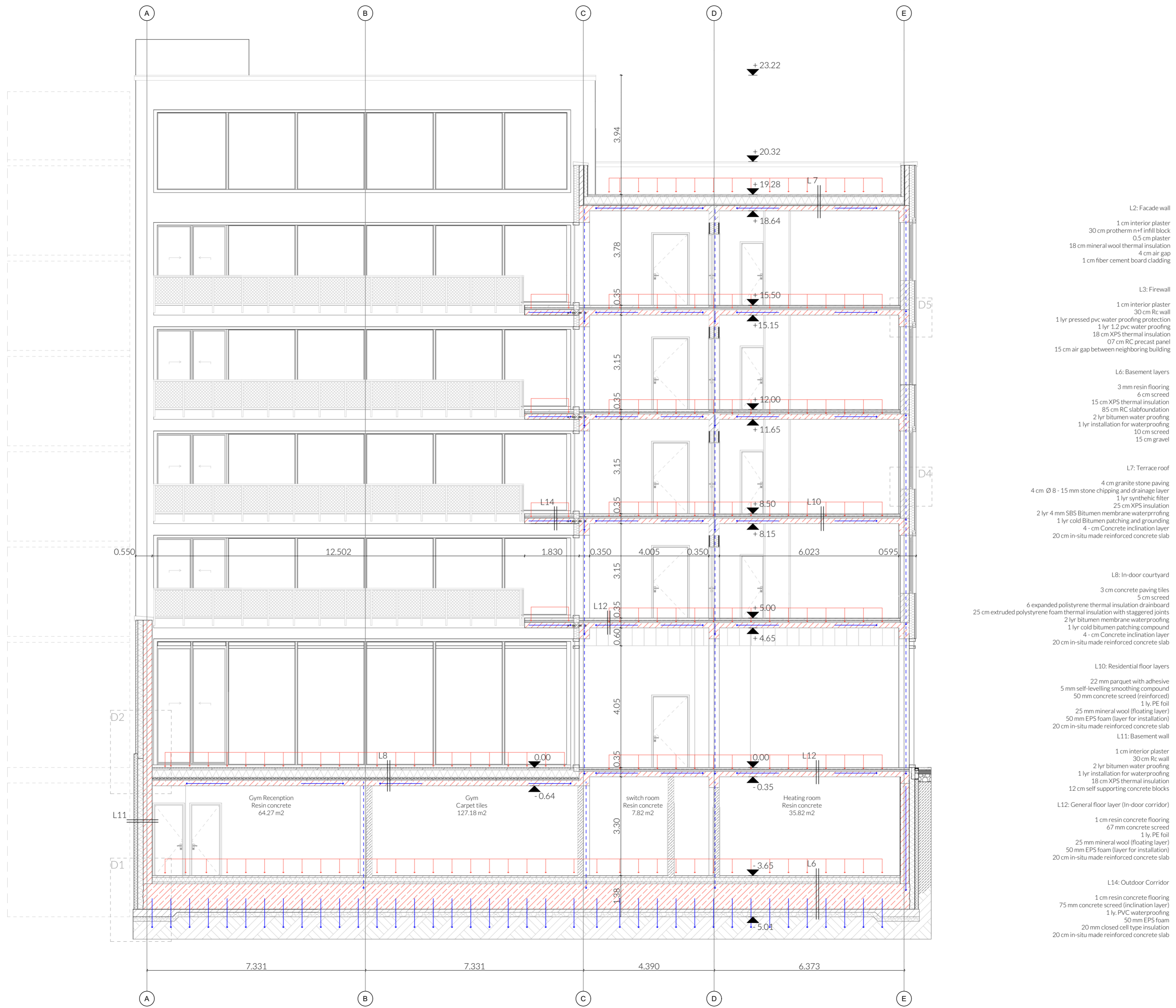


Basement shear wall Frame



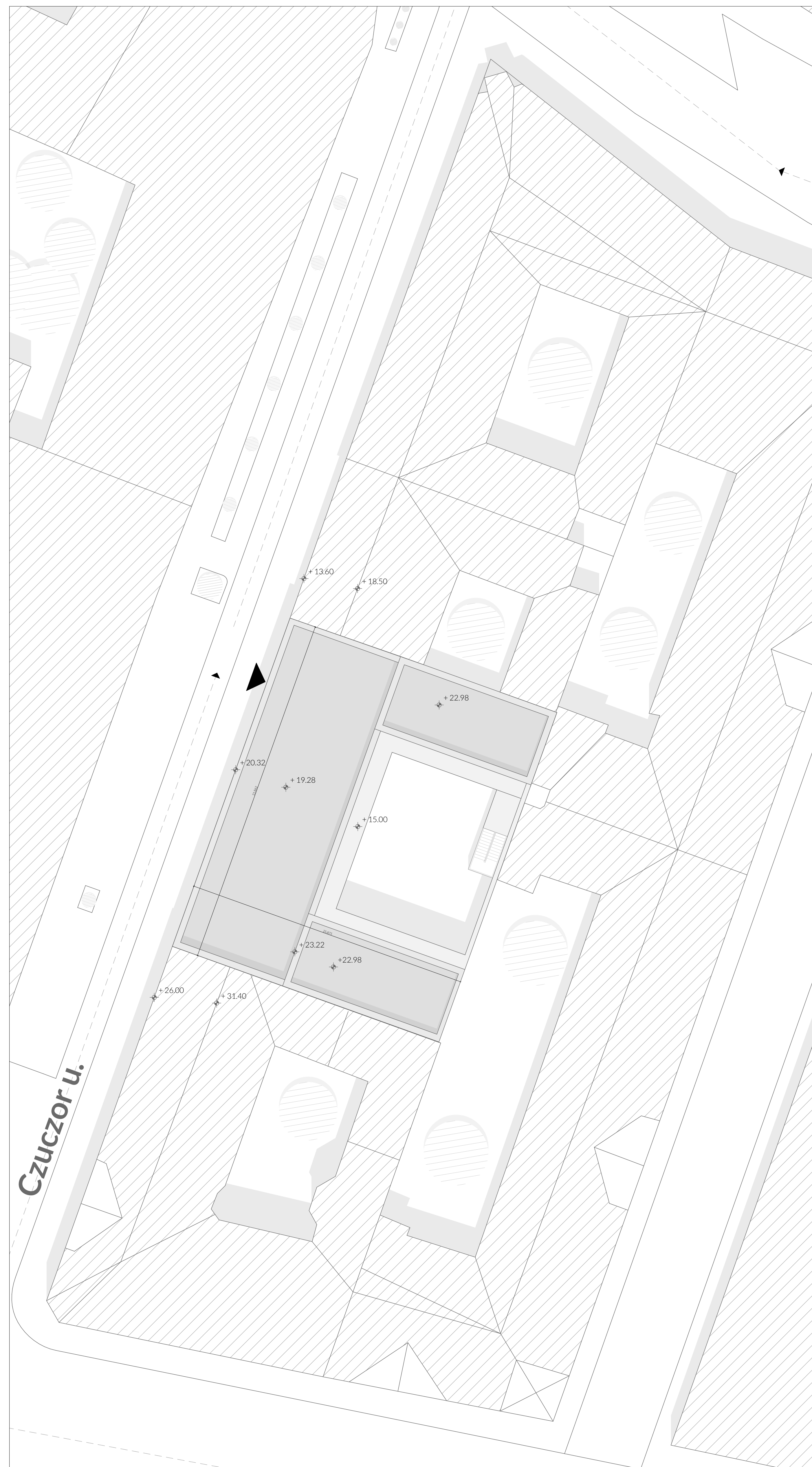


General Floor shear wall Frame



- L2: Facade wall
 - 1 cm interior plaster
 - 30 cm prothern nF infill block
 - 0.5 cm plaster
 - 18 cm mineral wool thermal insulation
 - 4 cm air gap
 - 1 cm fiber cement board cladding
- L3: Firewall
 - 1 cm interior plaster
 - 30 cm Rc wall
 - 1 lyr pressed pvc water proofing protection
 - 1 lyr 1.2 pvc water proofing
 - 18 cm XPS thermal insulation
 - 07 cm RC precast panel
 - 15 cm air gap between neighboring building
- L6: Basement layers
 - 3 mm resin flooring
 - 6 cm screed
 - 15 cm XPS thermal insulation
 - 85 cm RC slabfoundation
 - 2 lyr bitumen water proofing
 - 1 lyr installation for waterproofing
 - 10 cm screed
 - 15 cm gravel
- L7: Terrace roof
 - 4 cm granite stone paving
 - 4 cm Ø 8 - 15 mm stone chipping and drainage layer
 - 1 lyr synthetic filter
 - 25 cm XPS insulation
 - 2 lyr 4 mm SBS Bitumen membrane waterproofing
 - 1 lyr cold Bitumen patching and grounding
 - 4 - cm Concrete inclination layer
 - 20 cm in-situ made reinforced concrete slab
- L8: In-door courtyard
 - 3 cm concrete paving tiles
 - 5 cm screed
 - 6 expanded polystyrene thermal insulation drainboard
 - 25 cm extruded polystyrene foam thermal insulation with staggered joints
 - 2 lyr bitumen membrane waterproofing
 - 1 lyr cold bitumen patching compound
 - 4 - cm Concrete inclination layer
 - 20 cm in-situ made reinforced concrete slab
- L10: Residential floor layers
 - 22 mm parquet with adhesive
 - 5 mm self-leveling smoothing compound
 - 50 mm concrete screed (reinforced)
 - 1 ly. PE foil
 - 25 mm mineral wool (floating layer)
 - 50 mm EPS foam (layer for installation)
 - 20 cm in-situ made reinforced concrete slab
- L11: Basement wall
 - 1 cm interior plaster
 - 30 cm Rc wall
 - 2 lyr bitumen water proofing
 - 1 lyr installation for waterproofing
 - 18 cm XPS thermal insulation
 - 12 cm self supporting concrete blocks
- L12: General floor layer (In-door corridor)
 - 1 cm resin concrete flooring
 - 67 mm concrete screed
 - 1 ly. PE foil
 - 25 mm mineral wool (floating layer)
 - 50 mm EPS foam (layer for installation)
 - 20 cm in-situ made reinforced concrete slab
- L14: Outdoor Corridor
 - 1 cm resin concrete flooring
 - 75 mm concrete screed (inclination layer)
 - 1 lyr PVC waterproofing
 - 50 mm EPS foam
 - 20 mm closed cell type insulation
 - 20 cm in-situ made reinforced concrete slab

┆ Vertical loads
 ┆ Vertical Load transfer
 — Horizontal Load transfer
 Load bearing elements RC

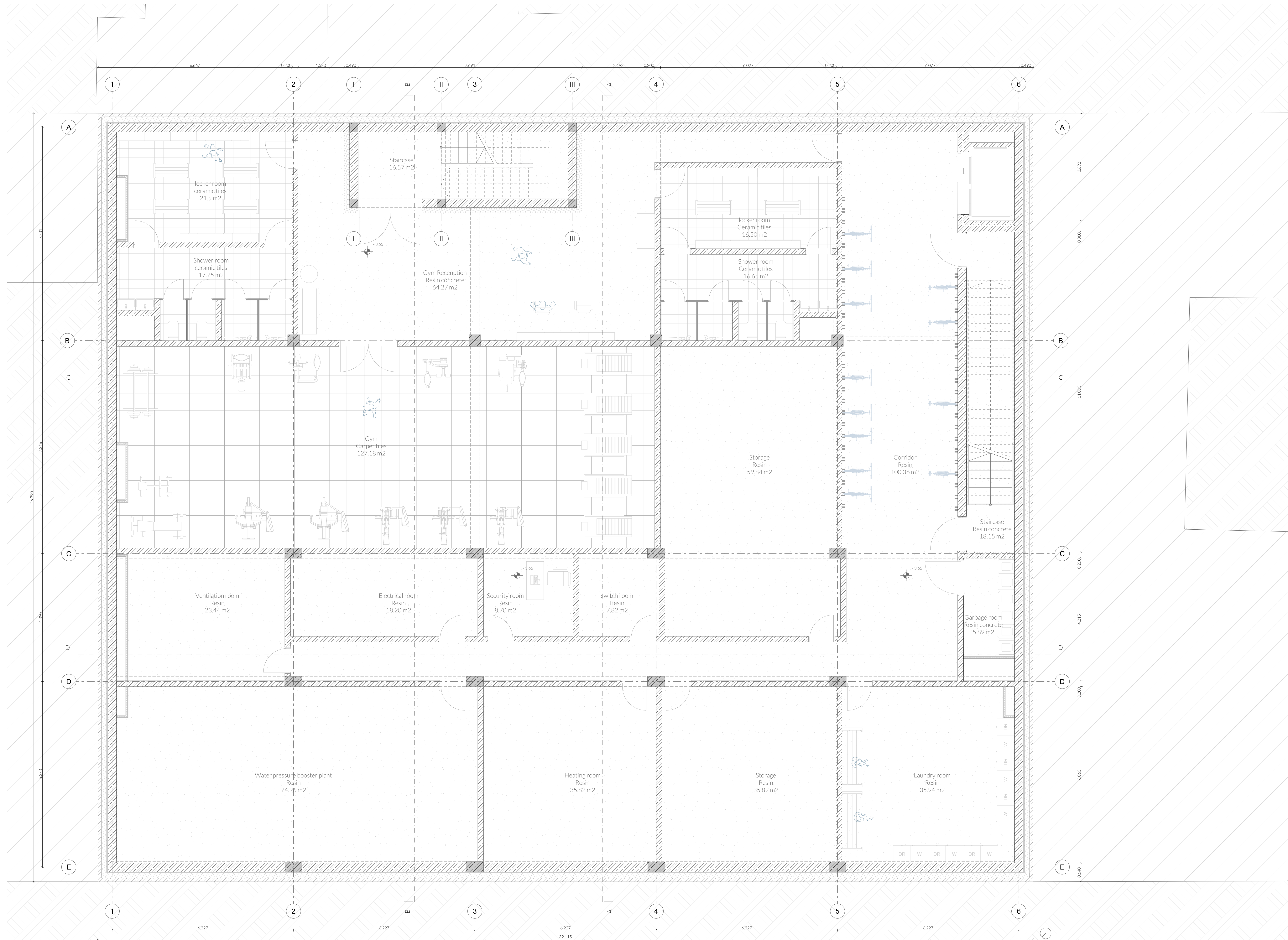


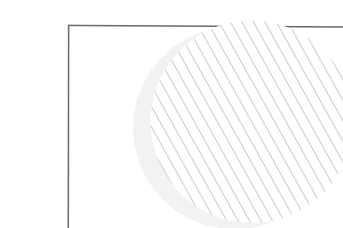
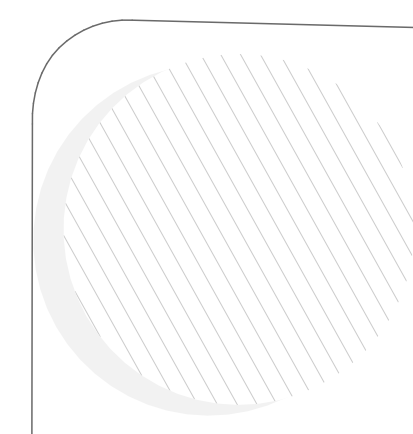
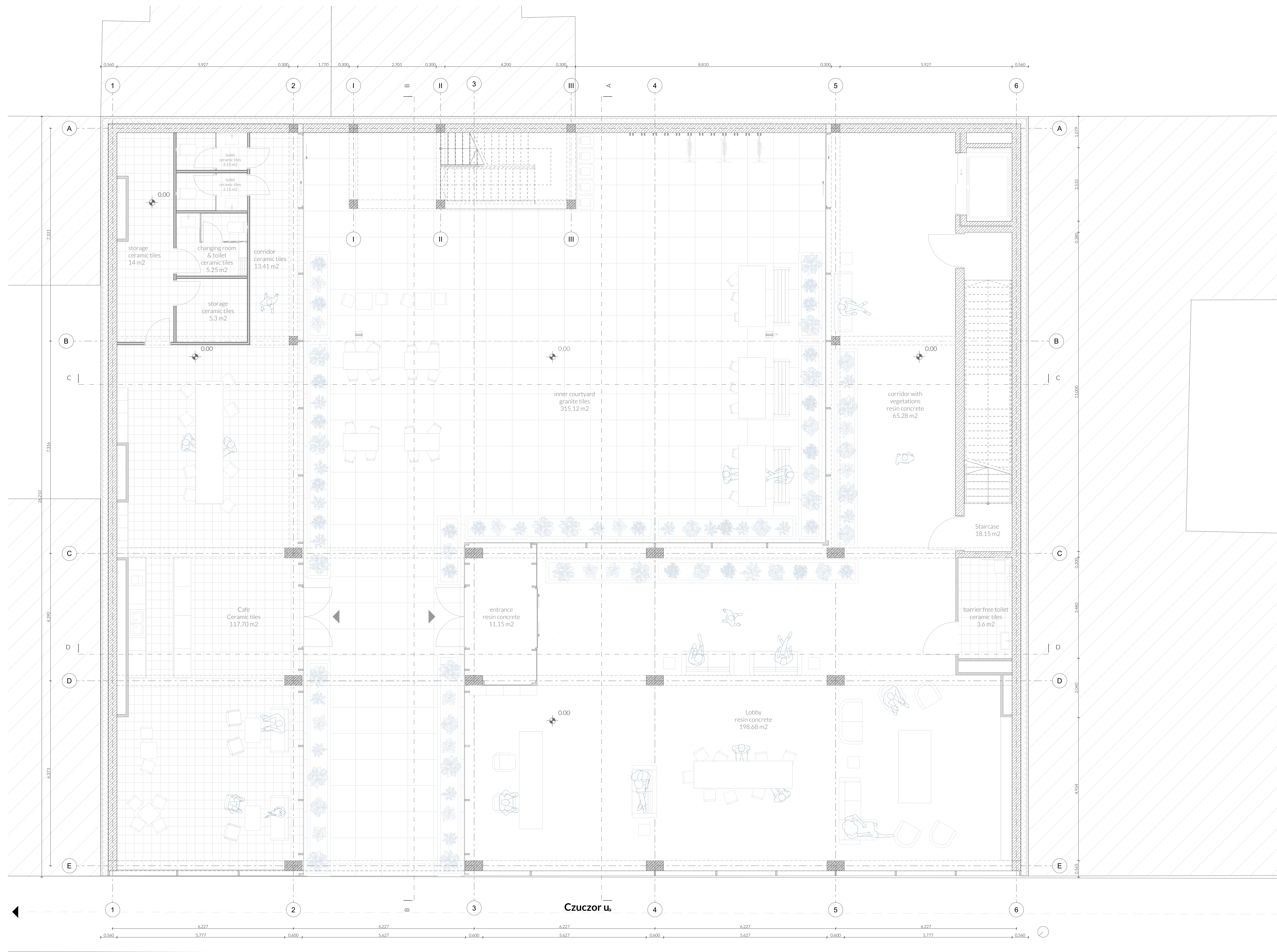
Siteplan 1:200

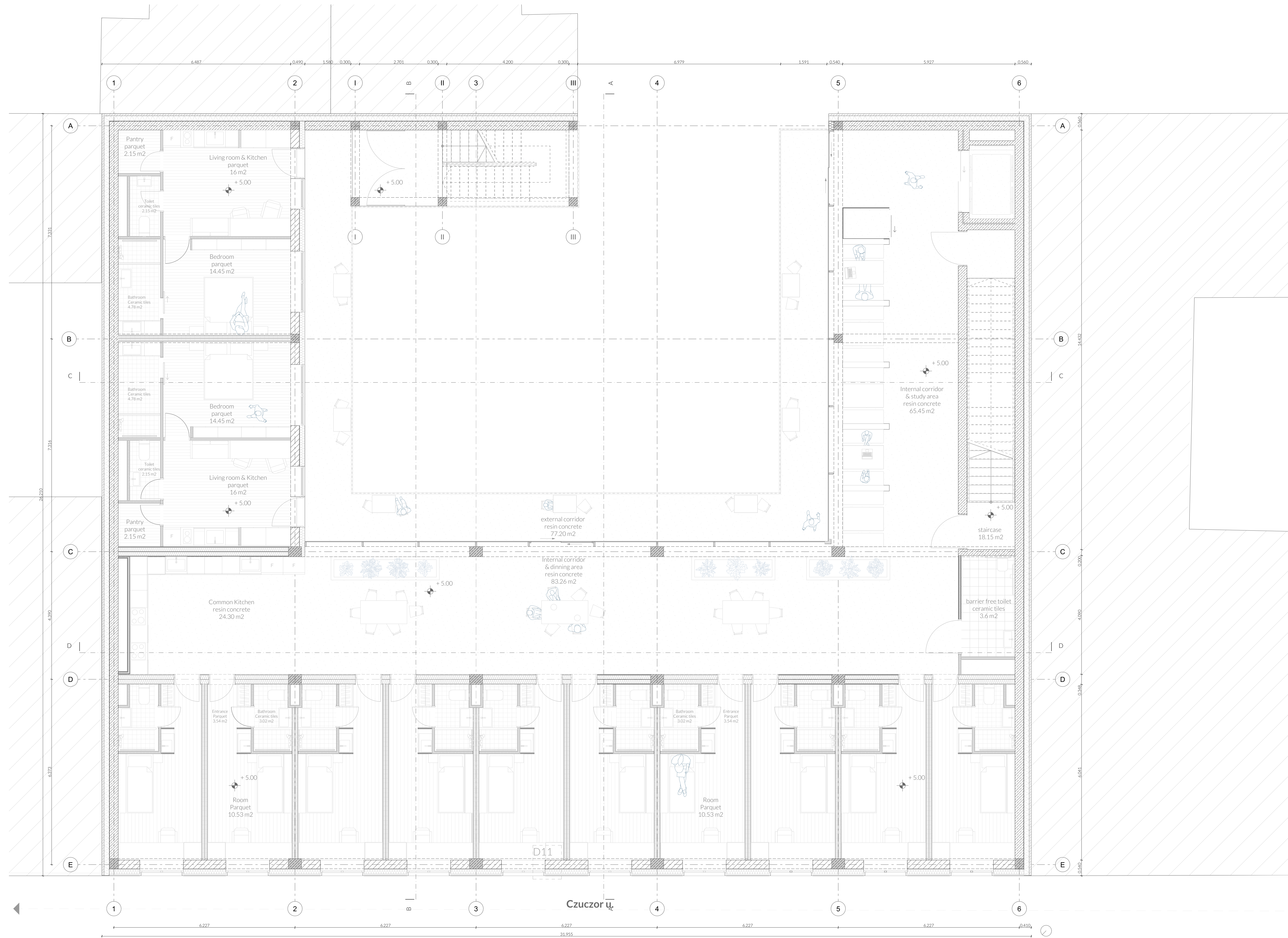


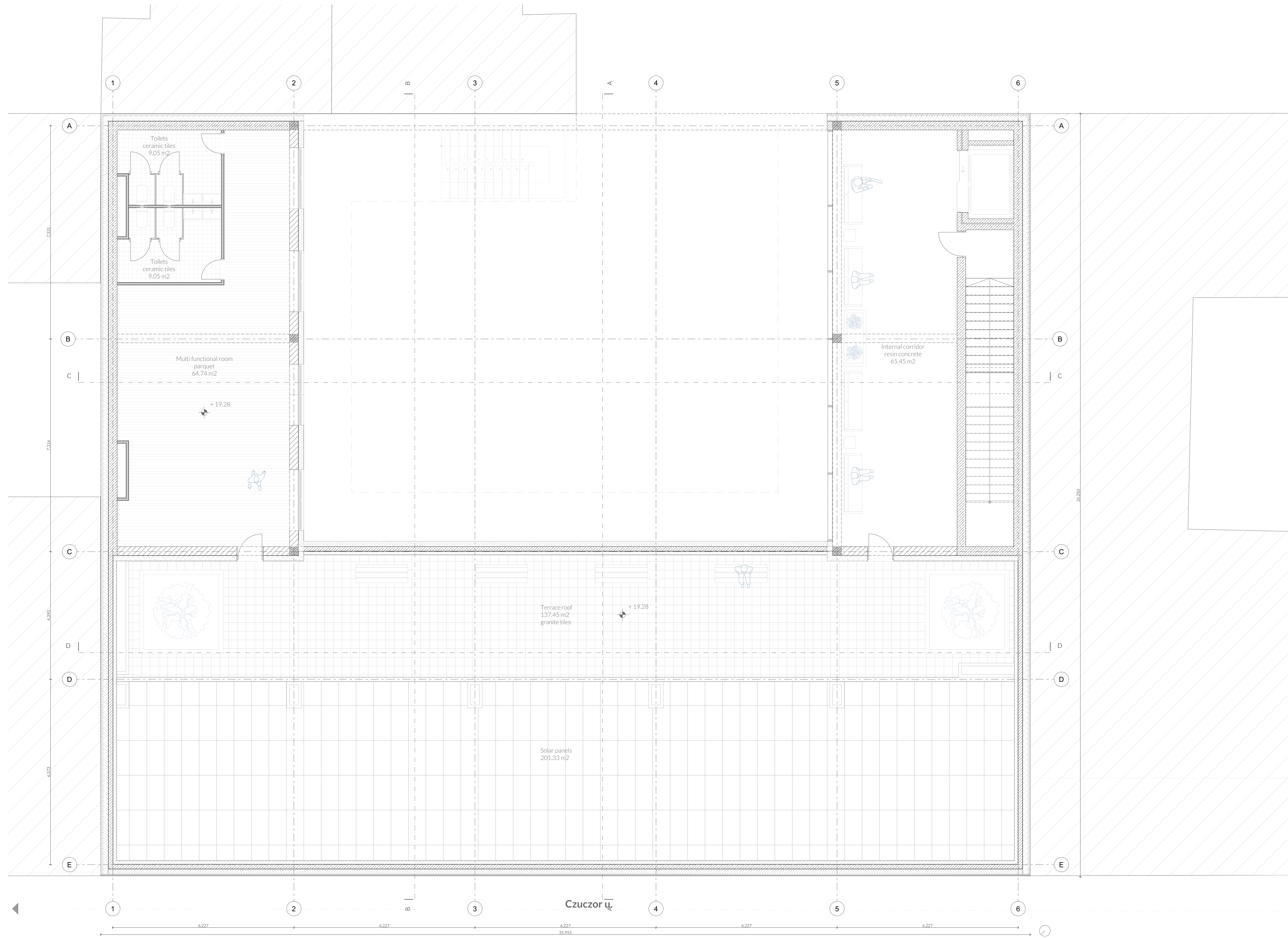
Siteplan 1:500

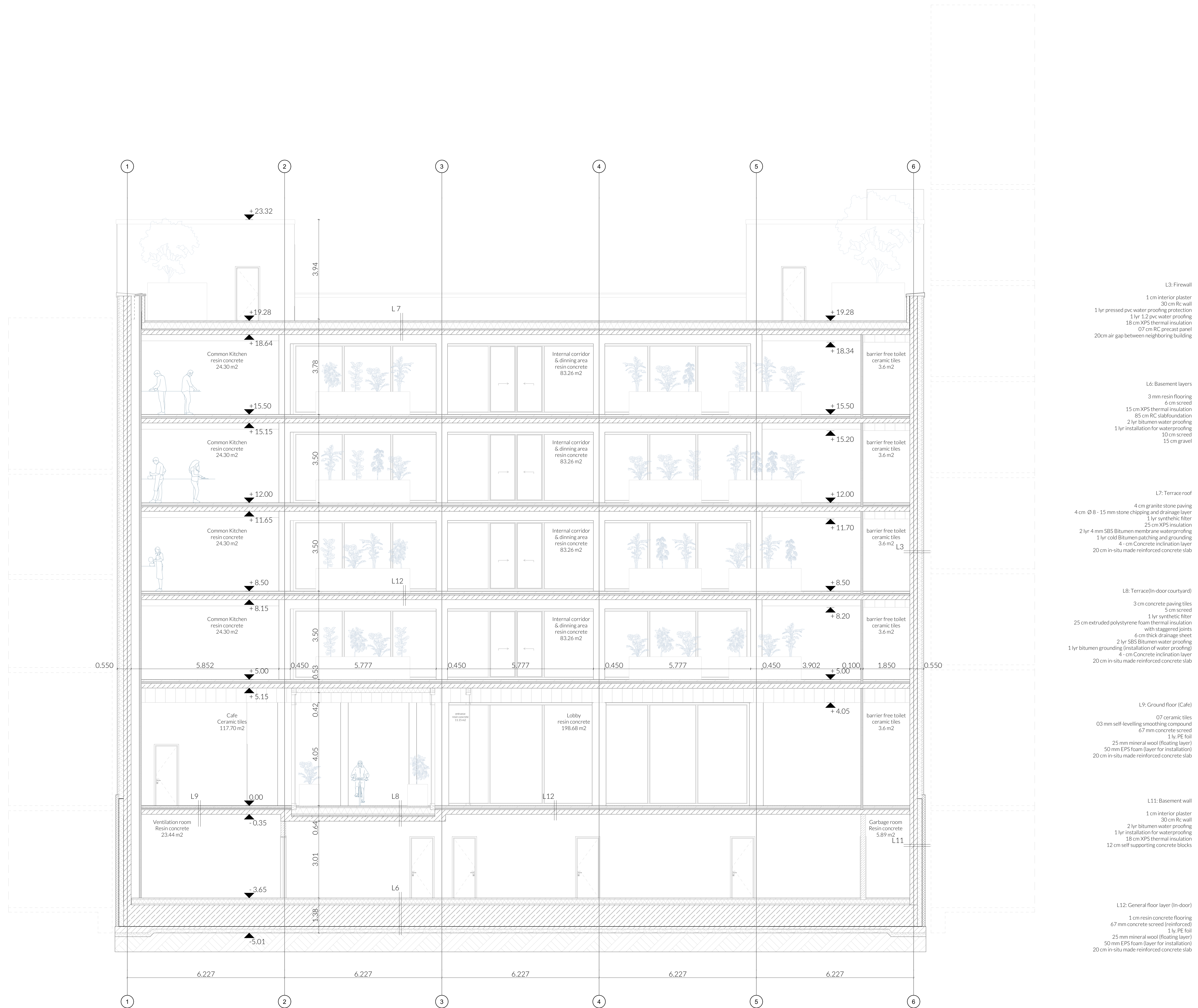












L3: Firewall
 1 cm interior plaster
 30 cm Rc wall
 1 yr pressed pvc water proofing protection
 1 yr 1.2 pvc water proofing
 18 cm XPS thermal insulation
 07 cm RC precast panel
 20cm air gap between neighboring building

L6: Basement layers
 3 mm resin flooring
 6 cm screed
 15 cm XPS thermal insulation
 85 cm RC slab foundation
 2 yr bitumen water proofing
 1 yr installation for waterproofing
 10 cm screed
 15 cm gravel

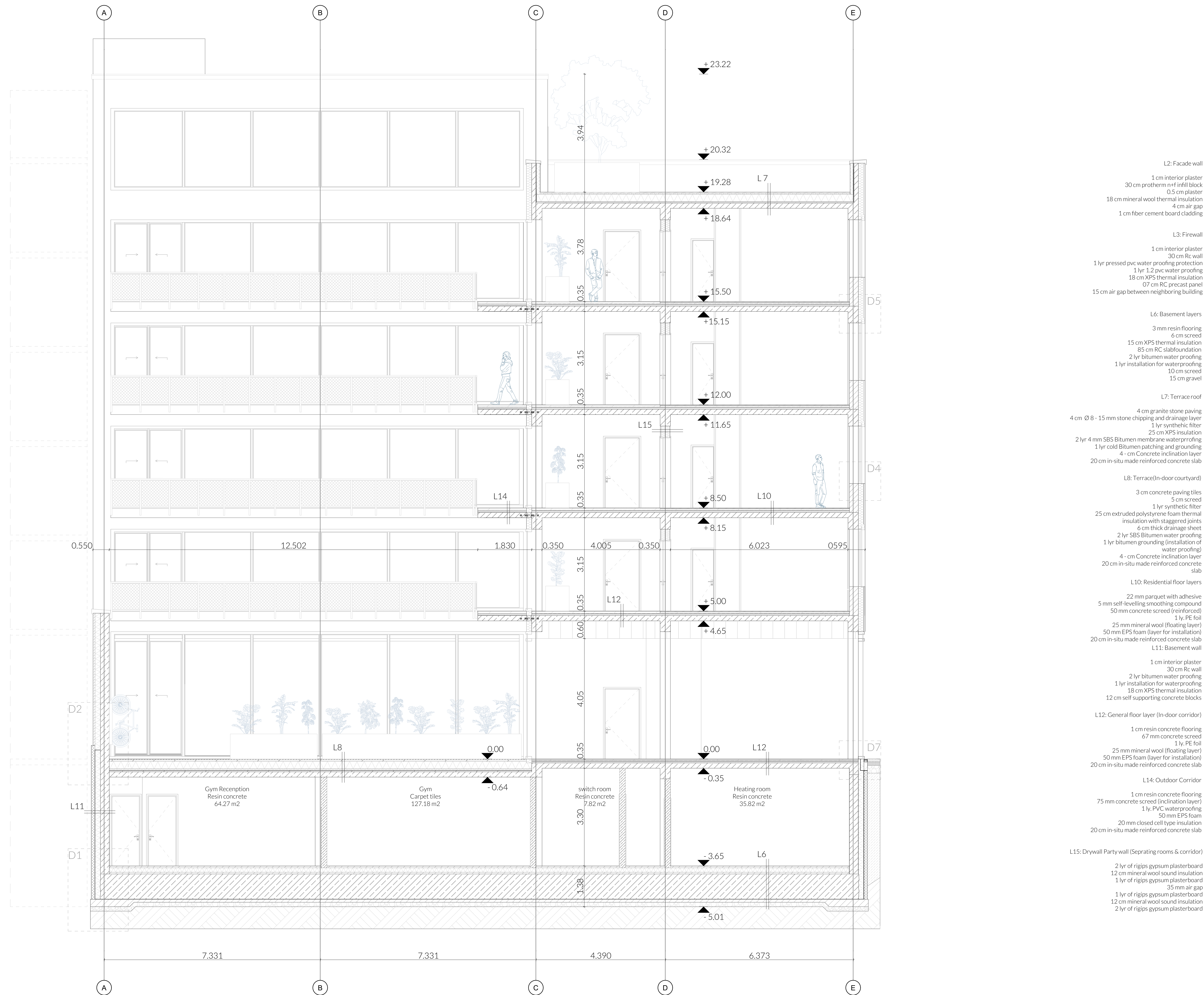
L7: Terrace roof
 4 cm granite stone paving
 4 cm Ø 8 - 15 mm stone chipping and drainage layer
 1 yr synthetic filter
 25 cm XPS insulation
 2 yr 4 mm SBS Bitumen membrane water proofing
 1 yr cold Bitumen patching and grounding
 4 - cm Concrete inclination layer
 20 cm in-situ made reinforced concrete slab

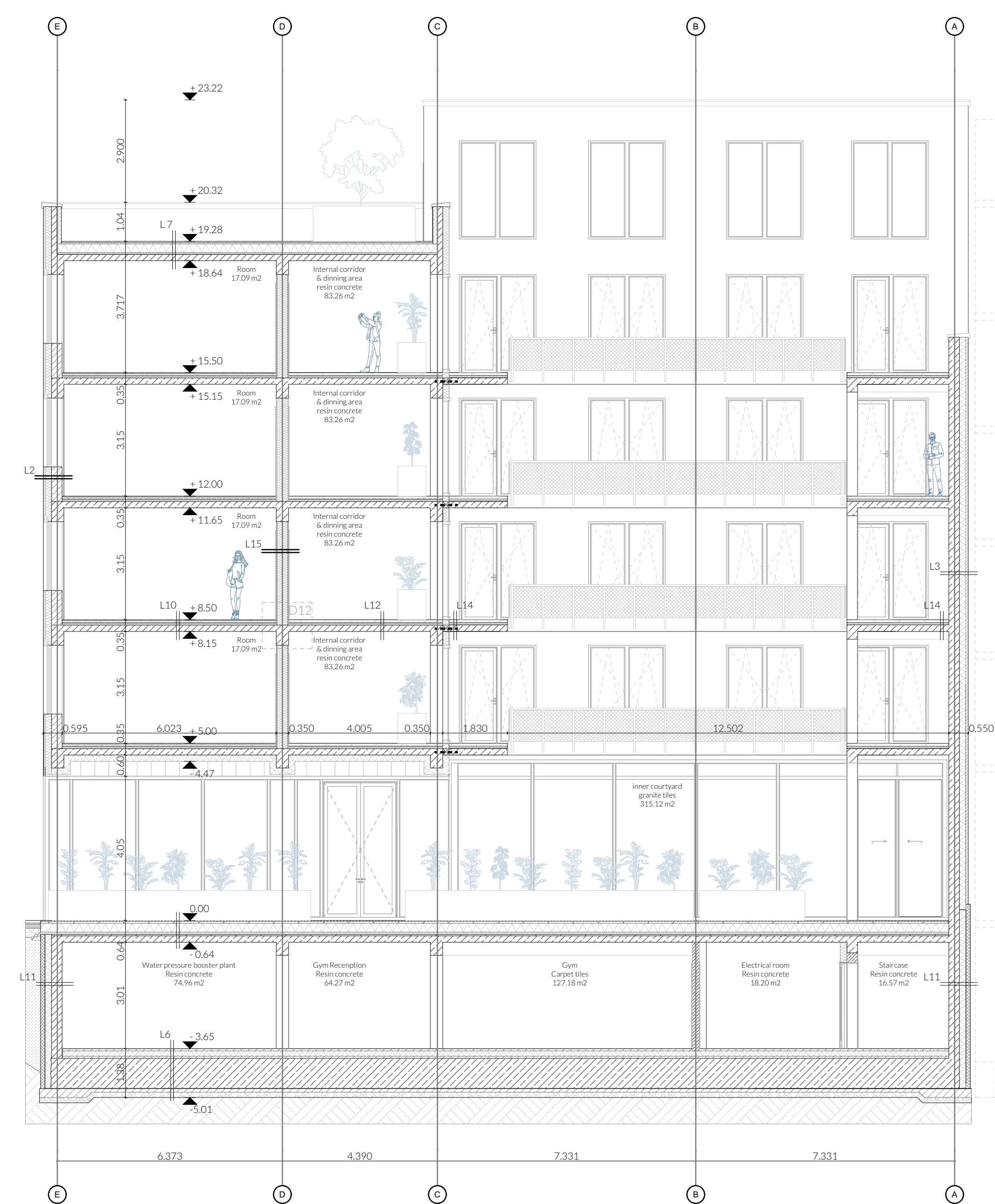
L8: Terrace(In-door courtyard)
 3 cm concrete paving tiles
 5 cm screed
 1 yr synthetic filter
 25 cm extruded polystyrene foam thermal insulation with staggered joints
 6 cm thick drainage sheet
 2 yr SBS Bitumen water proofing
 1 yr bitumen grounding (installation of water proofing)
 4 - cm Concrete inclination layer
 20 cm in-situ made reinforced concrete slab

L9: Ground floor (Cafe)
 07 ceramic tiles
 03 mm self-levelling smoothing compound
 67 mm concrete screed
 1 yr PE foil
 25 mm mineral wool (floating layer)
 50 mm EPS foam (layer for installation)
 20 cm in-situ made reinforced concrete slab

L11: Basement wall
 1 cm interior plaster
 30 cm Rc wall
 2 yr bitumen water proofing
 1 yr installation for waterproofing
 18 cm XPS thermal insulation
 12 cm self supporting concrete blocks

L12: General floor layer (In-door)
 1 cm resin concrete flooring
 67 mm concrete screed (reinforced)
 1 yr PE foil
 25 mm mineral wool (floating layer)
 50 mm EPS foam (layer for installation)
 20 cm in-situ made reinforced concrete slab





Section B - B

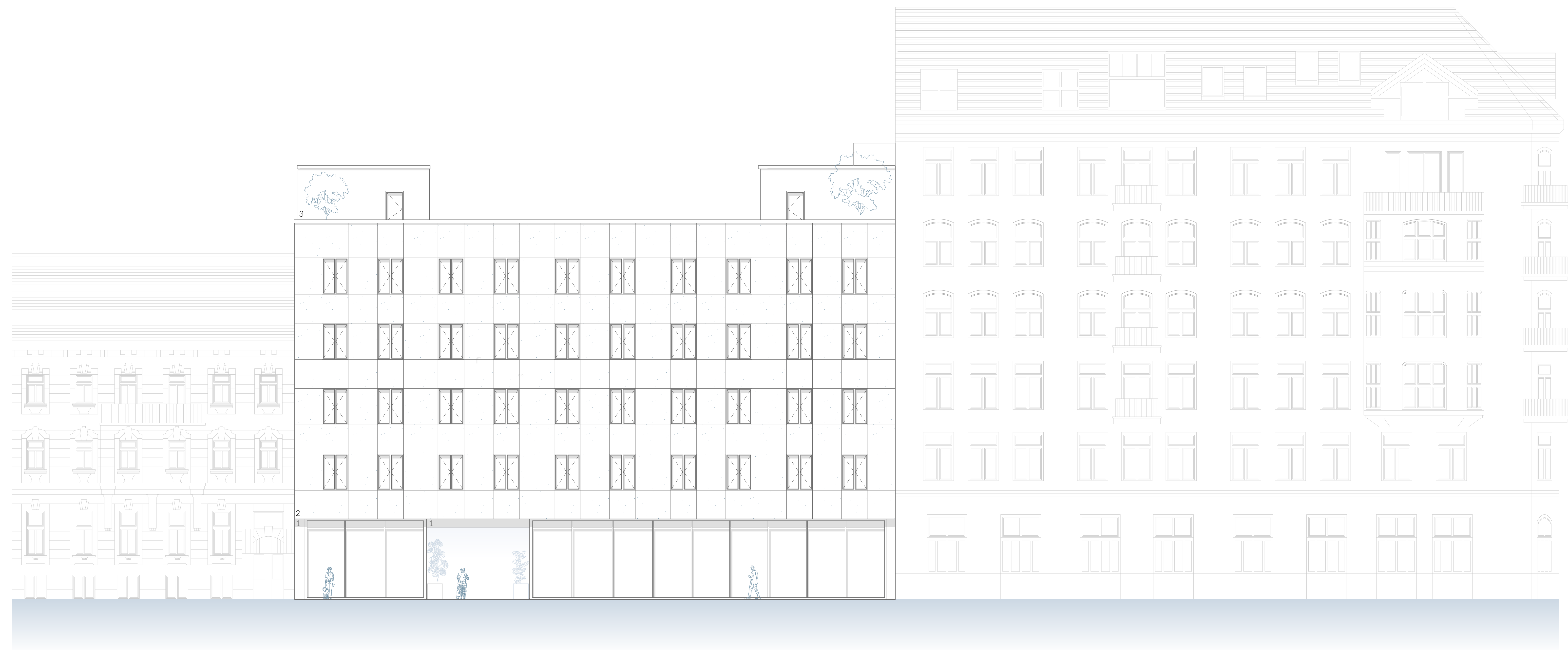
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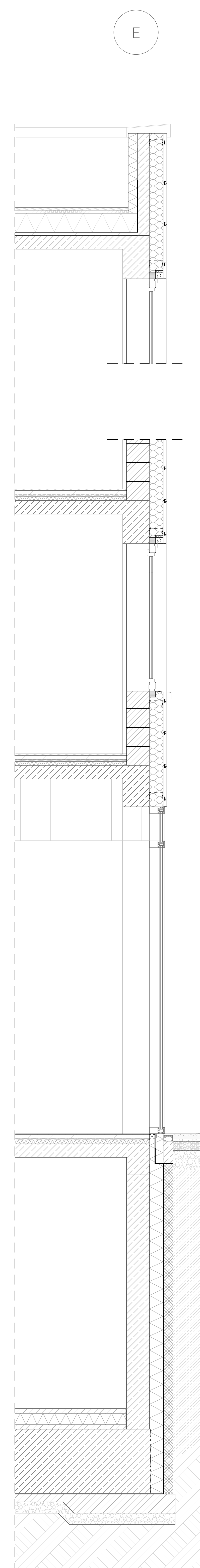
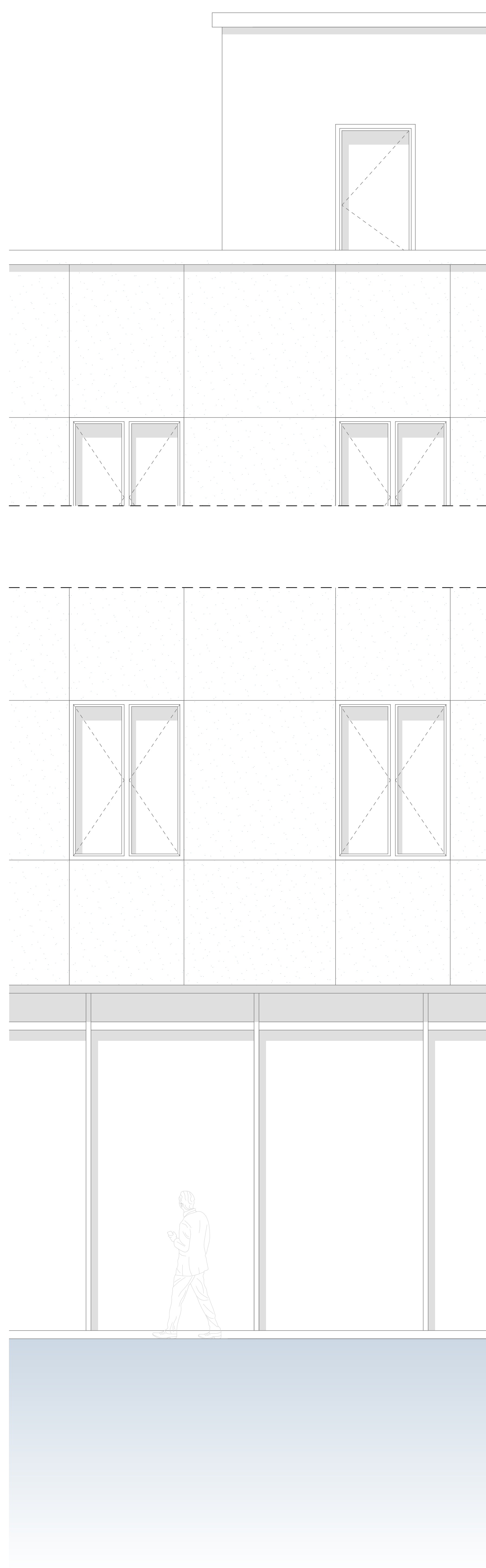
Section C - C

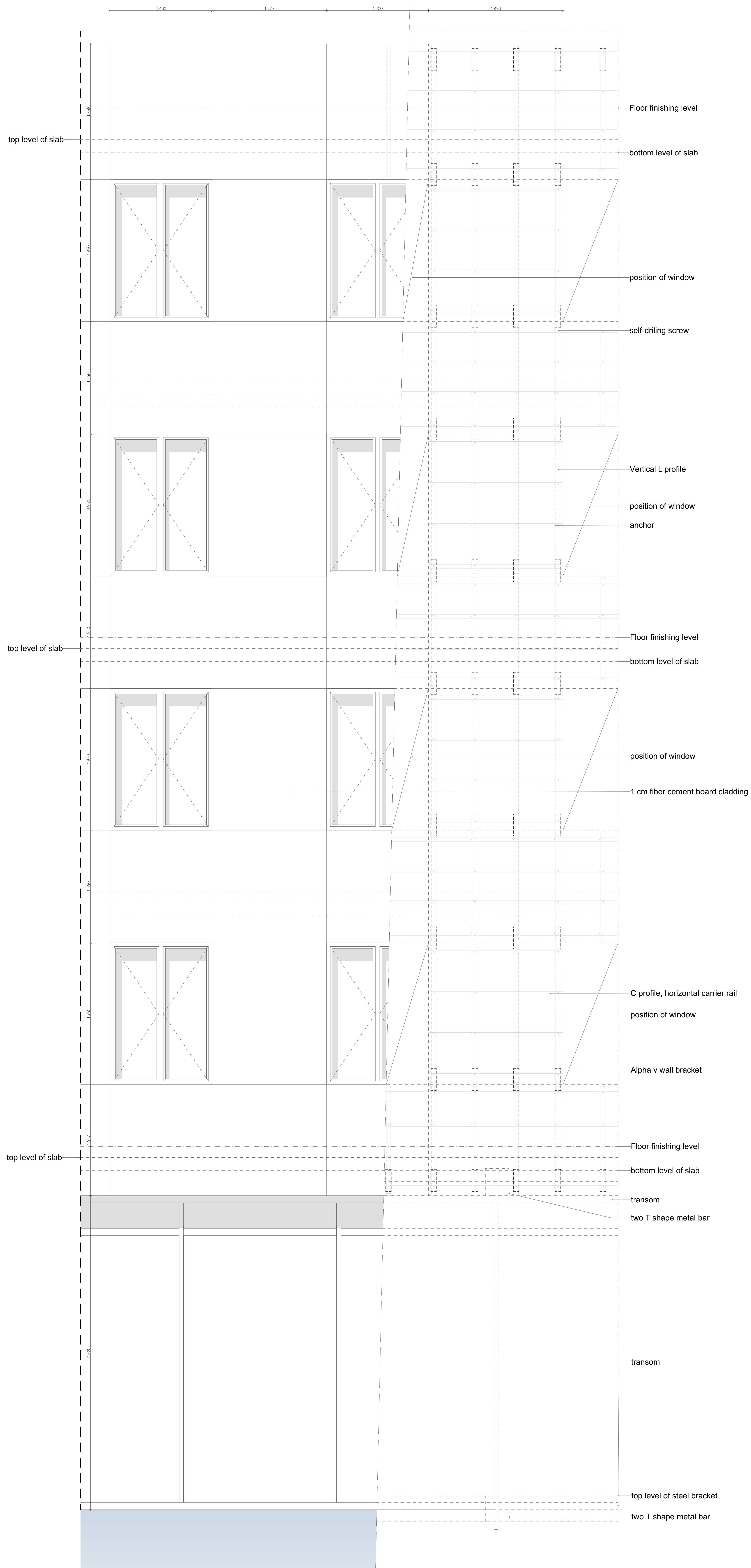
1:100

- L3 Fin wall
1 cm exterior plaster
20 cm mineral wool insulation
15 cm XPS thermal insulation
15 cm RC slab
15 cm air gap between neighboring building
- L6 Basement beam
20 cm concrete
15 cm XPS thermal insulation
15 cm RC slab
2 cm insulation for waterproofing
1 cm insulation for waterproofing
15 cm concrete
- L7 Terrace roof
4 cm gravel stone covering
15 cm stone chipping and drainage layer
1 cm concrete floor
25 cm XPS thermal insulation
2 cm 100% Bitumen waterproofing and grouting
4 cm Concrete insulation layer
20 cm in-situ made reinforced concrete slab
- L8 Terrace slab component
10 cm concrete paving slab
3 cm concrete
1 cm insulation
25 cm mineral wool insulation
1 cm insulation for waterproofing
1 cm 100% Bitumen waterproofing and grouting
4 cm Concrete insulation layer
20 cm in-situ made reinforced concrete slab
- L9 Ground floor (L14)
07 concrete slab
02 mm self-healing waterproofing compound
07 mm concrete
1 cm PE foil
02 mm mineral wool insulation
50 mm EPS foam board for insulation
20 cm in-situ made reinforced concrete slab
- L10 Basement wall
1 cm exterior plaster
20 cm mineral wool insulation
15 cm XPS thermal insulation
15 cm RC slab
15 cm air gap between neighboring building
- L11 General floor beam (in-door corridor)
15 cm reinforced concrete floor slab
4 cm XPS thermal insulation
15 cm RC slab
25 mm mineral wool insulation
20 cm EPS foam board for insulation
20 cm in-situ made reinforced concrete slab
- L12 Central floor (in-door)
10 cm reinforced concrete floor slab
4 cm XPS thermal insulation
15 cm RC slab
25 mm mineral wool insulation
50 mm EPS foam board for insulation
20 cm in-situ made reinforced concrete slab
- L13 In-situ reinforced floor
1 cm EPS foam board for insulation and grouting layer
1 cm insulation
1 cm 100% Bitumen waterproofing and grouting
25 cm reinforced concrete floor slab
1 cm PE foil
25 cm mineral wool insulation
50 mm EPS foam board for insulation
20 cm in-situ made reinforced concrete slab
- L14 Outdoor Corridor
10 cm reinforced concrete floor slab
25 mm mineral wool insulation
15 cm XPS thermal insulation
15 cm RC slab
20 cm EPS foam board for insulation
20 cm in-situ made reinforced concrete slab



1. Aluminium thin profile 2. Fiber cement board cladding 3. Plaster

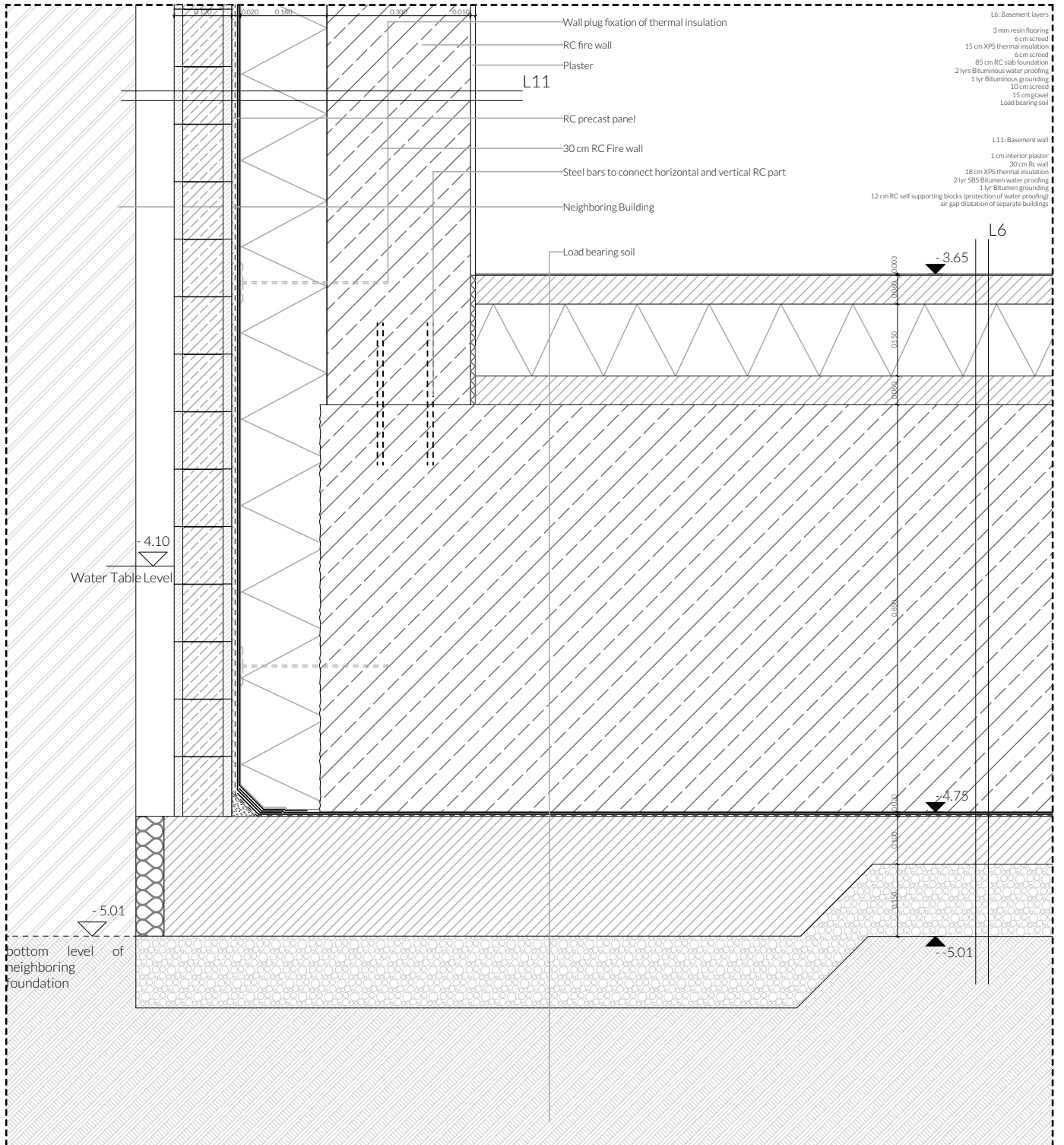




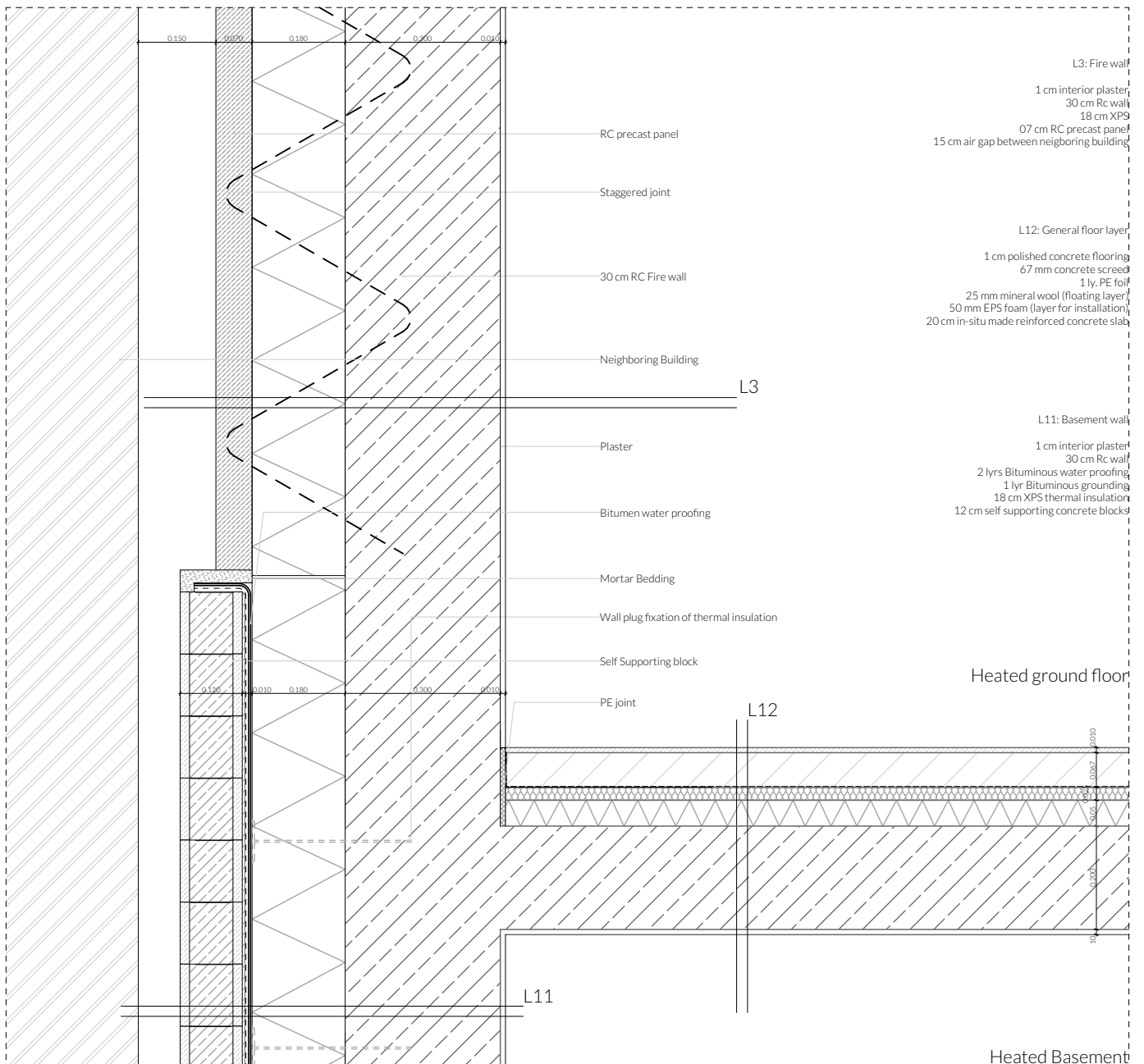
Facade Fastening



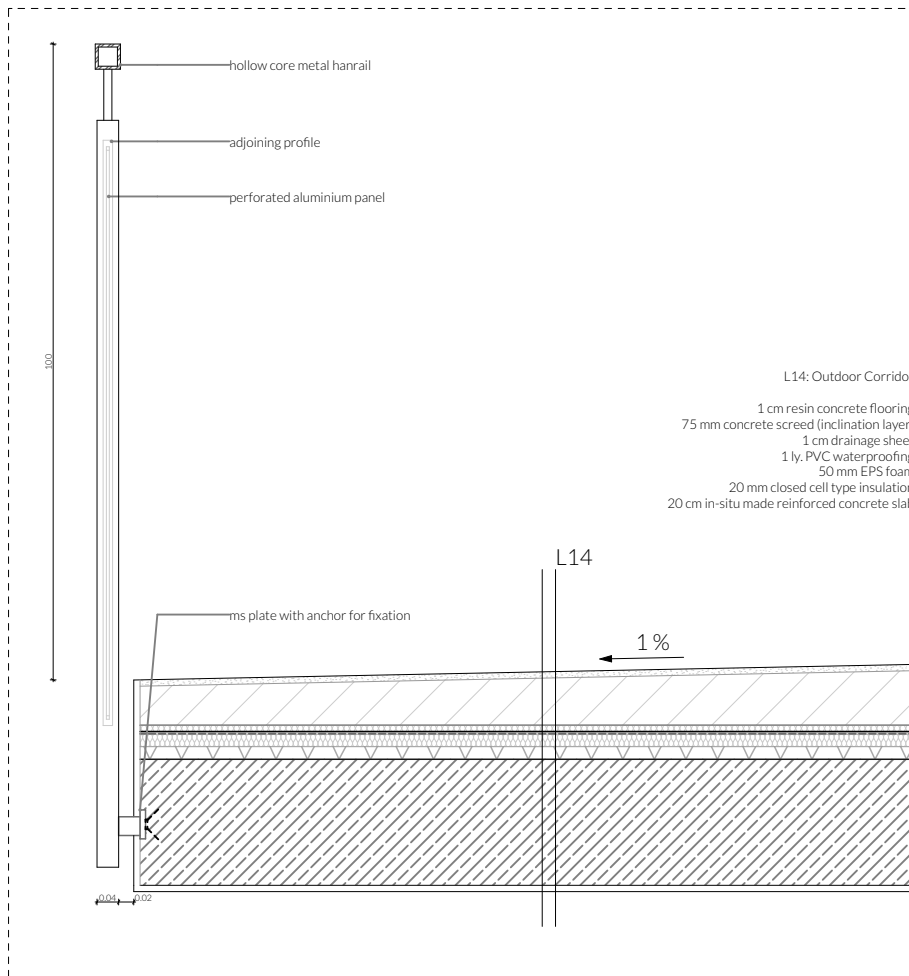
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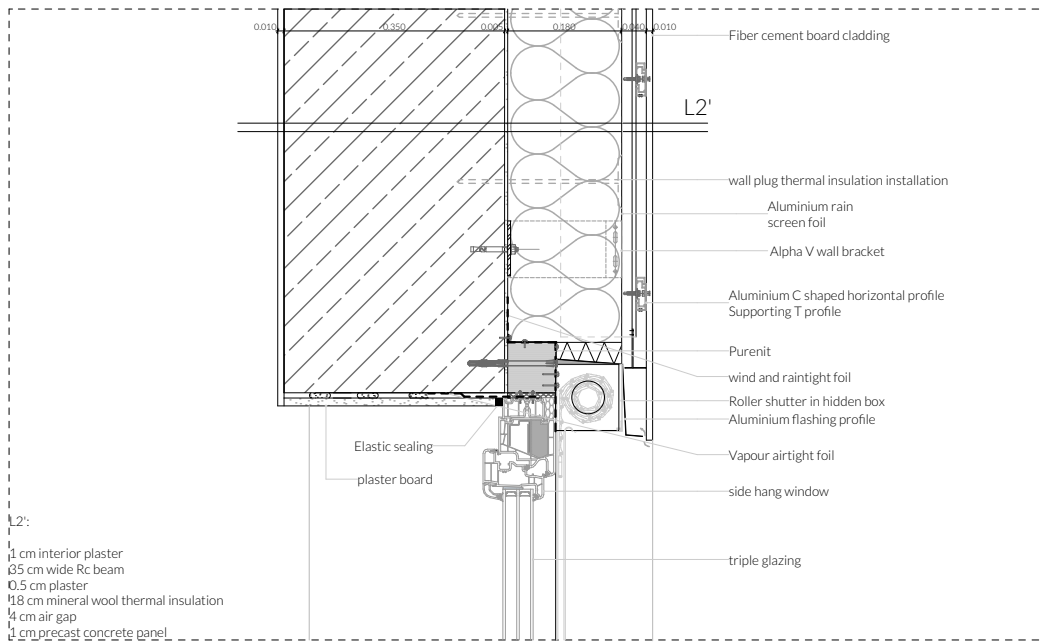
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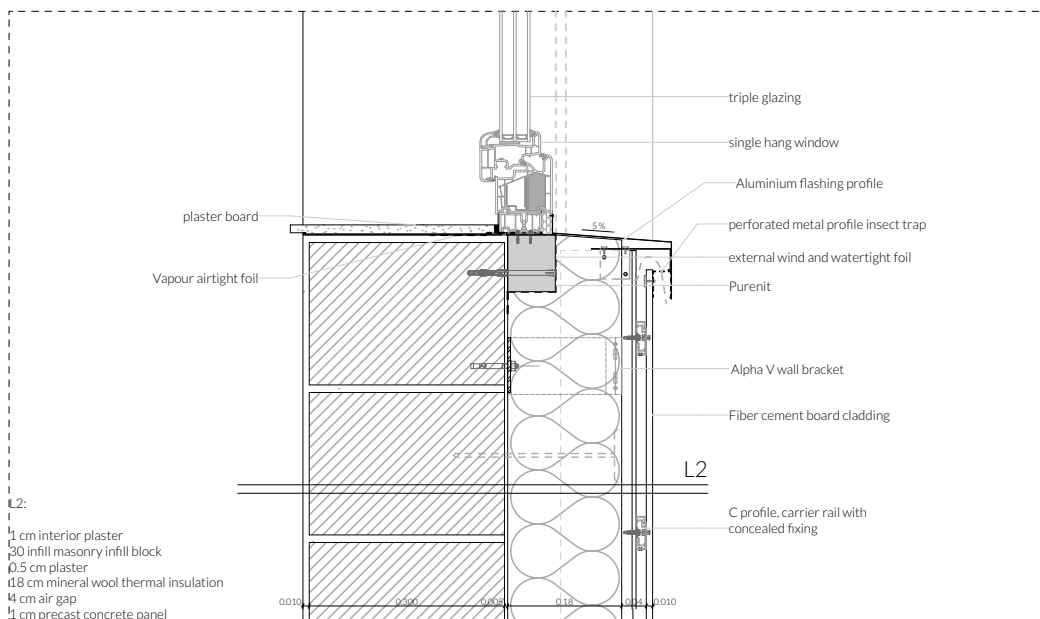
D3



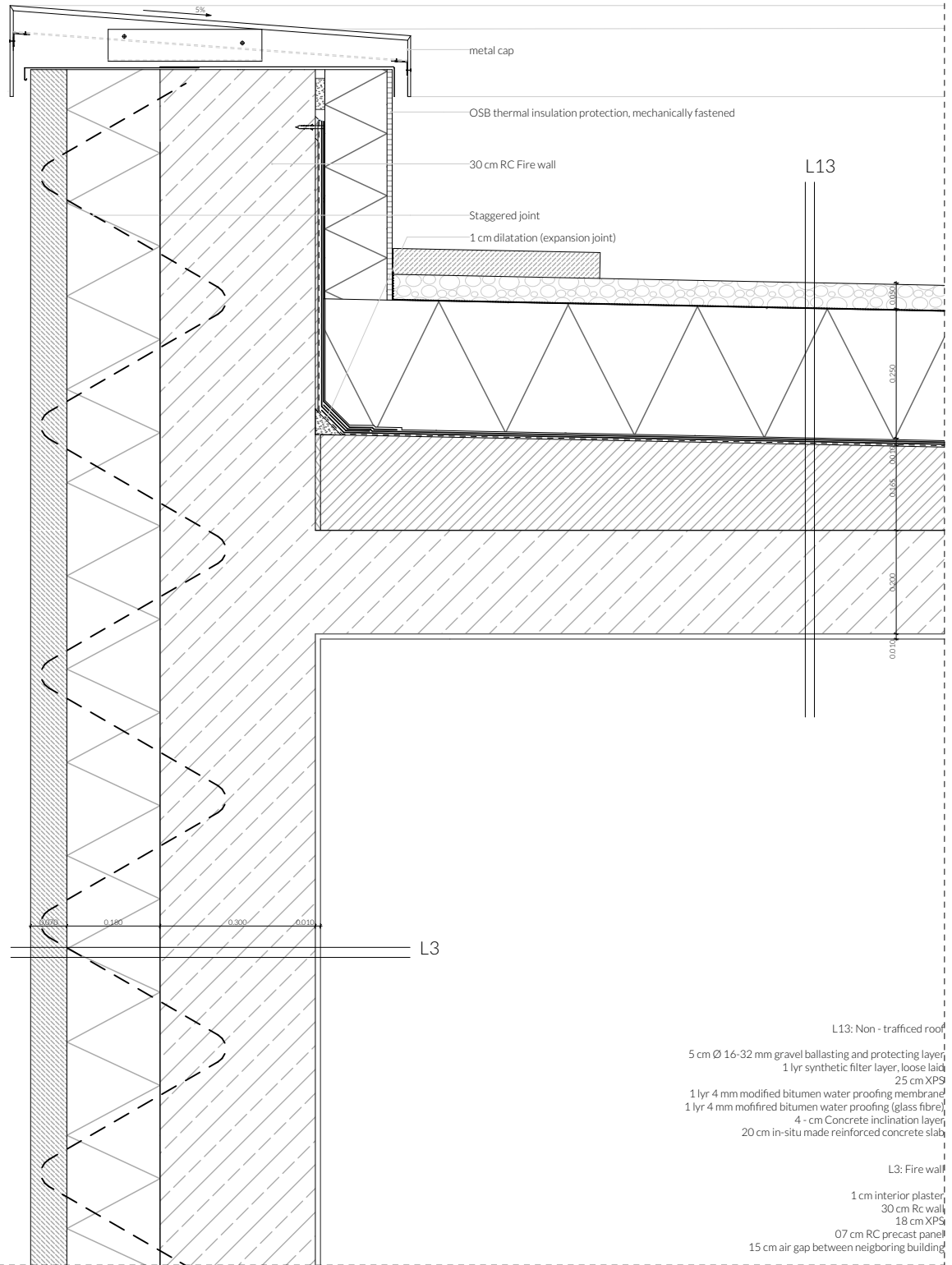
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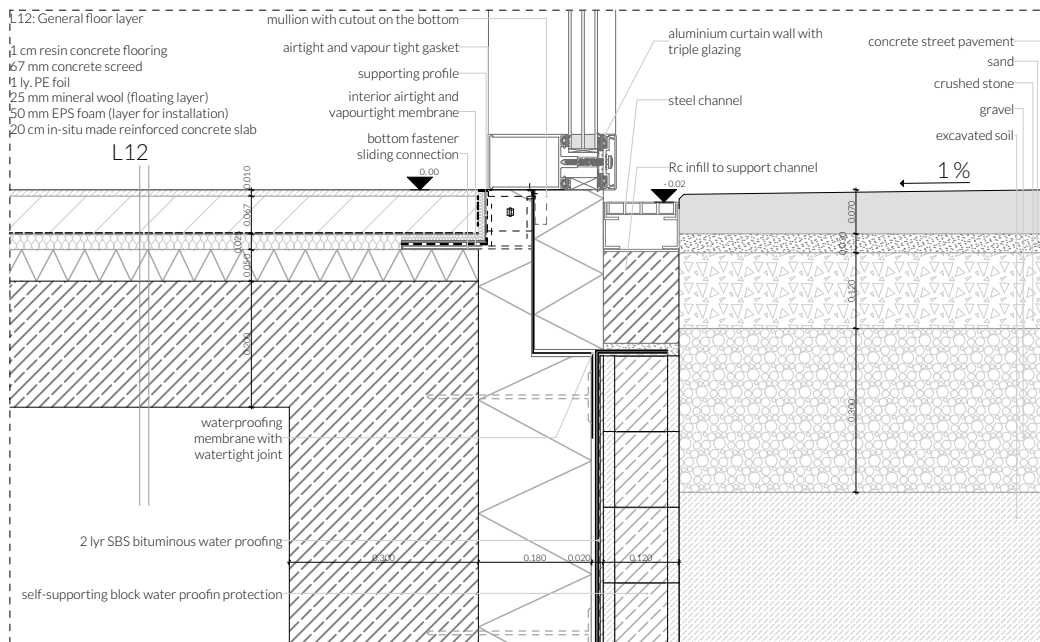
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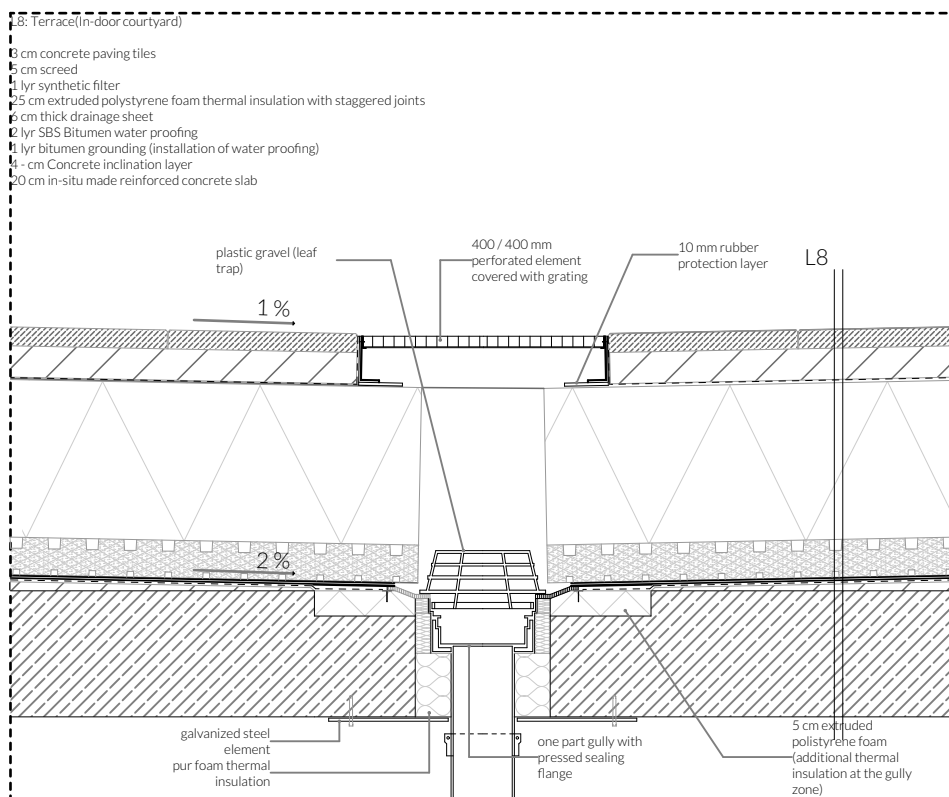
D6



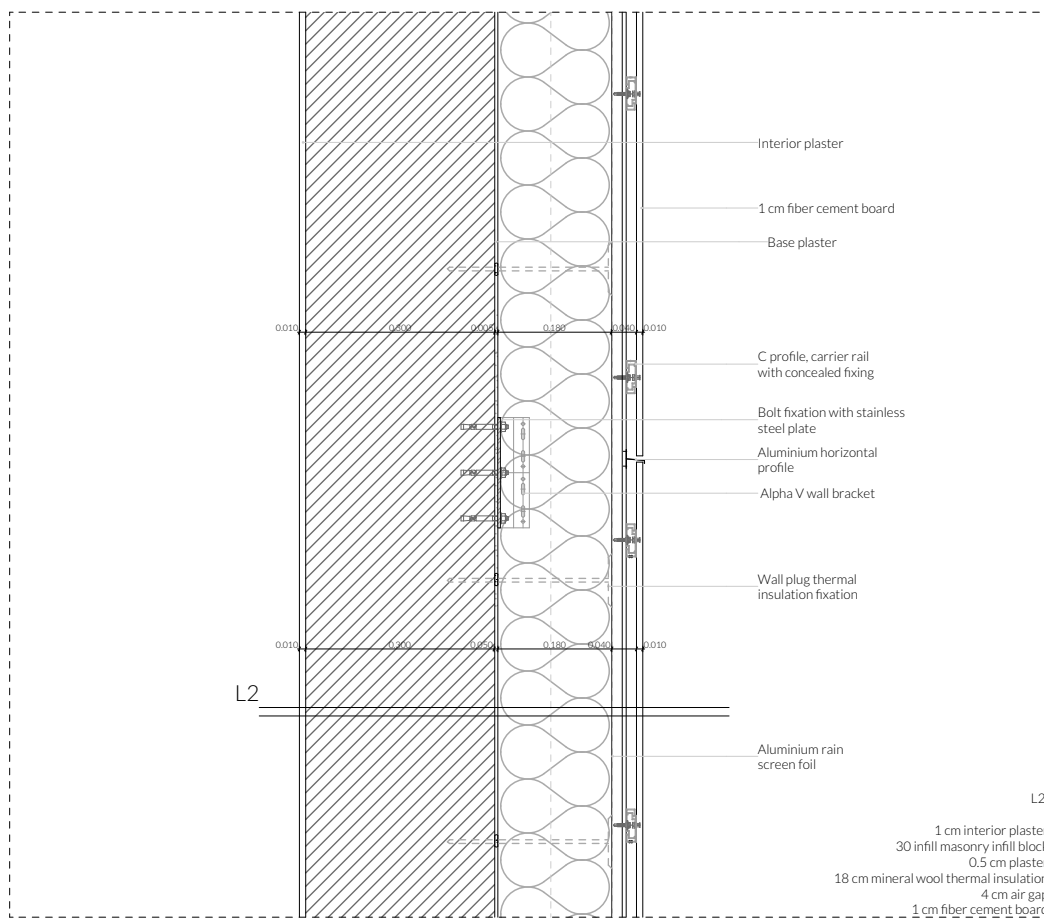
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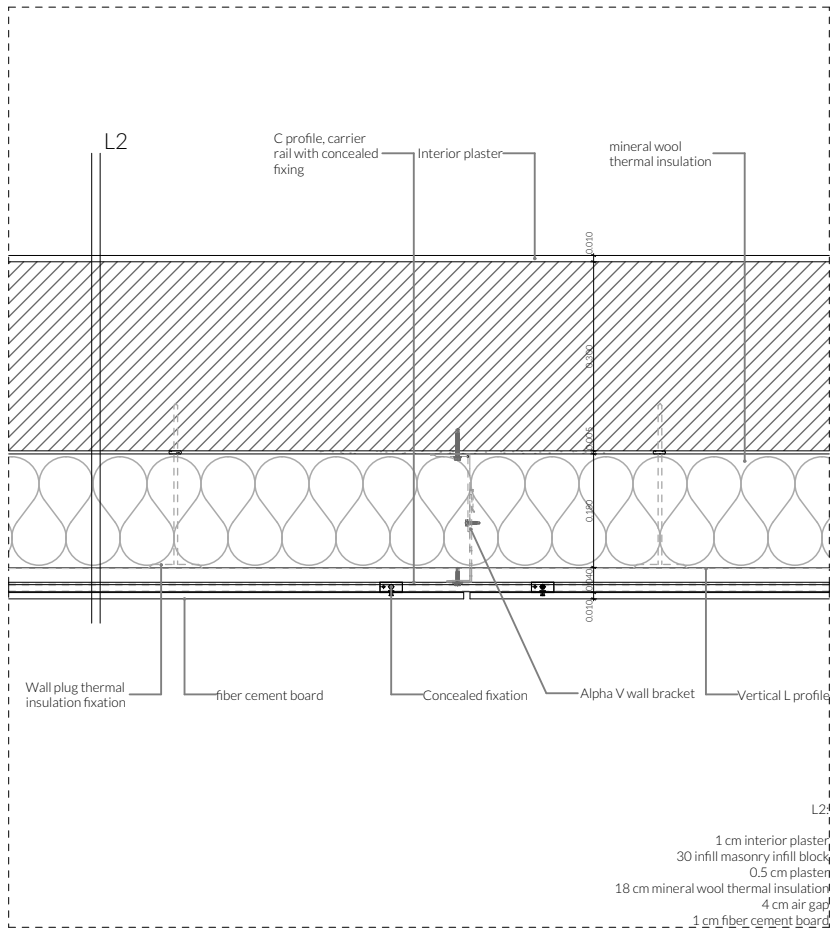
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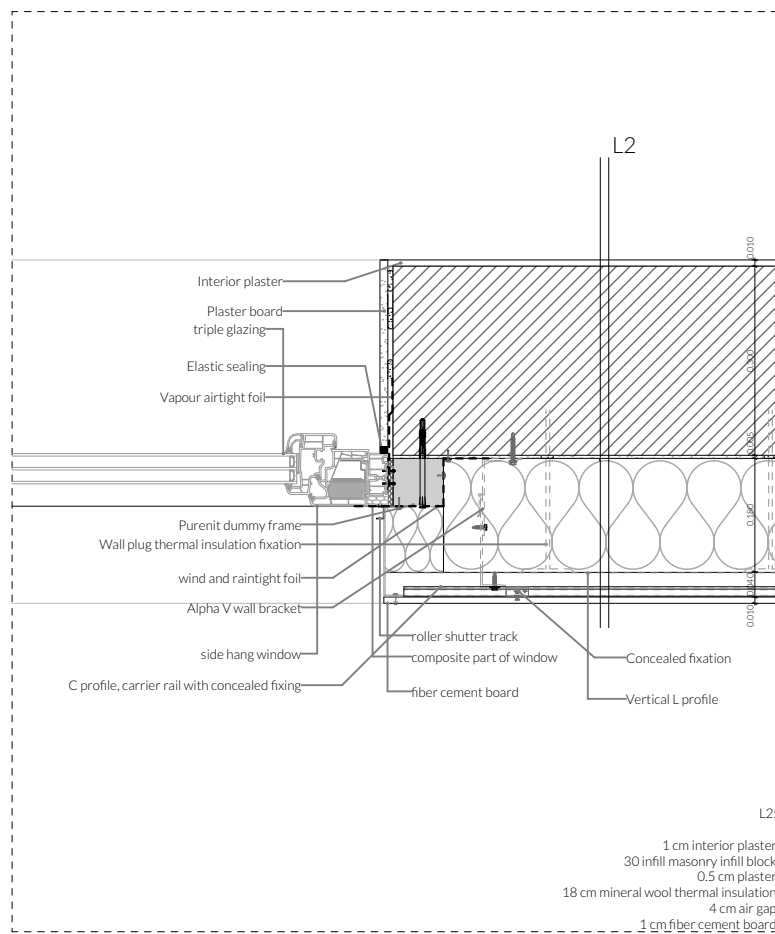
D9



D10



D11



D12

