

Roberto Bianchi
Spartaco Paris

Architettura e Costruzione

Tecniche di rappresentazione del progetto architettonico

Compendio didattico per il Laboratorio di Costruzione
dell'Architettura 2

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dell'Architettura 2

Coordinamento scientifico e curatela

Roberto Bianchi
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Rassegna estratta da **Professor Eberle, D. (2014). Handwerkheft II. ETH Zurich: Department Architektur, Entwurf III/IV.**
Deplazes, A. (2005). Constructing Architecture, materials, processes structures. Basel: Birkhäuser – Publishers for Architecture

Le schede sono state redatte a cura di
Angelo Figliola

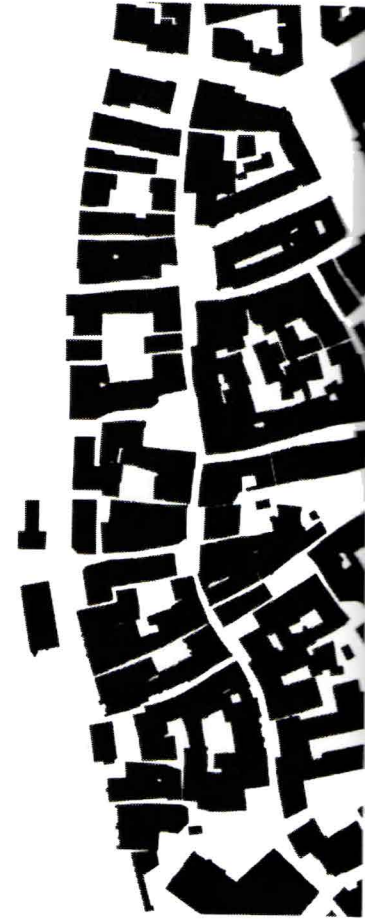
Nota alla lettura degli elaborati

La rassegna critica di materiali raccolti costituisce una guida alla rappresentazione dei progetti architettonici dalla scala urbana agli aspetti costruttivi e tecnologici passando attraverso la realizzazione dei modelli fisici al fine di individuare una comune base di rappresentazione e facilitare la valutazione in sede d'esame.

I materiali utilizzati, elaborati in originali con scale comprese tra 1:500 e 1:20, sono stati ridotti alla stessa scala di rappresentazione.

Pieni ■ Nero 100%

Vuoti □ Bianco



0 100 200 m

M 1:5000 scala urbana



Figurplan

Luogo /

Luogo _ Struttura _ Involucro /

Luogo _ Struttura _ Involucro _ Programma _ Matericità

Vuoti

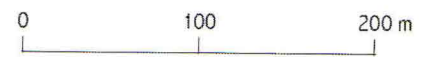
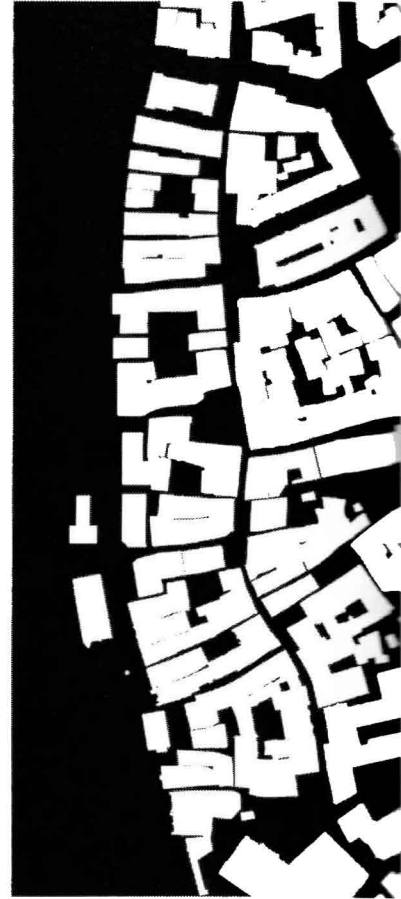


Bianco

Pieni



Nero 100%



M 1:5000

scala urbana



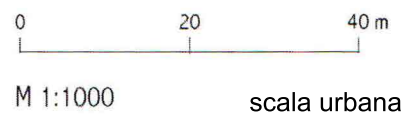
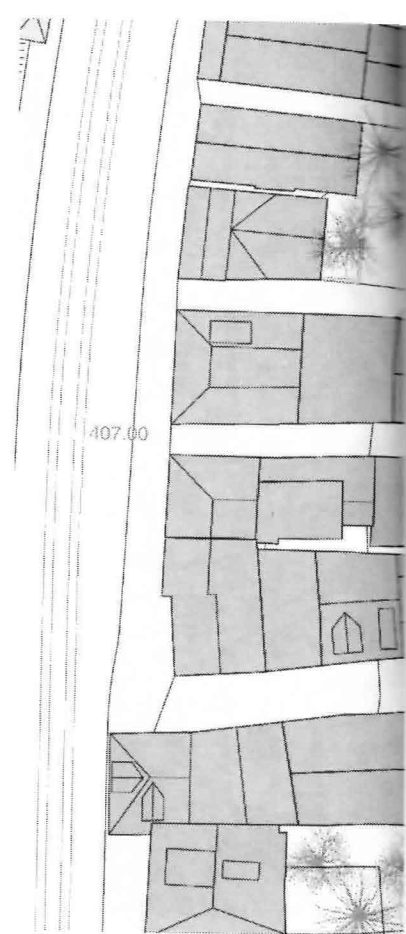
Grundplan

Luogo /

Luogo _ Struttura _ Involucro /

Luogo _ Struttura _ Involucro _ Programma _ Matericità

Bordi, contorni etc.	— 0.03 mm, Nero	50%
Coperture	— 0.05 mm, Nero	100%
Strade	— 0.13 mm, Nero	100%
Füllung Strassen	□ Bianco	100%
Füllung öffentlicher Aussenraum	□ Nero	20%
Füllung halbprivater Aussenraum	□ Nero	15%
Füllung Dach Gebäudehöhe <8m	■ Nero	40%
Füllung Dach Gebäudehöhe >8m	■ Nero	50%
Füllung Dach Gebäudehöhe >25m	■ Nero	60%
Alberature, vegetazione	☼ JPG/PNG,	
Simbolo del Nord	⊕ 0.05/0.25 mm, Nero	100%
Beschriftung Höhenkoten	407.00 Helvetica Reg. 8pt, Nero	80%
Beschriftung Strassen, Wege etc.	abc Helvetica Reg. 8pt, Nero	100%





Quartierplan

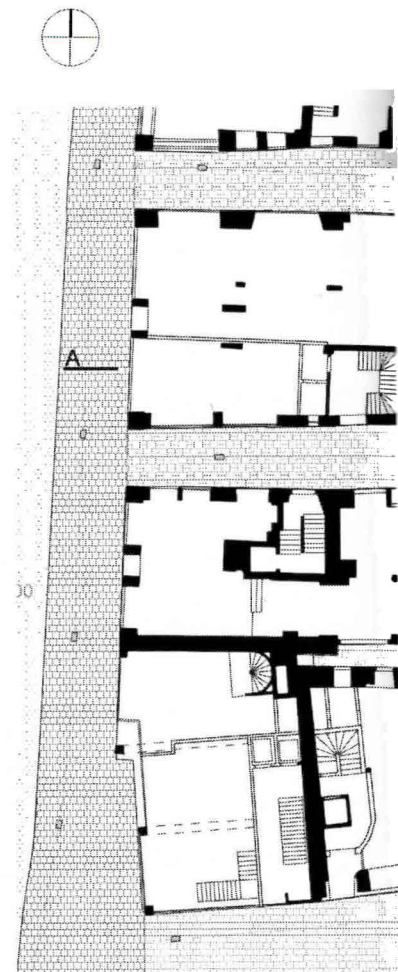
Ort /

Ort_Struktur_Hülle /

Ort_Struktur_Hülle_Programm_Materialität

Schienen, Höhenkurven etc.	—	0.03 mm, Schwarz 50%
Trottoir, Strassen	—	0.05 mm, Schwarz 100%
Ansicht Bestand+Neubau	—	0.08 mm, Schwarz 100%
Schnitt Bestand+Neubau	—	0.13 mm, Schwarz 100%
Schnitt Abbruch	—	0.08 mm, Schwarz 40%
Füllung tragende Wände	■	Schwarz 100%
Füllung n. tragende Wände Abbruch	■	Schwarz 60%
Füllung versiegelte Belege*	▒	Textur
Füllung n. versiegelte Wege	▒	0.03 mm, Schwarz 40%
Baumstämme geschnitten	○	0.03 mm, Schwarz 100%
Nordpfeil	⊕	0.05/0.25 mm, Schwarz 100%
Beschriftung Wege, Höhenlinien etc.	abc	Helvetica Reg. 8pt, Schwarz 100%

* Die verschiedenen Oberflächen im Aussenraum sind aufzunehmen und darzustellen, siehe Beispiel Strasse, Asphalt, Pflastersteine etc.



0 10 20 m

M 1:500

Ebene Stadt



Situationsplan

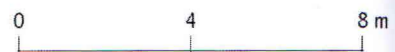
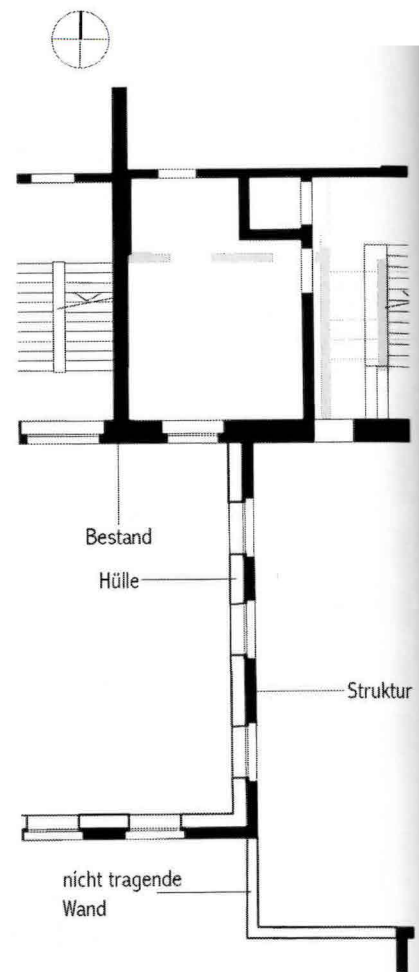
Ort / Struktur /

Ort_Struktur_Hülle /

Ort_Struktur_Hülle_Programm_Materialität

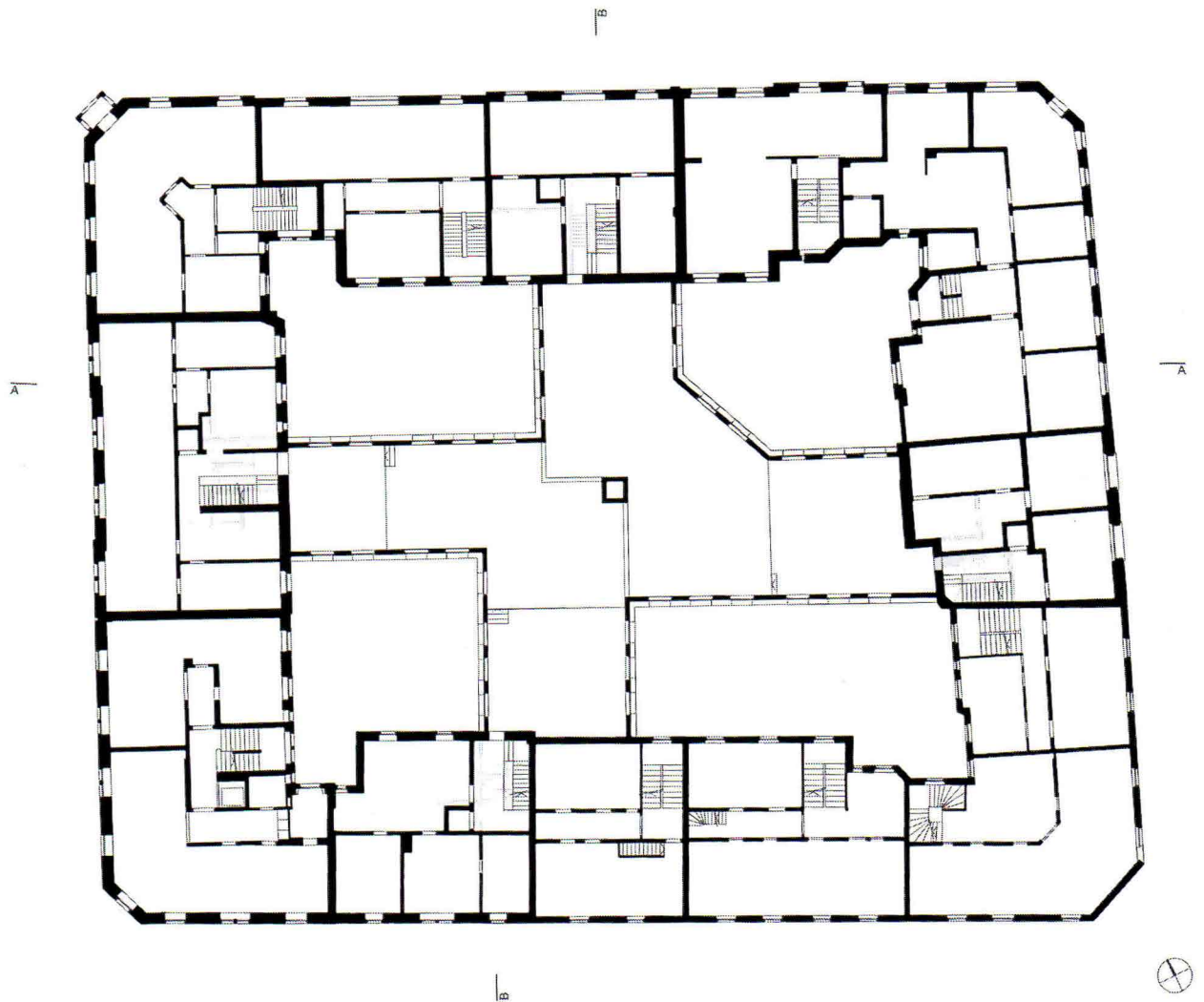
Ansicht Bestand / Neubau	— 0.05 mm, Schwarz 100%
Ansicht Abbruch	- - - 0.05 mm, Schwarz 100%
Schnitt Hülle*	— 0.20 mm, Schwarz 100%
Schnitt Abbruch	— 0.20 mm, Schwarz 40%
Symbole	— 0.30 mm, Schwarz 100%
Füllung tragende Wände	■ Schwarz 100%
Füllung nicht tragende Wände	□ Weiss
Füllung Abbruch	■ Schwarz 20%
Nordpfeil	⊕ 0.05/0.25 mm, Schwarz 100%
Beschriftung	abc Helvetica Reg. 8pt, Schwarz 100%

* Der zweischalige Aufbau der Wände ist darzustellen.



M 1:200

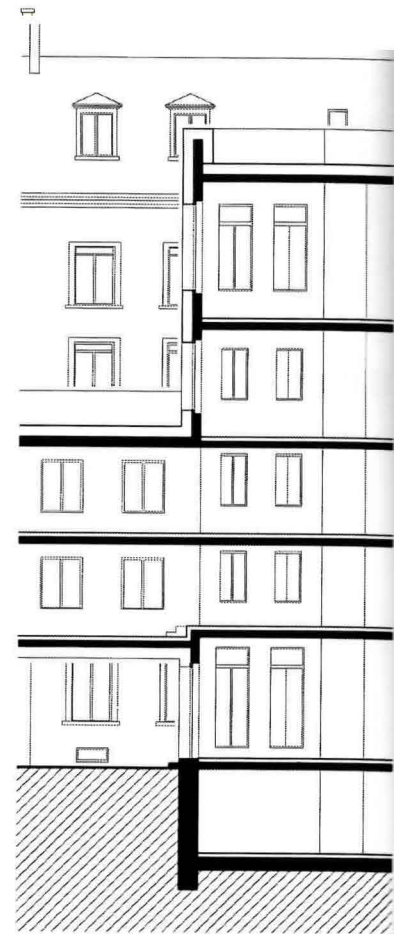
Ebene Haus



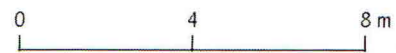
Grundriss Regelgeschoss

Ort_Struktur_Hülle /
Ort_Struktur_Hülle_Programm_Materialität

Ansicht Bestand / Neubau	— 0.05 mm, Schwarz 100%
Ansicht Abbruch	— 0.05 mm, Schwarz 70%
Schnitt Hülle / Boden*	— 0.20 mm, Schwarz 100%
Schnitt Abbruch	— 0.20 mm, Schwarz 40%
Terrain	— 0.35 mm, Schwarz 100%
Symbole	— 0.30 mm, Schwarz 100%
Füllung tragende Wände	■ Schwarz 100%
Füllung nicht tragende Wände	□ Weiss
Füllung Abbruch	■ Schwarz 20%
Füllung Terrain	▨ 0.05 mm, 45° Schraffur
Bäume/Vegetation, Ansicht	🌳 JPG/PNG, Transparenz 40%
Beschriftung	abc Helvetica Reg. 8pt, Schwarz 100%

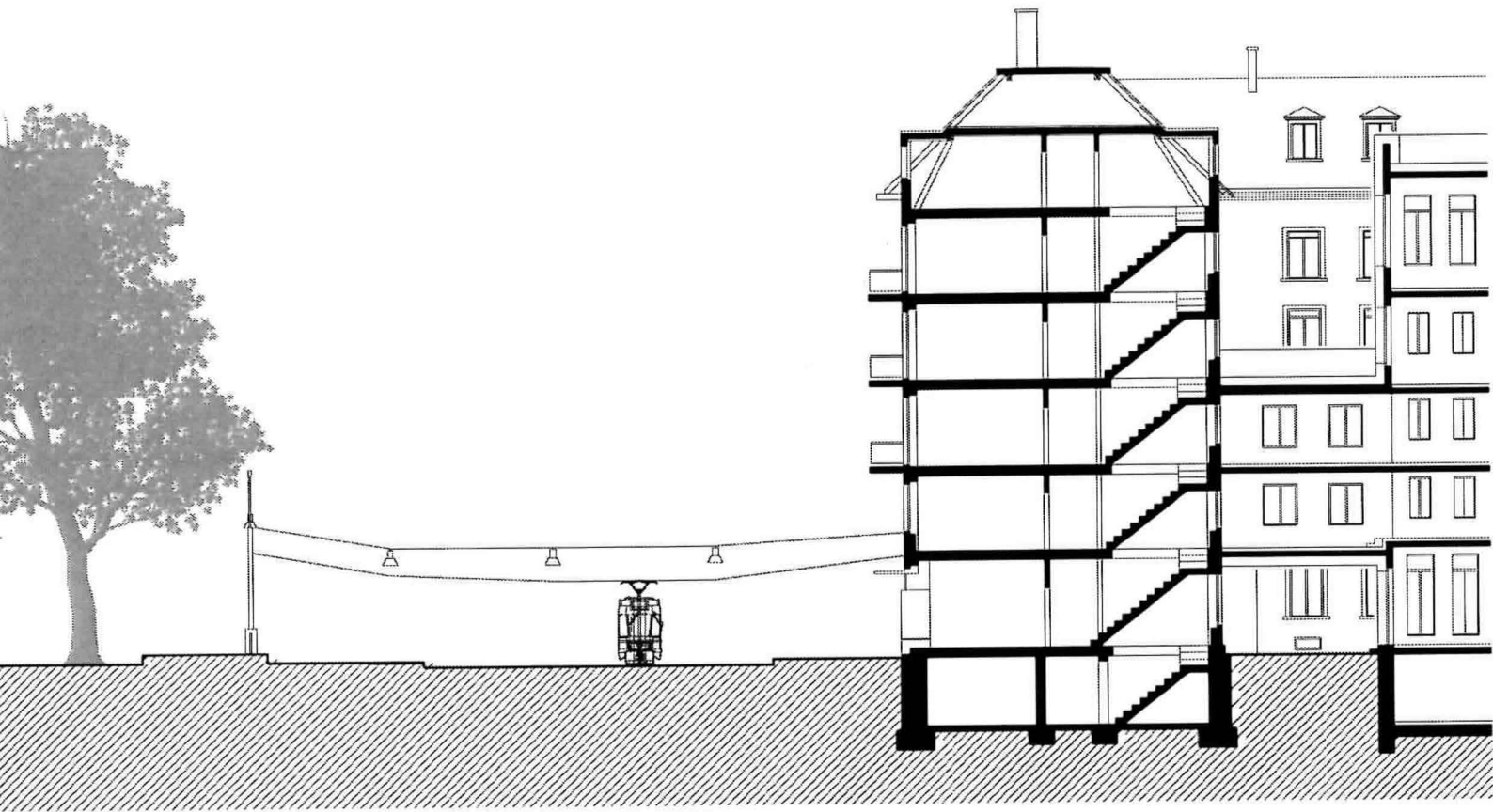


**Der zweischalige Aufbau der Wände und der Böden ist darzustellen.*



M 1:200

Ebene Haus



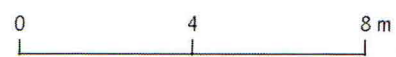
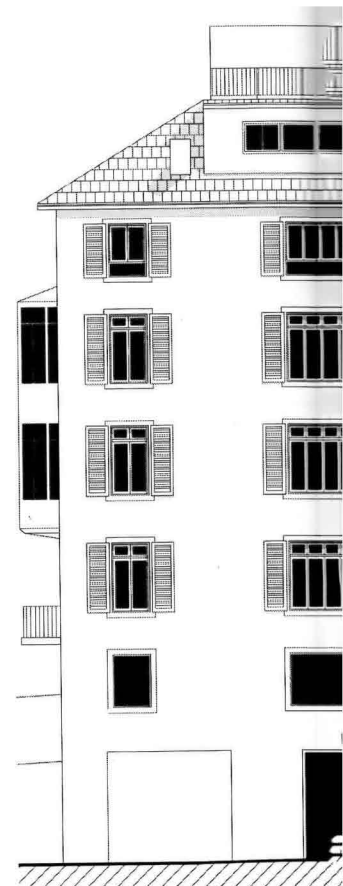
Schnitt Ebene Haus

Ort_Struktur_Hülle /

Ort_Struktur_Hülle_Programm_Materialität



Ansicht Bestand / Neubau	— 0.05 mm, Schwarz 100%
Gebäudeumriss	— 0.08 mm, Schwarz 100%
Ansicht Hülle Abbruch	— 0.05 mm, Schwarz 40%
Terrain	— 0.35 mm, Schwarz 100%
Füllung Terrain	/// 0.05 mm, 45° Schraffur
Füllung Öffnungen	■ Schwarz 70 %
Schatten	■ Schwarz 20%
Bäume/Vegetation, Ansicht	JPG/PNG, Transparenz 40%
Beschriftung	abc Helvetica Reg. 8pt, Schwarz 100%

















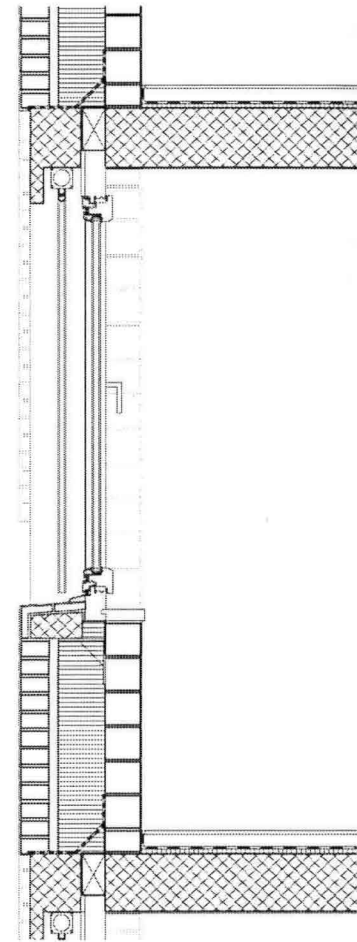
M 1:200

Ebene Haus



Ansicht
Ort_Struktur_Hülle /
Ort_Struktur_Hülle_Programm_Materialität

Ansicht	—	0.05 mm, Schwarz 100%
Schnitt	—	0.20 mm, Schwarz 100%
Backsteine		0.05 mm, 45° Schraffur
Bewehrter und unbewehrter Beton		0.05 mm, Schwarz 100%
Betonwerkstein, Kunststein		0.05 mm, Schwarz 100%
Mörtel, Gips, Verputz		0.05 mm, Schwarz 100%
Holz massiv		0.05 mm, 45° Schraffur
Vollholz, Brettschichtholz		0.05 mm, Schwarz 100%
Holzwerkstoffe		0.05 mm, 45° Schraffur
Metall		Weiss
Stahl		Schwarz 100%
Dämmstoffe		0.05mm, Schwarz 100%
Glas		0.05mm, Schwarz 100%
Kunststoffe		Schwarz 50%
Naturstein allgemein		0.05mm, 45° Schraffur
Sperrschichten (Wind, Dampf etc.)		Schwarz 100% Weiss
Beschriftung	abc	Helvetica Reg. 8pt, Schwarz 100%

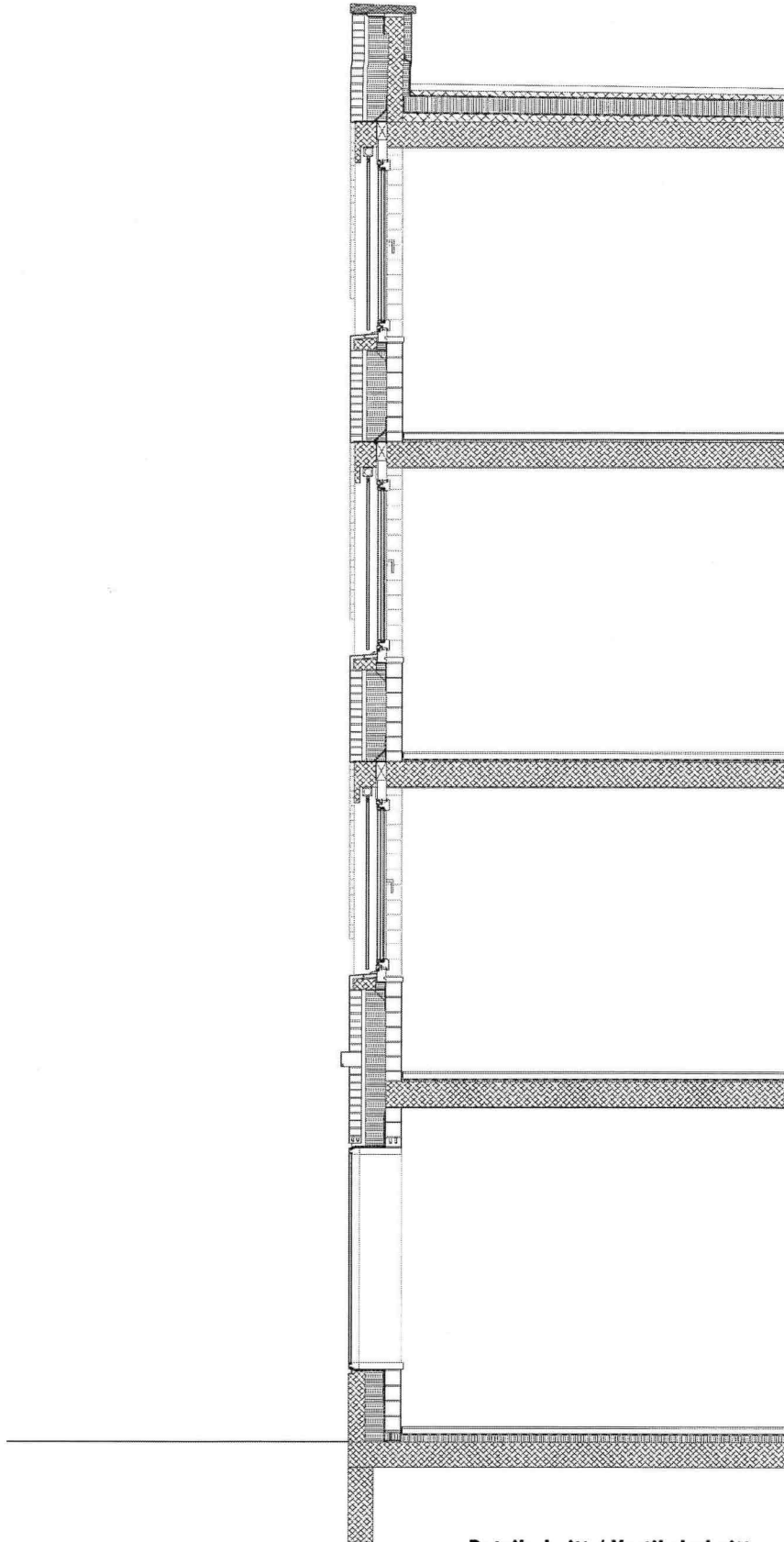


* Schraffuren nach SIA 400



M 1:50

Ebene Haus



Detailschnitt / Vertikalschnitt
Hülle

Situation / Stadtstruktur

Das Situationsmodell soll nach Möglichkeiten bei Tageslicht draussen fotografiert werden. Das beste Licht ist das Streiflicht früh morgens. Die durch dieses harte Licht erzeugten Schatten geben der Aufnahme den notwendigen Kontrast, damit sich die Volumen klar abzeichnen.

Das Modell wird so nach der Sonne gerichtet, dass die Lichtführung der Realität entspricht, und die Schatten nicht gerade das wichtigste Augenmerk verdecken.

In der Regel wird mit drei unterschiedlichen Belichtungszeiten fotografiert, damit sicher die richtige Einstellung dabei ist. Stark überbelichtete oder unterbelichtete Bereiche können am Computer nicht mehr verbessert werden. Trotzdem ist es notwendig, dass die Bilder immer beim Probeplott mit einem Abstand von ca. 2 Meter auf Ihre Wirkung überprüft werden. Die notwendigen Helligkeit - und Kontrast - Anpassungen werden anschliessend am Computer vorgenommen.

Besonders wichtig ist die Wahl des Standpunkts und der Augenhöhe (Objektivhöhe im Bezug zum Objekt).

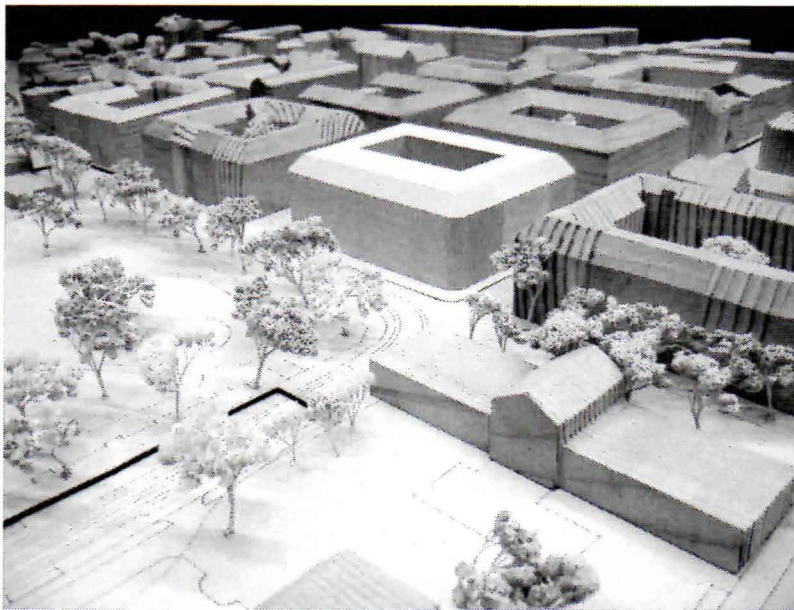
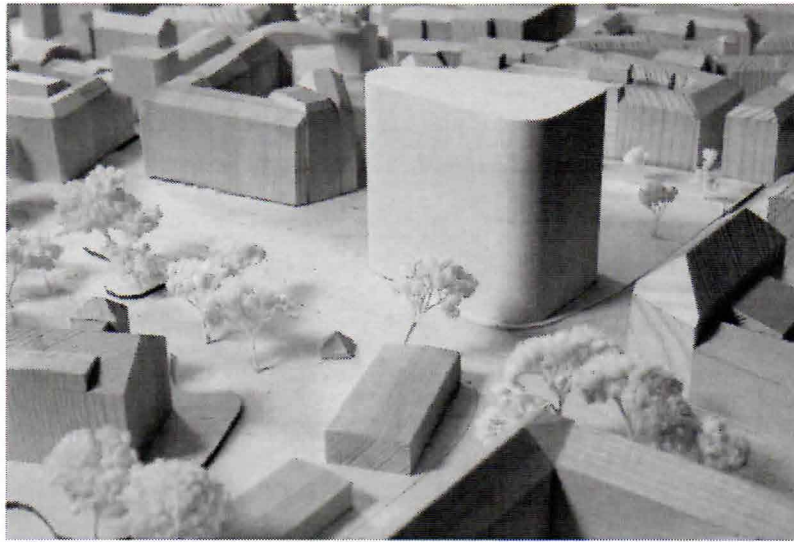
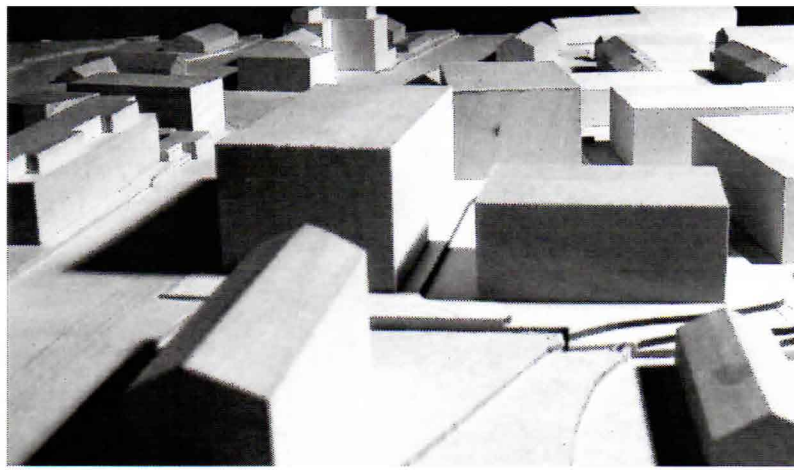
Das Modell aus der Vogelperspektive ist nicht erwünscht, da das Modell selbst Teil der Präsentation ist. Ziel sind perspektivische Ansichten wie der Fussgänger sie wahrnehmen würde. Dabei soll natürlich das Projekt bzw. der Bauplatz im Mittelpunkt stehen und aus möglichst verschiedenen Blickwinkeln abgelichtet werden.

Beim fotografieren soll darauf geachtet werden, welche Bereiche scharf und welche unscharf abgelichtet werden. Grundsätzlich gilt in der Modellfotografie möglichst alle Bereiche scharf abzubilden, auch jene im Hintergrund (Tiefenschärfe). Eine grosse Tiefenschärfe ist nur mit grosser Helligkeit (Tageslicht) zu erreichen. Dank dieser kann eine kleine Blende bei einer Belichtungszeit von 1/60 sec. gewählt werden. Bei schlechten Lichtverhältnissen muss ab Stativ fotografiert werden, wodurch die Belichtungszeit erhöht werden kann ohne dass das Bild verwackelt. Manchmal ist ein unscharfer Bereich gerade erwünscht, zB. bei einem im Hintergrund liegenden Hügelzug, oder zur Erzeugung einer bestimmten Atmosphäre, oder damit etwas Unwichtiges weniger stark in Erscheinung tritt.

0 10 20 m

M 1:500

Ebene Stadt



Situation / Stadtstruktur

Ort / Struktur /

Ort_Struktur_Hülle /

Ort_Struktur_Hülle_Programm_Materialität

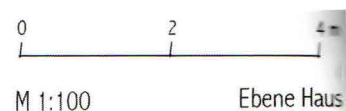
Ausdruck Typologie

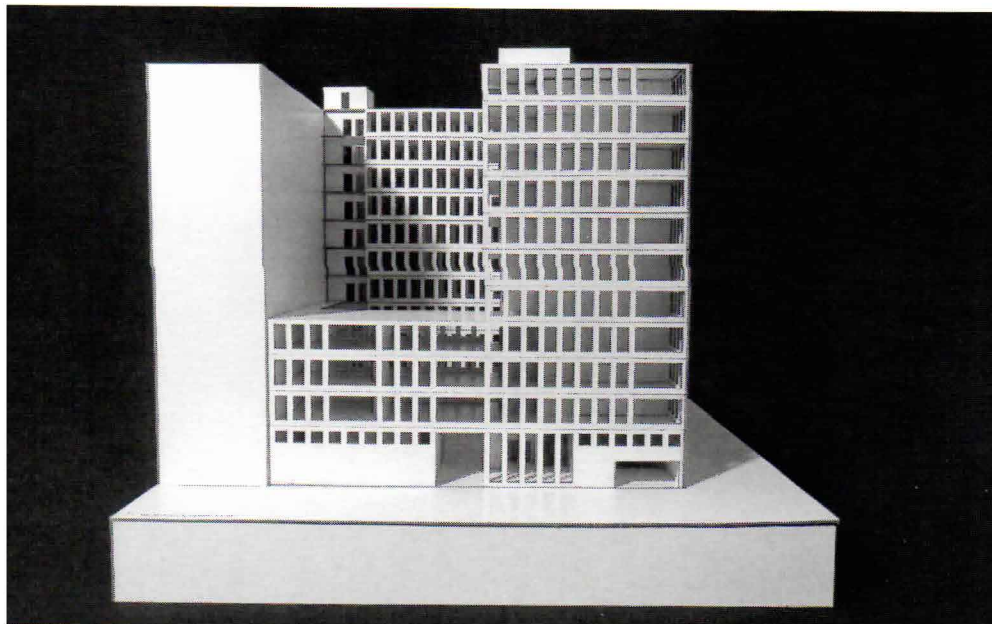
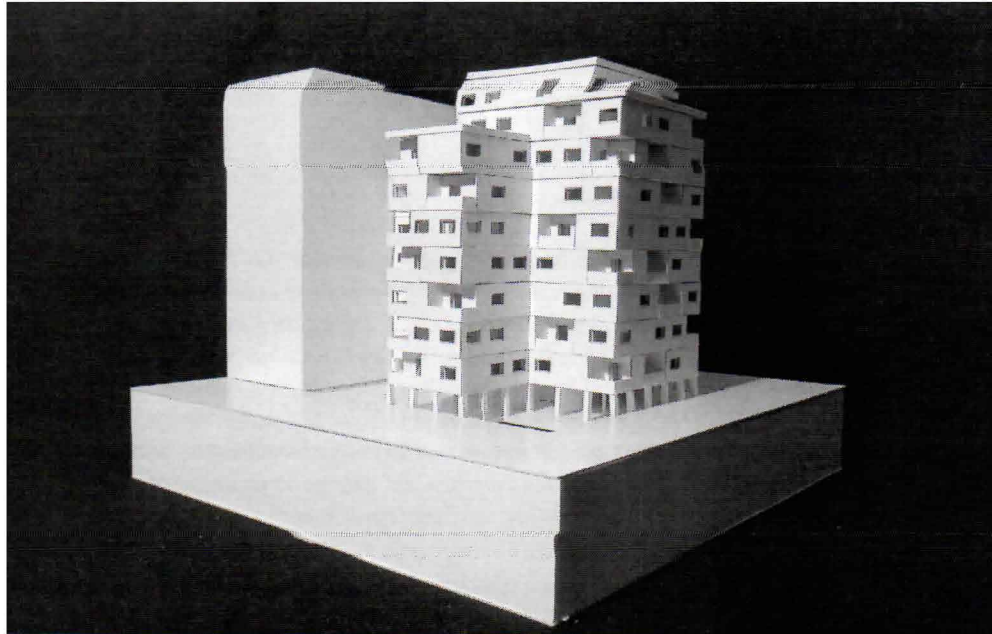
Die drei geforderten Bilder zeigen möglichst verschiedene Perspektiven, wobei verschiedene Themen wie z.B. Hauptfassade, Übergang zum Bestand oder das Erdgeschoss mit der Eingangssituation in den Vordergrund rücken.

Die vorab erklärten Grundsätze der Fotografie gelten auch hier. Da nun ein Volumen in den Vordergrund tritt, ist es besonders wichtig mittels Wahl des Standpunktes auf Augenhöhe darauf zu achten, dass die vertikalen Elemente des Modells auch auf dem Bild vertikal erscheinen und nicht verzogen sind. Dadurch bekommt das Bild erst die notwendige Präzision.

Wenn trotz optimaler Objektivplatzierung solche perspektivischen Verzerrungen entstehen muss mittels Bildbearbeitung nachgeholfen werden.

Es empfiehlt sich vor schwarzem Hintergrund zu fotografieren. Ansonsten müssen jegliche störenden Objekte nachträglich in aufwendiger Arbeit retouchiert werden.





Ausdruck Typologie
Programm

Strukturmodell

Das Strukturmodell macht die konstruktive Struktur erkennbar.

Gebaut wird im Strukturmodell alles was zur Primärstruktur, zur Erschliessungsstruktur und zur Entfluchtungsstruktur gehört.

Das Modell ist geschossweise aufzubauen, wobei Decken- und Wandstärken massstabsgerecht zu bauen sind:

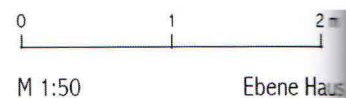
- Deckenstärke 40 cm
- Aussenwandstärke 60 cm
- Innenwand- und Stützenstärke 25 cm

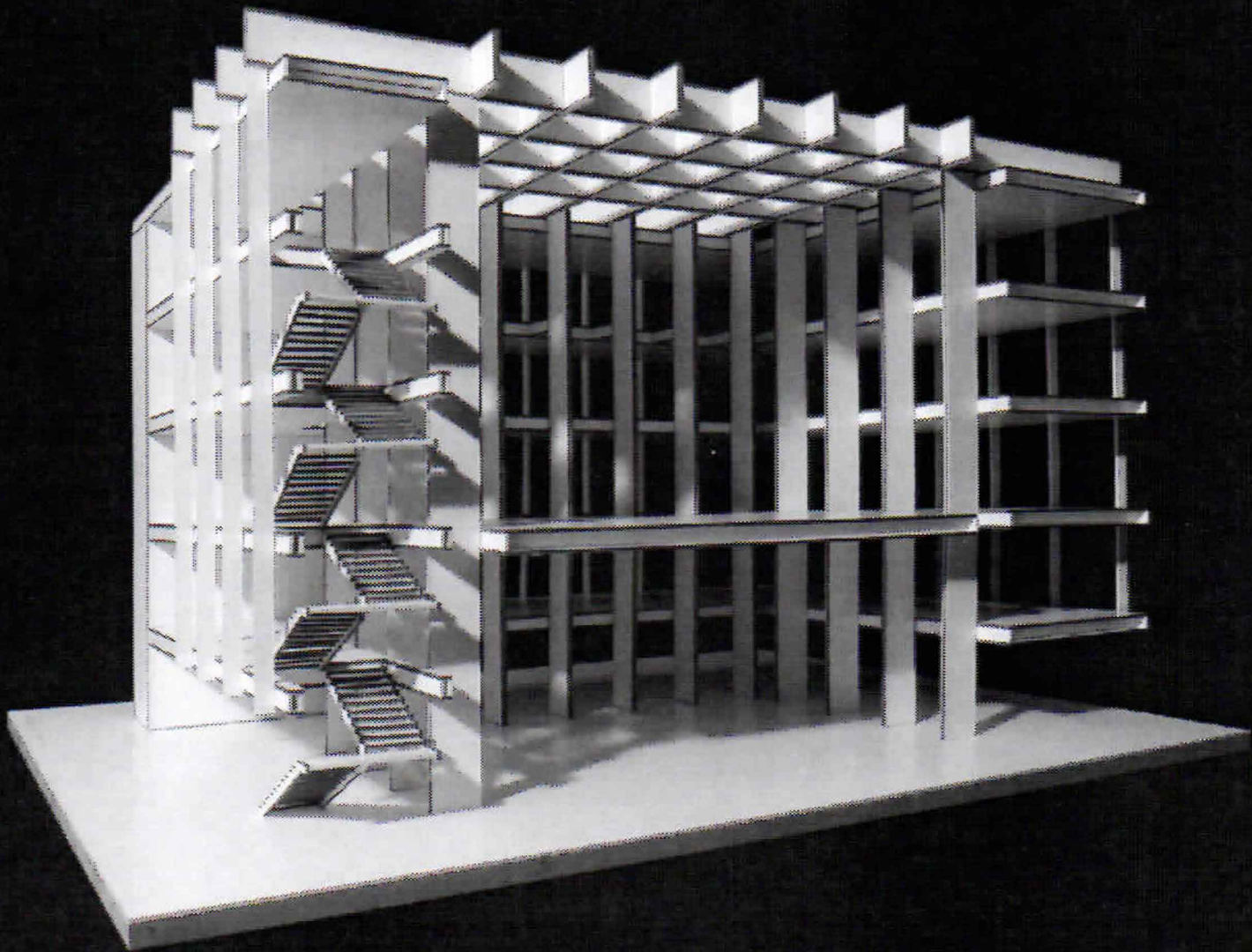
Material: Holz, Holzwerkstoff

Nichttragende Wände, Absturzsicherungen und andere Elemente, welche zum Verständnis des strukturellen Konzeptes beitragen, sind mit dünneren Materialstärken zu bauen.

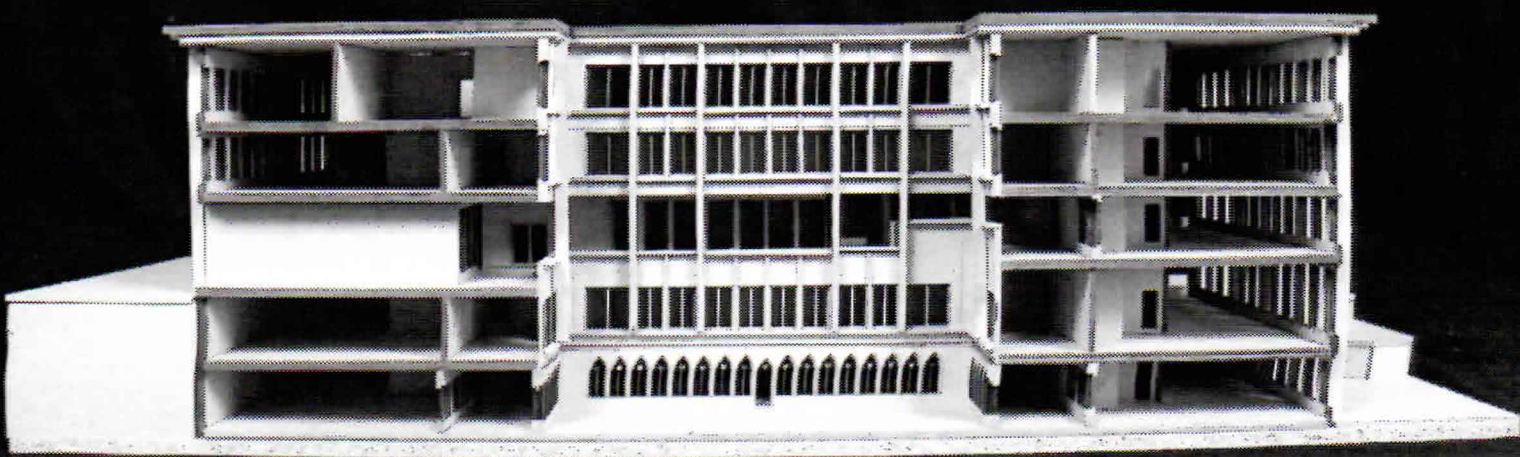
Das anschliessende Terrain ist darzustellen (Kontext).

Der Sockel ist mit einem Nordpfeil zu versehen.



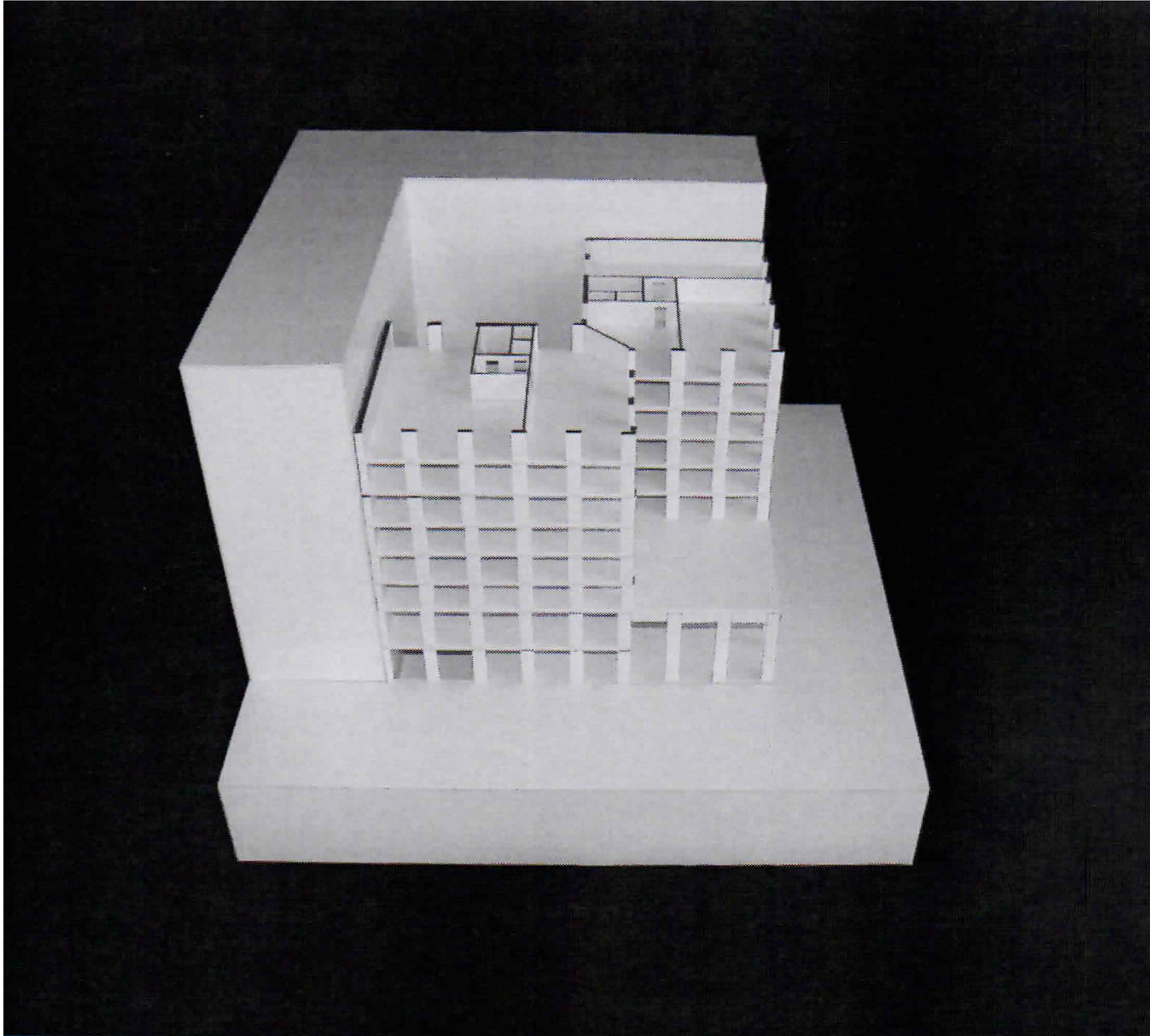


Strukturmodell
Struktur



Schnittmodell

Ort_Struktur_Hülle /
Ort_Struktur_Hülle_Programm_Materialität



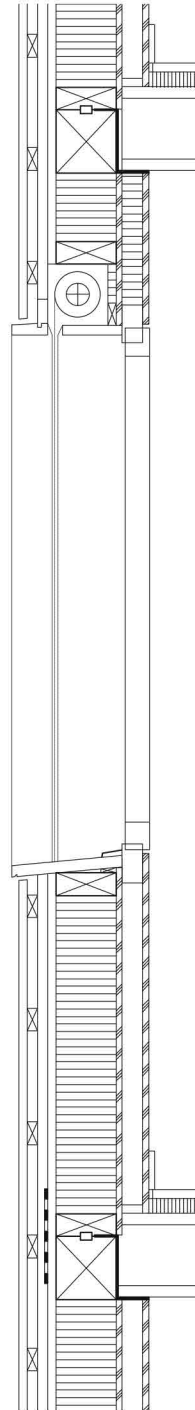
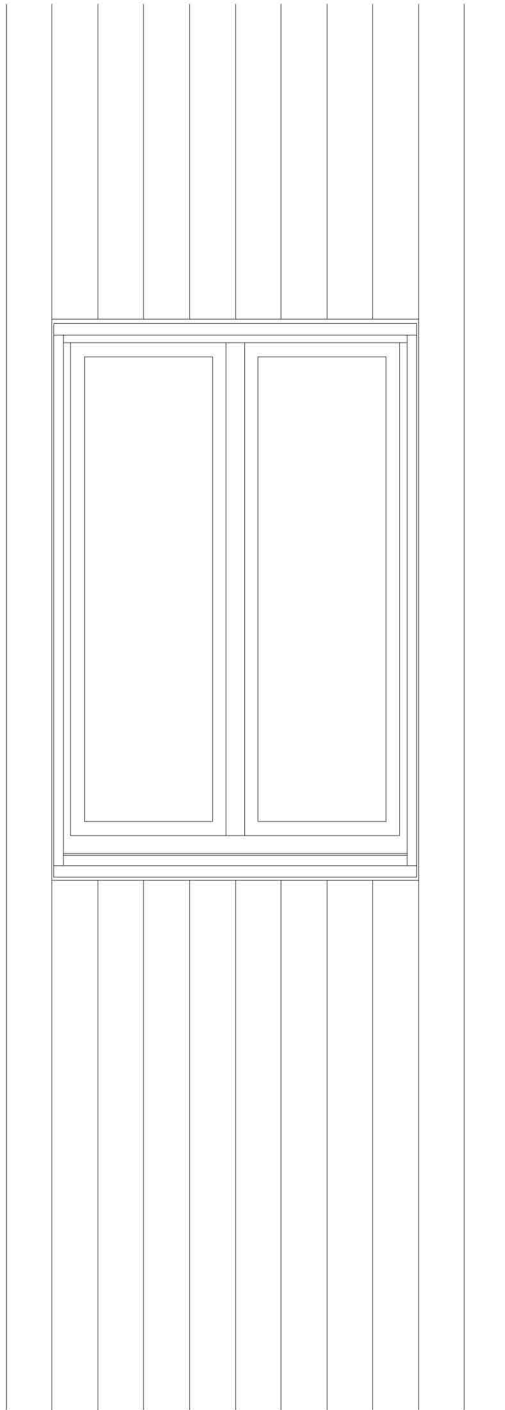
Typologiemodell
Programm

Constructing Architecture

Materials

Processes

Structures



Detail drawings, scale 1:20

The detail drawings should be regarded as supplementing the 1:50 working drawings. Every layer is shown and marked/hatched/shaded accordingly. Loadbearing parts of the construction are indicated by means of thicker lines. Junctions such as floor bearings are to be drawn and annotated in detail. Windows are shown schematically with frame and lights by means of individual boxes. All parts of construction such as sunshading with guide tracks, battens, window sills/boards, etc. must be clearly identifiable.

The floor construction is to be drawn showing all layers, including junctions and terminations. If special fittings are included (e.g. underfloor heating pipes), then these should be mentioned.

See to the following catalogue of building components for further examples of drawings. The building components are in some instances shown with too much detail. Freehand sketches may be more abstract. The layout of the drawing must always be considered first.

- Size of drawings, size of paper
- Alignment of plan, section, elevation

General remarks on representation in drawings

Many companies (e.g. window manufacturers) provide detail drawings in various data formats. These are highly detailed (1:1). They are included at this scale and are often too precise at the other scales involved. The abstract means of representation mentioned above are generally adequate.

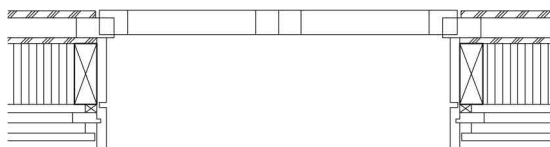
The person producing the drawing should always consider for whom the drawing is intended and what information that person needs. Wherever possible, standard paper sizes are used:

Format	Dimensions in mm
DIN A4	210 x 297
DIN A3	297 x 420
DIN A2	420 x 594
DIN A1	594 x 841
DIN A0	841 x 1189

Exchange of drawings between specialists and members of the design team can take place using various formats: DXF, DWG.

Drawing information included in title block:









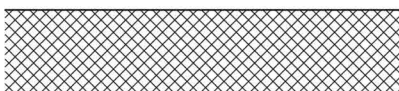



- Client
- Person responsible for the drawing
- Content of the drawing
- Scale
- Scale bar for reduced drawings
- North arrow
- ± 0.00 = metres above sea level



Plan, section, scale 1:20

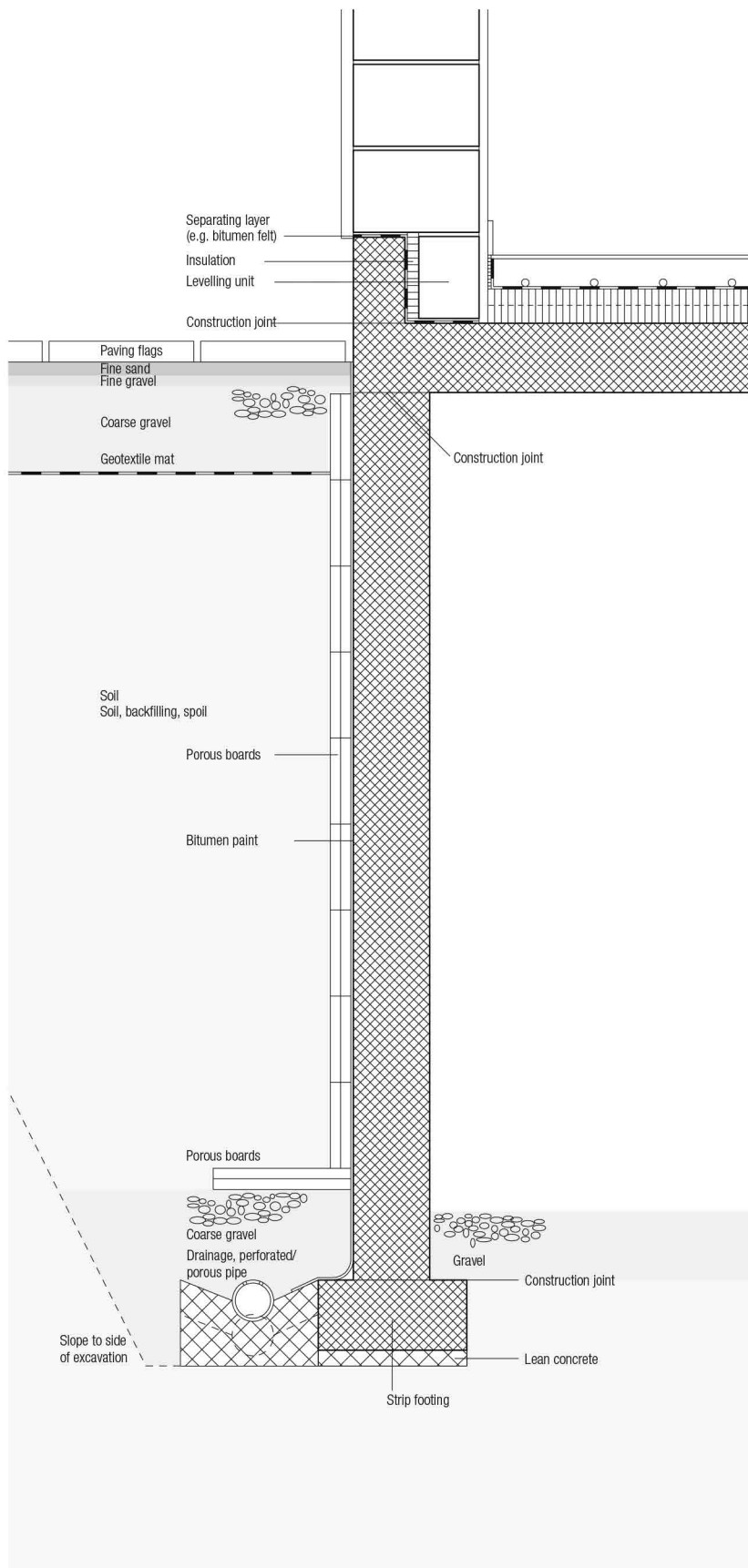
Symbols

Legend for the catalogue of components

	Vapour barrier/check
	Waterproofing, airtight membrane
	Separating layer
	Impact sound insulation
	Thermal insulation
	Thermal insulation, impervious to vapour
	Thermal insulation, waterproof
	Reconstituted stone
	In situ concrete
	Lean concrete
	Wood-based board
	Section solid timber

Plinth, single-leaf masonry

1:20



Wall construction

- Render	35 mm
- Single-leaf masonry, 36.5 x 24.8 x 23.8 cm	365 mm
- Plaster	25 mm
<i>Total</i>	<i>425 mm</i>

Floor construction

- Hard-fired floor tiles	10 mm
- Tile adhesive	5 mm
- Screed with underfloor heating	80 mm
- Separating layer (e.g. 1 mm plastic sheet)	
- Thermal insulation, vapourproof (e.g. cellular glass)	100 mm
- Concrete slab over basement	200 mm
<i>Total</i>	<i>395 mm</i>

Wall construction, damp basement

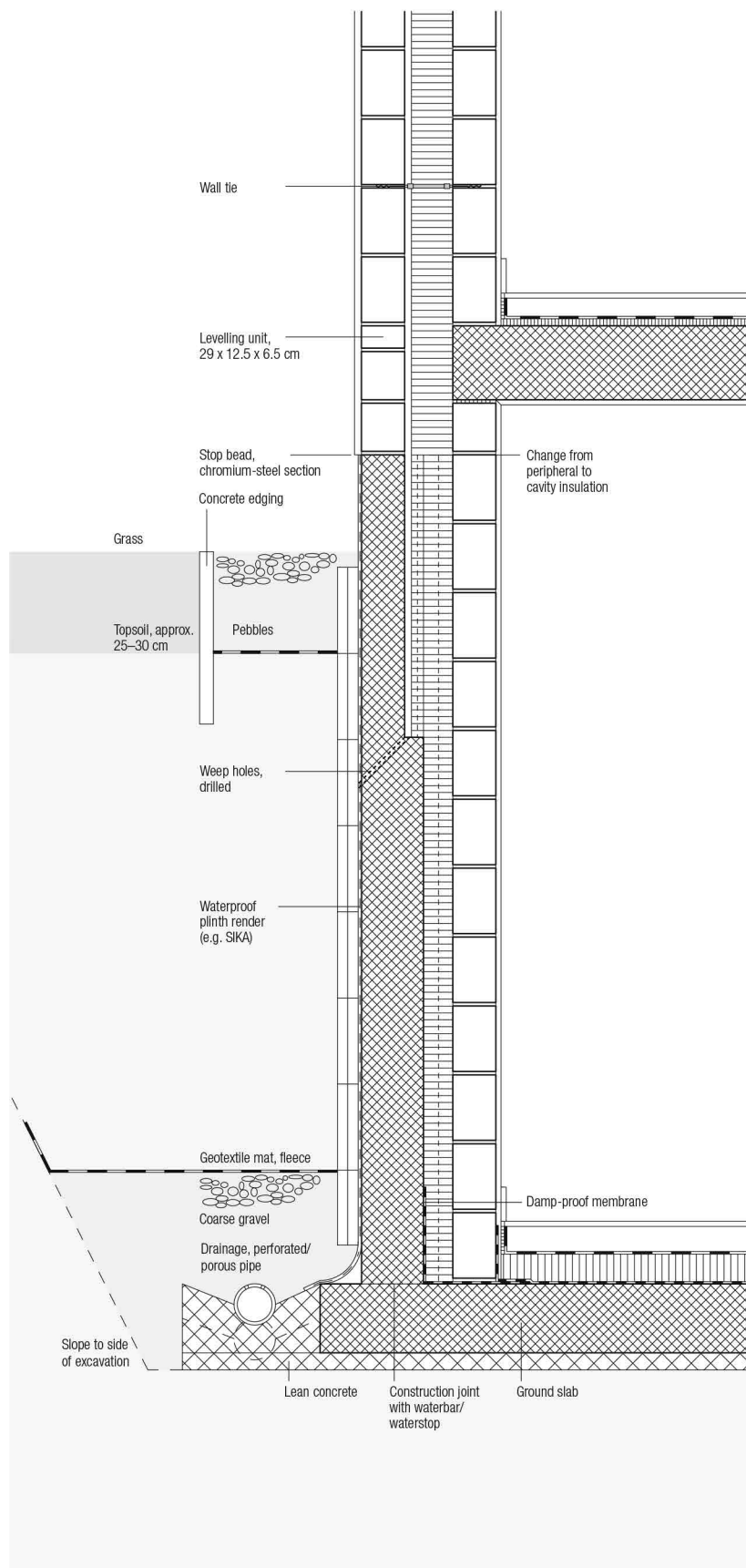
- Porous boards	60 mm
- Waterproofing (e.g. bitumen paint)	2 mm
- In situ concrete wall	220 mm
<i>Total</i>	<i>282 mm</i>

Floor construction, damp basement

- Layer of stones (e.g. rounded gravel)	200 mm
---	--------

Plinth, double-leaf masonry, rendered

1:20



Wall construction

- Render	20 mm
- Clay masonry, B, 29 x 12.5 x 19 cm	125 mm
- Cavity (construction tolerance)	20 mm
- Thermal insulation (e.g. rockwool)	120 mm
- Clay masonry, B 0, 29 x 12.5 x 19 cm	125 mm
- Plaster	15 mm
<i>Total</i>	<i>425 mm</i>

Floor construction

- Ready-to-lay parquet flooring	15 mm
- Screed	60 mm
- Separating layer (e.g. 1 mm plastic sheet)	
- Impact sound insulation	20 mm
- Concrete slab over basement	210 mm
- Plaster to soffit	10 mm
<i>Total</i>	<i>315 mm</i>

Wall construction, heated basement

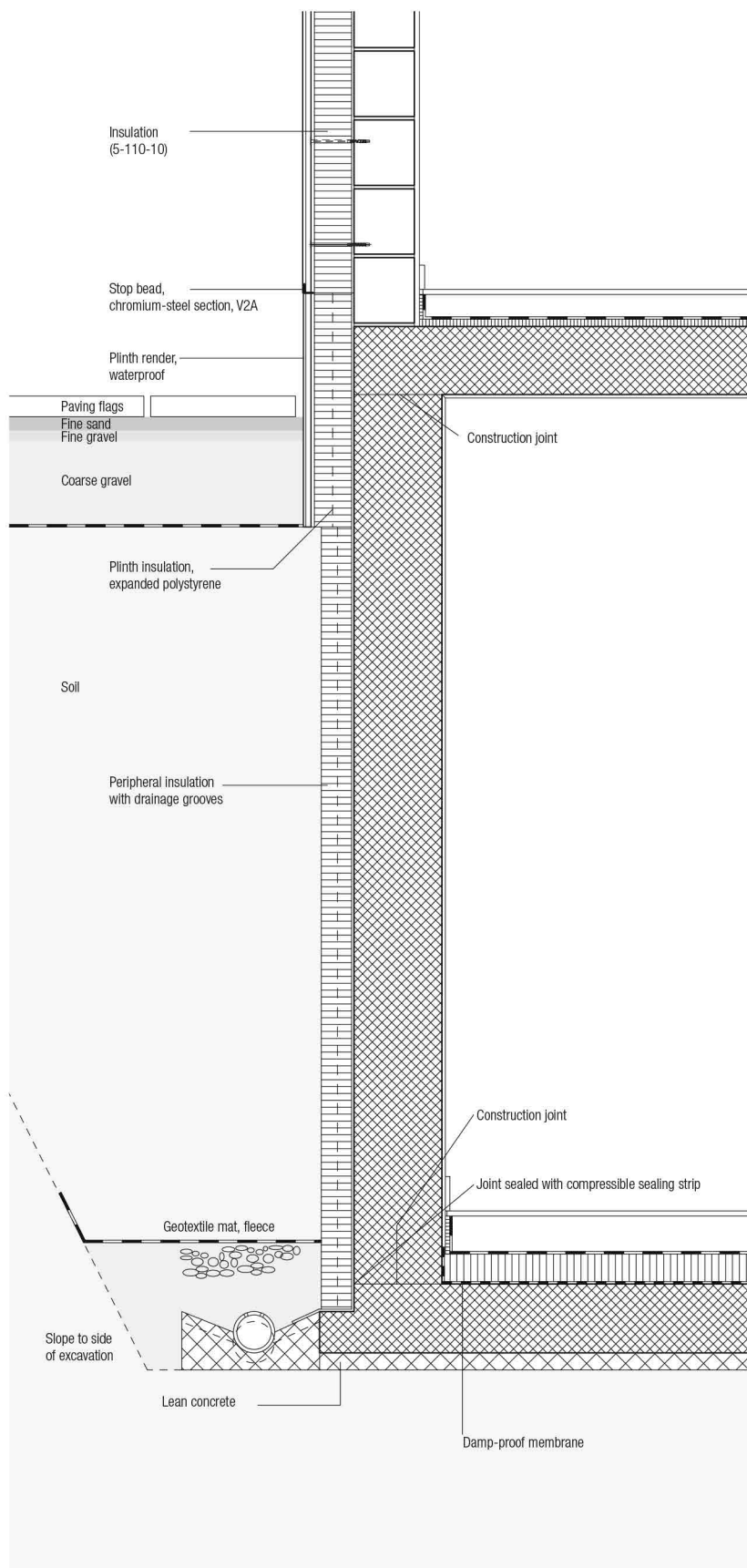
- Porous boards	60 mm
- Waterproof plinth render	10 mm
- In situ concrete wall	180 mm
- Thermal insulation (vapourproof)	60 mm
- Clay masonry, B, 25 x 12 x 14 cm	120 mm
- Plaster	10 mm
<i>Total</i>	<i>440 mm</i>

Floor construction, heated basement

- Ready-to-lay parquet flooring	15 mm
- Screed	80 mm
- Thermal insulation (e.g. cellular glass, expanded polystyrene)	80 mm
- Damp-proof membrane (e.g. Robit)	
- Concrete ground slab	200 mm
- Lean concrete	50 mm
<i>Total</i>	<i>425 mm</i>

Plinth, external insulation, rendered

1:20



Wall construction

- e.g. Wancor-Therm K
- Mineral render finish coat (coloured or painted) 2 mm
- Bonding render (with glass mat inlay over entire surface) 4 mm
- Mineral render undercoat 20 mm
- Insulation board 5-110-10 (3-layer board), fixed with plastic fasteners 125 mm
- Clay masonry, B, 29 x 17.5 x 19 cm 175 mm
- Plaster 15 mm
- Total* 341 mm

Floor construction

- Magnesite flooring (seamless) 15 mm
- Screed 65 mm
- Separating layer (e.g. 1 mm plastic sheet)
- Impact sound insulation 20 mm
- Concrete slab over basement 200 mm
- Plaster to soffit 10 mm
- Total* 310 mm

Wall construction, heated basement

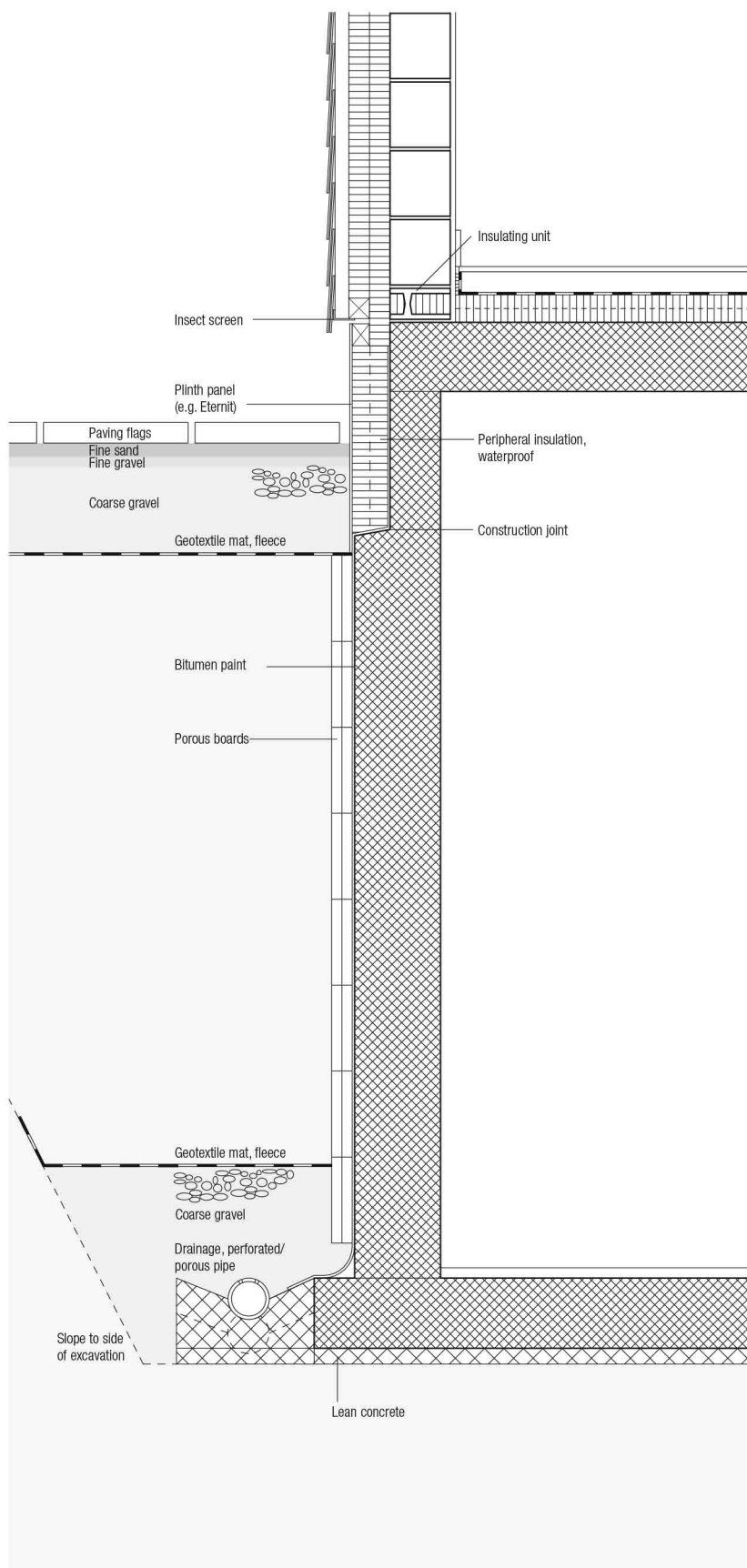
- Mortar coat (waterproof) 3 mm
- Peripheral insulation with drainage grooves 80 mm
- Waterproofing (e.g. bitumen paint) 2 mm
- In situ concrete wall 240 mm
- Plaster 10 mm
- Total* 335 mm

Floor construction, heated basement

- Magnesite flooring 15 mm
- Screed 80 mm
- Separating layer (e.g. 1 mm plastic sheet)
- Insulation (e.g. Floormate 200) 80 mm
- Damp-proof membrane (e.g. Robit)
- Concrete ground slab 200 mm
- Lean concrete 50 mm
- Total* 425 mm

Plinth, external cladding, lightweight

1:20



Wall construction

- Cladding in medium and large format
e.g. Eternit slates, rectangular double-lap arrangement, 300 x 600 mm 10 mm
- Ventilated cavity (40 x 70 mm vertical battens) 40 mm
- Thermal insulation, 2 layers each 60 mm,
with 60 x 60 mm battens in both directions 120 mm
- Clay masonry, B, 29 x 17.5 x 19 cm 175 mm
- Plaster 15 mm
- Total 360 mm*

Floor construction

- Ready-to-lay parquet flooring 15 mm
- Screed 60 mm
- Separating layer (e.g. 1 mm plastic sheet)
- Thermal insulation, vapourproof
(e.g. expanded polystyrene) 80 mm
- Concrete slab over basement 200 mm
- Total 355 mm*

Wall construction, unheated basement

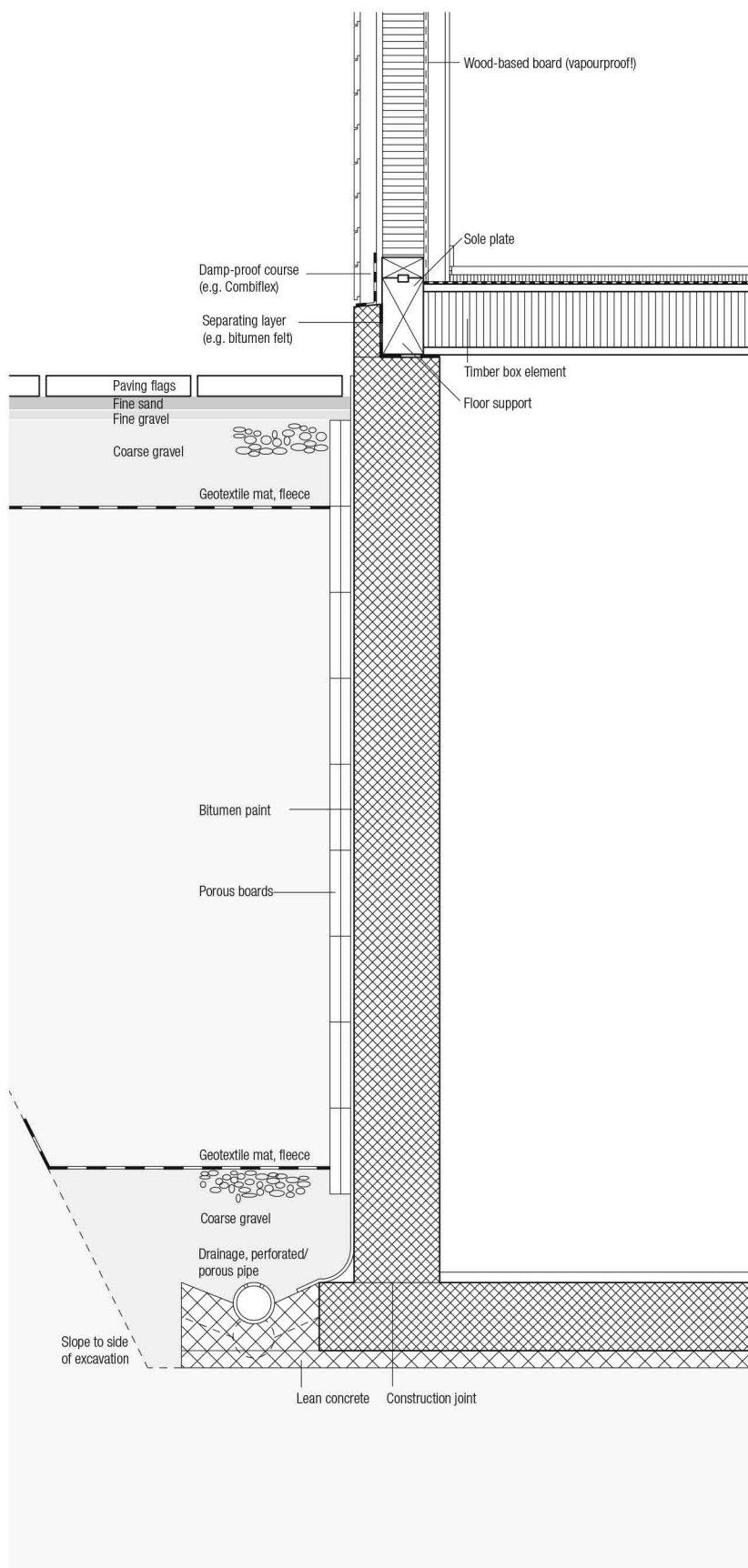
- Porous boards 60 mm
- Waterproofing (e.g. bitumen paint) 3 mm
- In situ concrete wall 260 mm
- Total 323 mm*

Floor construction, unheated basement

- Screed 30 mm
- Concrete ground slab, roughened 200 mm
- Lean concrete 50 mm
- Total 280 mm*

Plinth, timber platform frame construction

1:20



Wall construction

- Horizontal boards	24 mm
- Vertical battens (ventilated cavity)	40 mm
- Bitumen-impregnated softboard (airtight membrane)	18 mm
- Timber studding, insulation (e.g. Isofloc)	120 mm
- Wood-based board (plywood, vapourproof!)	12 mm
- Vertical battens (space for services)	50 mm
- Wood-cement particleboard (e.g. Fermacell) or fibre-reinforced plasterboard (e.g. Sasmox)	12 mm
Total	276 mm

Floor construction

- 3-ply core plywood, floating, tongue and groove	27 mm
- Impact sound insulation	20 mm
- Vapour barrier	
- Lignatur timber box element, soffit left exposed	220 mm
Total	267 mm

Wall construction, unheated basement

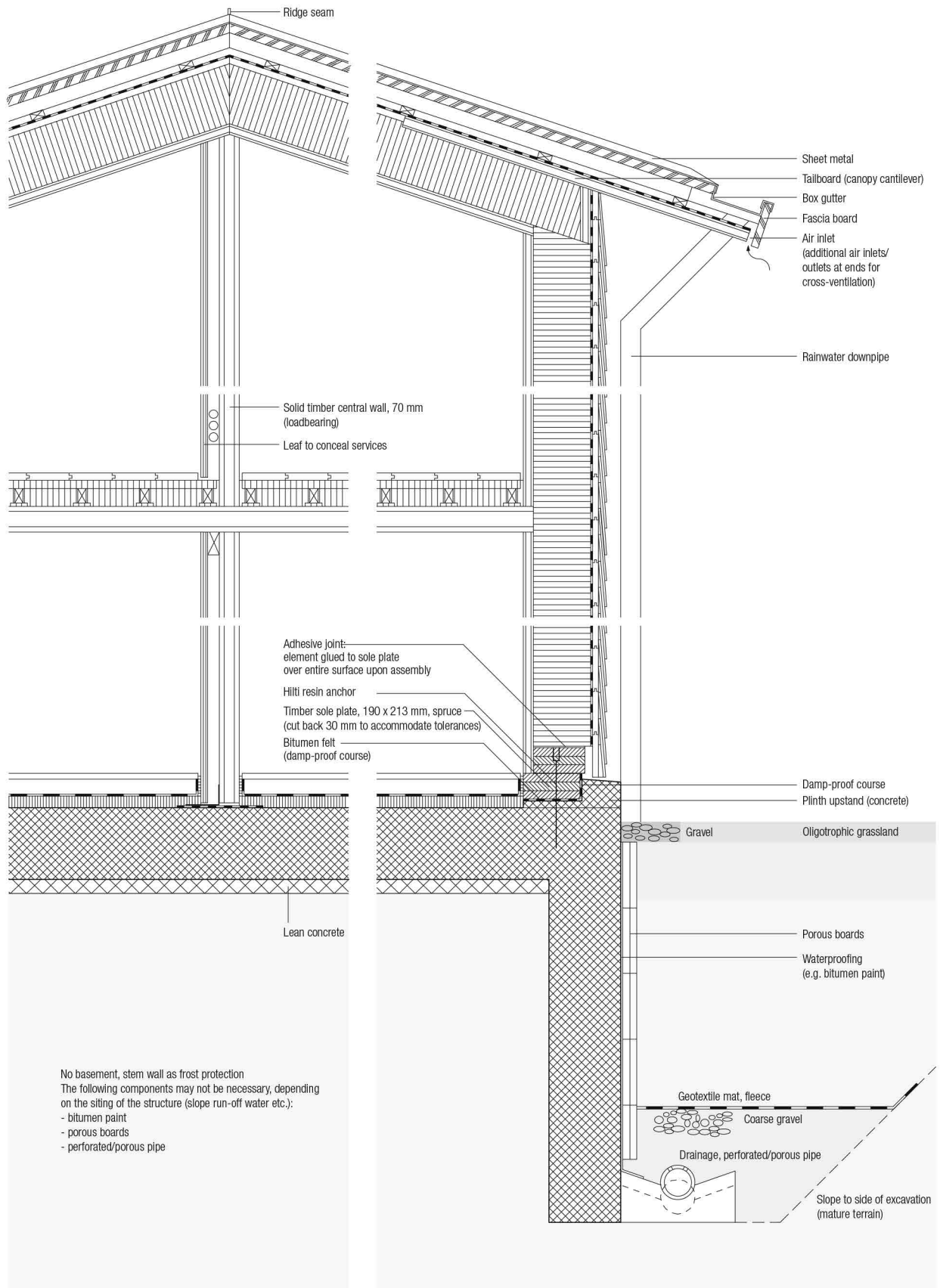
- Porous boards	60 mm
- Waterproofing (e.g. bitumen paint)	2 mm
- In situ concrete wall	240 mm
Total	302 mm

Floor construction, unheated basement

- Screed	30 mm
- Concrete ground slab	200 mm
- Lean concrete	50 mm
Total	280 mm

Plinth – Roof: solid timber panel construction

1:20





Figs 1 and 2: Solid timber panel construction, completed with shingle cladding (top); erecting the panels (bottom)
 Bearth & Deplazes: private house (Bearth-Candinas, Sumvitg (CH), 1998

Roof construction

- Sheet metal	0.6 mm
- Roof decking	30 mm
- Counter battens 50 x 80 mm (ventilated cavity)	80 mm
- Timber blocks for cross-ventilation, 30 x 50 mm	30 mm
- Secondary waterproofing/covering layer	3 mm
- Softboard	22 mm
- Solid timber ribs, 40 x 200 mm, with thermal insulation in between	200 mm
- Solid timber panel	35 mm
<i>Total</i>	<i>400 mm</i>

Floor construction, upper floors

- Solid timber floorboards (tongue and groove, concealed nailing)	24 mm
- Counter battens, 40 x 30 mm (with insulation in between)	30 mm
- Battens, 50 x 30 mm (with insulation in between)	50 mm
- Rubber strips as separating layer beneath battens (for impact sound insulation)	10 mm
- Solid timber panel (span: 3 m)	90 mm
<i>Total</i>	<i>204 mm</i>

Wall construction

- Larch shingles (without ventilated cavity), 3 layers	20 mm
- Spruce boards (tongue and groove), horizontal	20 mm
- Airtight membrane	
- Thermal insulation (around transverse ribs)	200 mm
- Solid timber panel (loadbearing, incl. vapour check function due to adhesive)	35 mm
<i>Total</i>	<i>275 mm</i>

Floor construction, ground floor

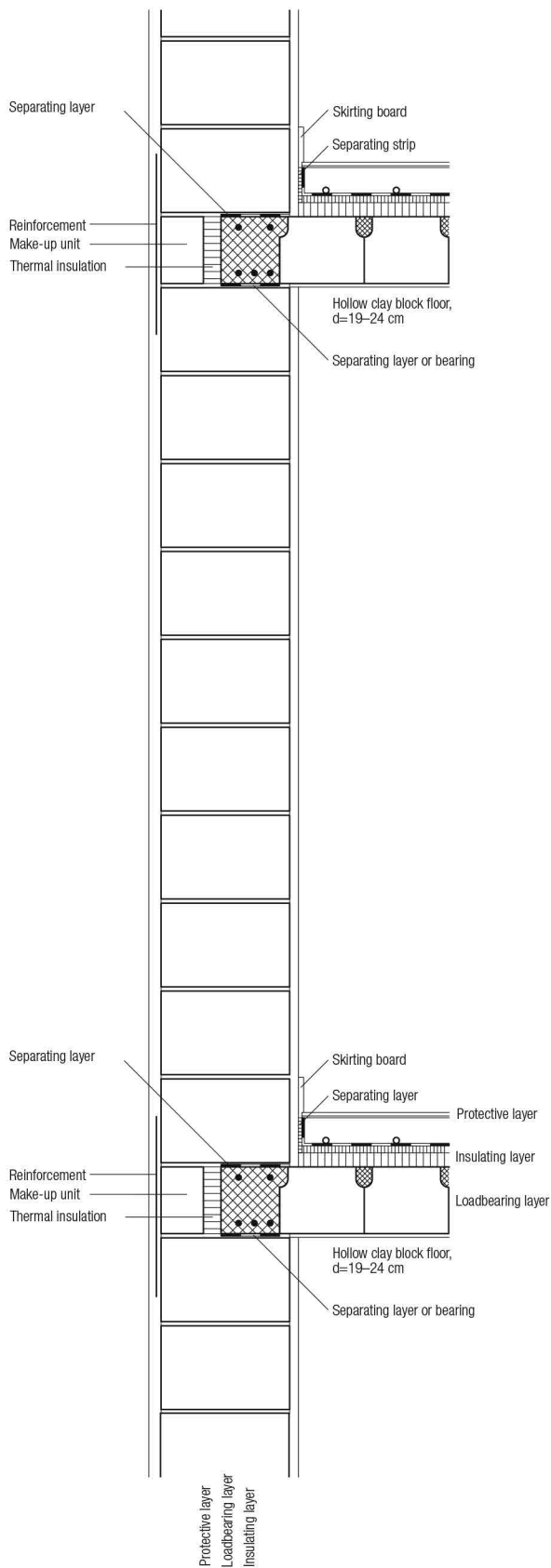
- Hard-fired floor tiles	30 mm
- Screed (with underfloor heating)	60 mm
- Separating layer (fleece)	2 mm
- Impact sound insulation	40 mm
- Reinforced concrete	250 mm
- Lean concrete	50 mm
<i>Total</i>	<i>432 mm</i>

Example:

Bearth & Deplazes: private house (Bearth-Candinas, Sumvitg (CH), 1998

Single-leaf masonry, rendered

1:20



Section

Wall construction

- Render	35 mm
- Single-leaf masonry, 36.5 x 24.8 x 23.8 cm	365 mm
- Plaster	25 mm
Total	425 mm

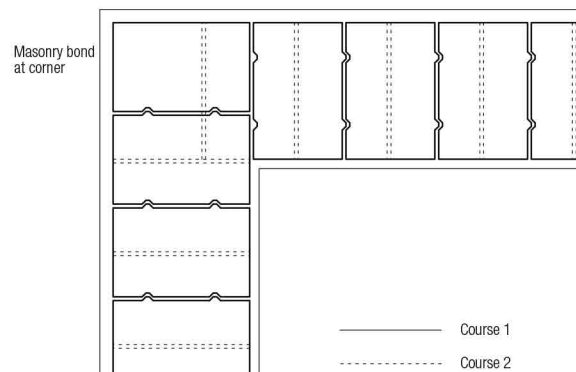
Floor construction

- Hard-fired floor tiles	10 mm
- Tile adhesive	5 mm
- Screed (floating) with underfloor heating	80 mm
- Separating layer (e.g. 1 mm plastic sheet)	
- Impact sound insulation	20 mm
- Thermal insulation	40 mm
- Hollow clay block floor with ring beam (1-way span)	195 mm
- Plaster to soffit	10 mm
Total	360 mm

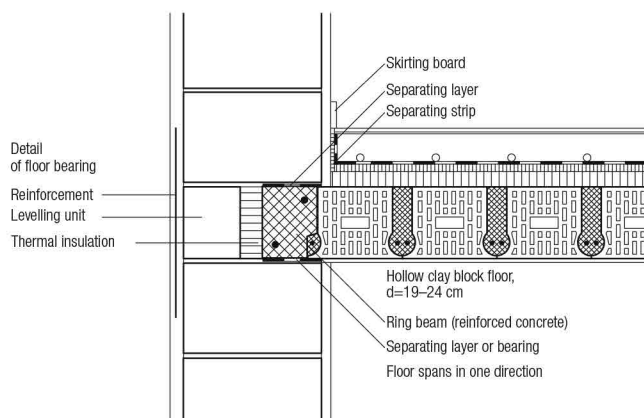
Example:

Giuliani & Hönger and Doetsch & Roth:

Kupper apartment block, Erlenbach (CH), 1993-1996



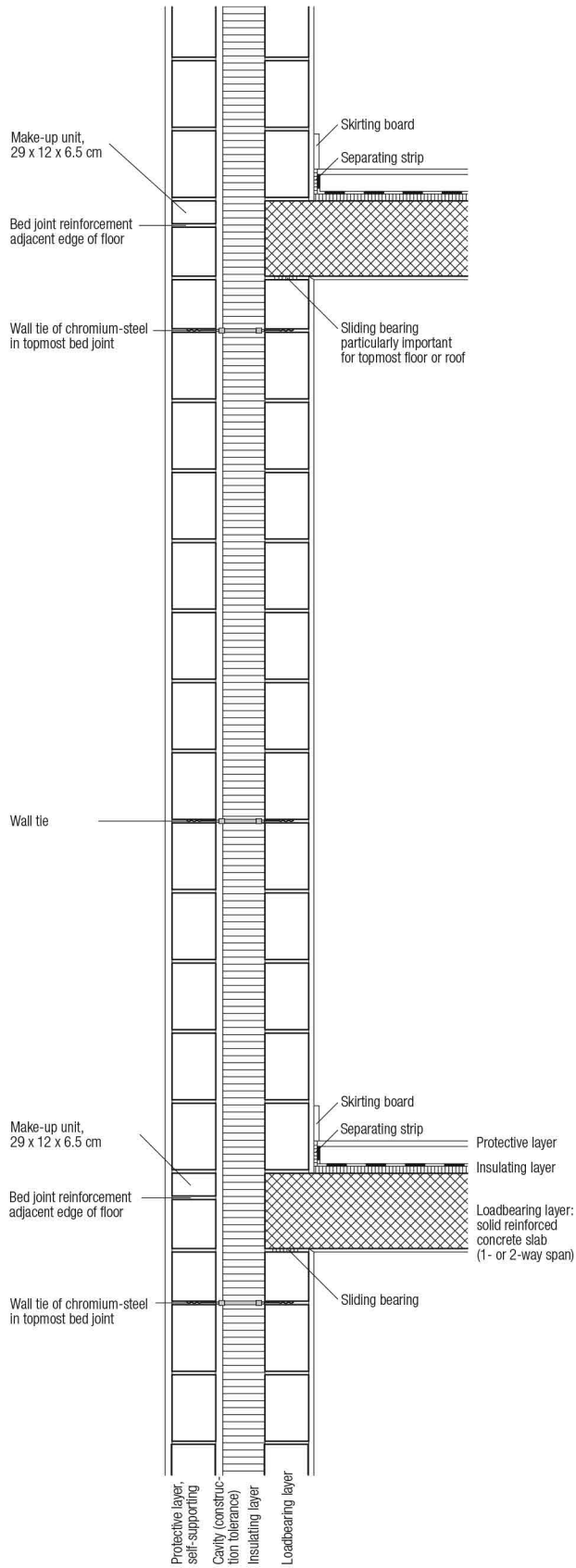
Plan



Longitudinal section

Double-leaf masonry, rendered

1:20



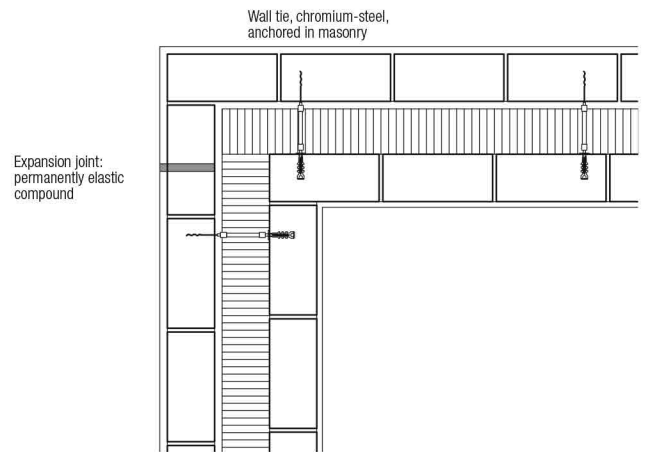
Section

Wall construction

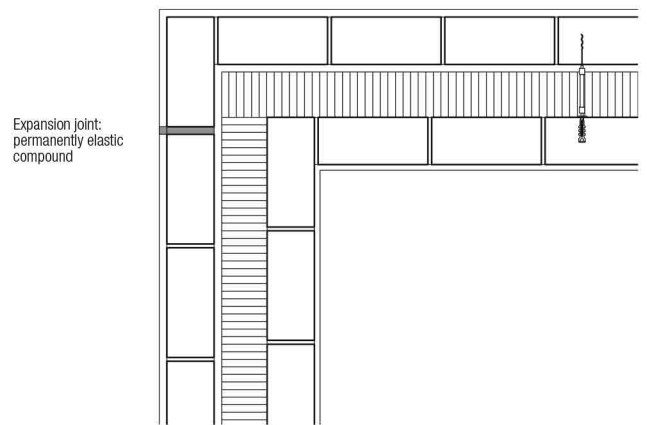
- Render	20 mm
- Clay masonry, BN, 29 x 12.5 x 19 cm	125 mm
- Ventilated cavity (construction tolerance)	20 mm
- Thermal insulation (e.g. rockwool)	120 mm
- Clay masonry, BN, 29 x 12.5 x 19 cm	125 mm
- Plaster	15 mm
Total	425 mm

Floor construction

- Ready-to-lay parquet flooring	15 mm
- Screed, floating	60 mm
- Separating layer (e.g. 1 mm plastic sheet)	
- Impact sound insulation	20 mm
- Concrete slab (depth according to structural analysis, 1- or 2-way span)	210 mm
- Plaster to soffit	10 mm
Total	315 mm



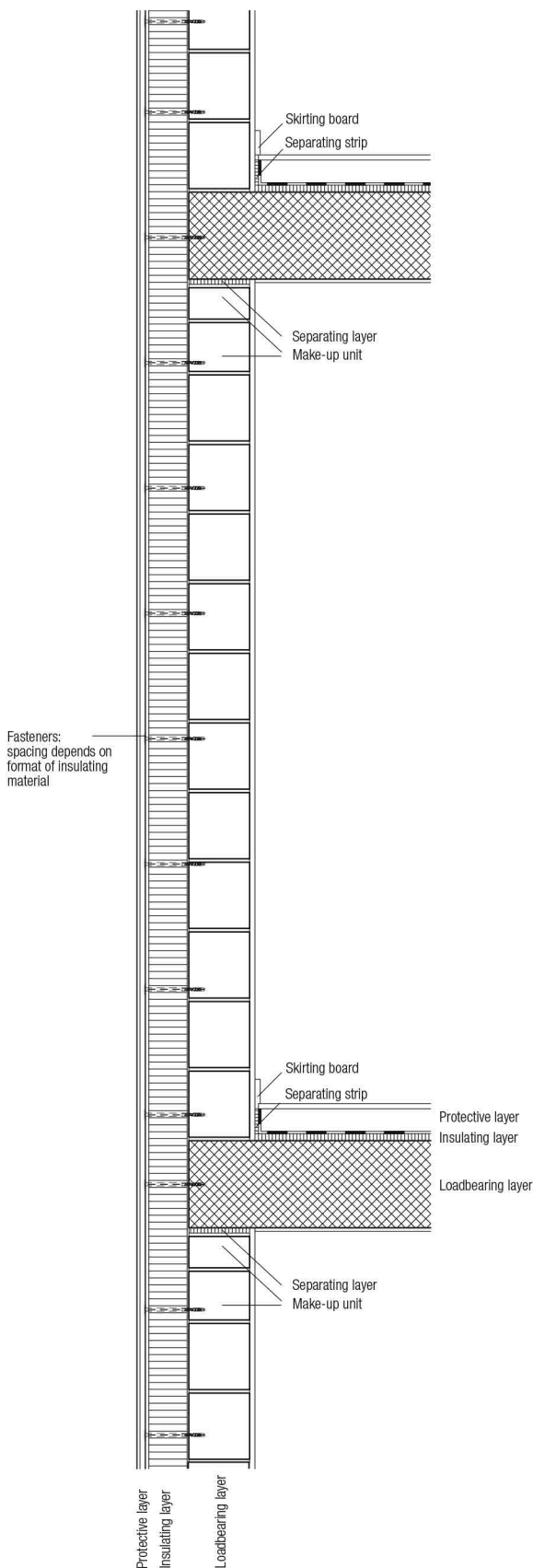
Plan, course 1



Plan, course 2

External insulation, rendered

1:20



Section

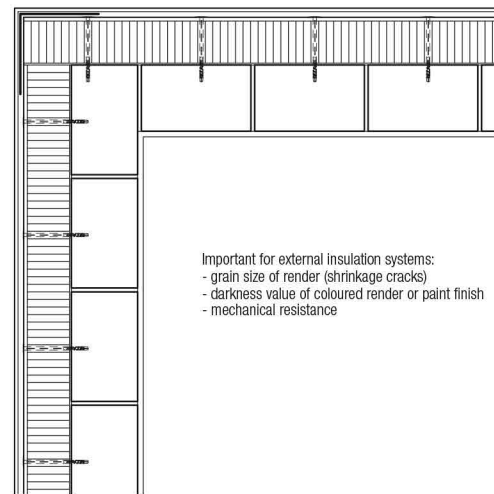
Wall construction

- e.g. Wancor-Therm K
- Mineral render finish coat (coloured or painted) 2 mm
- Bonding render (with glass mat inlay over entire surface) 4 mm
- Mineral render undercoat 20 mm
- Insulation board 5-110-10 (3-layer board), fixed with plastic fasteners 125 mm
- Clay masonry, B, 29 x 17.5 x 19 cm 175 mm
- Plaster 15 mm
- Total* 341 mm

Floor construction

- Magnesite flooring (seamless) 15 mm
- Screed 65 mm
- Separating layer (e.g. 1 mm plastic sheet)
- Impact sound insulation 20 mm
- Concrete slab 200 mm
- Plaster to soffit 10 mm
- Total* 310 mm

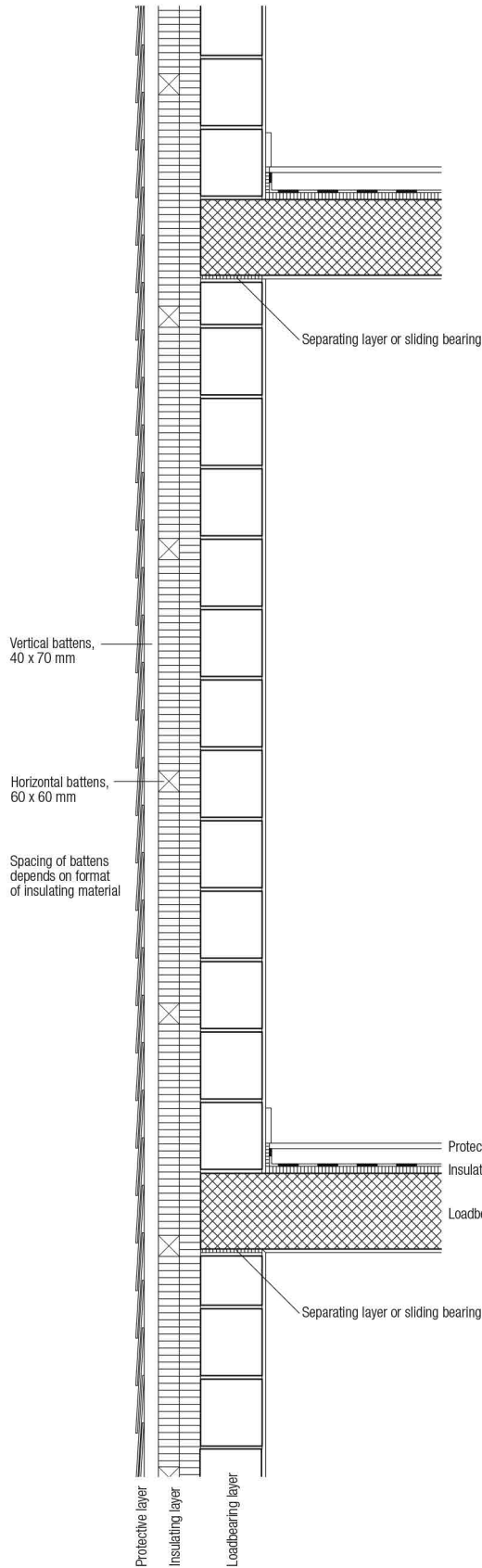
Mesh embedded to protect corner



Plan

External cladding, lightweight

1:20



Section

Wall construction

- Cladding in medium and large format
e.g. Eternit slates, rectangular double-lap arrangement, 300 x 600 x 5 mm 10 mm
- Variations:*
timber weatherboarding, 24 mm panels, e.g. sheet metal, Eternit, timber
- Ventilated cavity, (40 x 70 mm vertical battens) 40 mm
- Variations for small formats:*
slates, Eternit triple-lap arrangement clay, ceramics, horizontal battens, 30 x 50 mm
- Thermal insulation, 2 layers each 60 mm on grid of 60 x 60 mm battens 120 mm
- Clay masonry, B, 29 x 17.5 x 19 cm 175 mm
- Plaster 15 mm
- Total 360 mm**

Floor construction

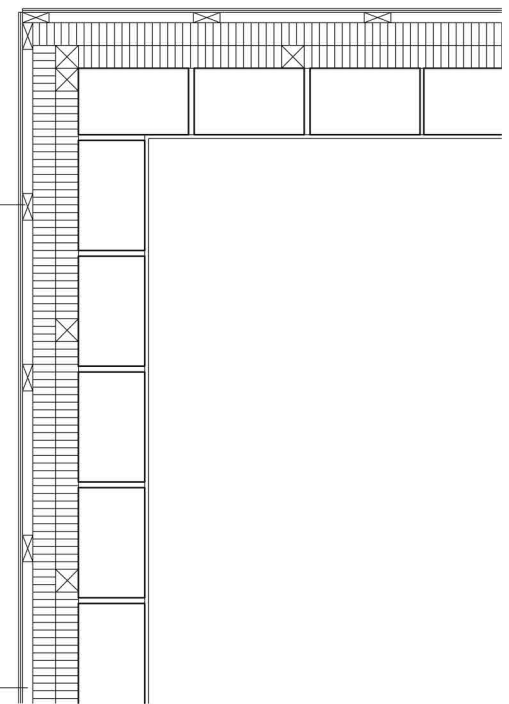
- Ready-to-lay parquet flooring 15 mm
- Screed 60 mm
- Separating layer (e.g. 1 mm plastic sheet)
- Impact sound insulation 20 mm
- Concrete slab 200 mm
- Total 295 mm**

Note: The battens (vertical, optional additional horizontal battens, so-called counter battens) depend on the cladding format.

Please note:
Cladding corner detail
(diverse options)

Vertical battens,
40 x 70 mm

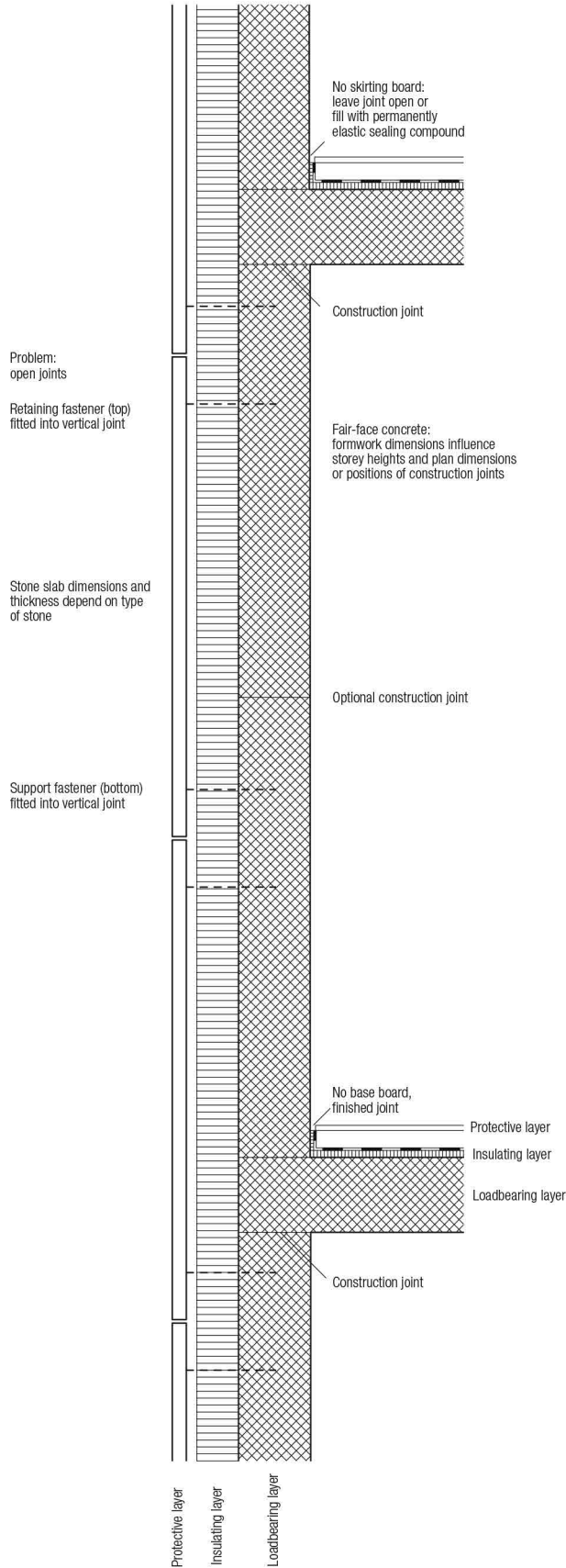
Ventilated cavity,
min. 40 mm, must always
remain open vertically!



Plan

External cladding, heavyweight

1:20



Section

Wall construction

- Stone slabs (e.g. slate)	20-40 mm
- Ventilated cavity	30 mm
- Thermal insulation	120 mm
- Fair-face concrete internally	200 mm
Total	390 mm

Floor construction

- Ready-to-lay parquet flooring	15 mm
- Screed	60 mm
- Separating layer (e.g. 1 mm plastic sheet)	
- Impact sound insulation	20 mm
- Concrete slab	200 mm
Total	295 mm

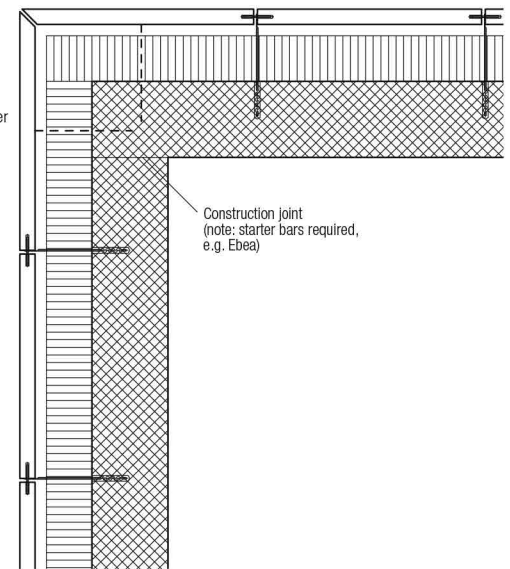
Important for non-self-supporting external cladding:
- fixed with retaining and support fasteners

Important for self-supporting external cladding:
- fixed for stability
(Reference example: private house "In den Lachen" [architects: Bearth & Deplazes], Chur; precast fair-face concrete facade elements)

Corner detail, e.g. stone slabs mitred

Support fastener fitted into horizontal joint

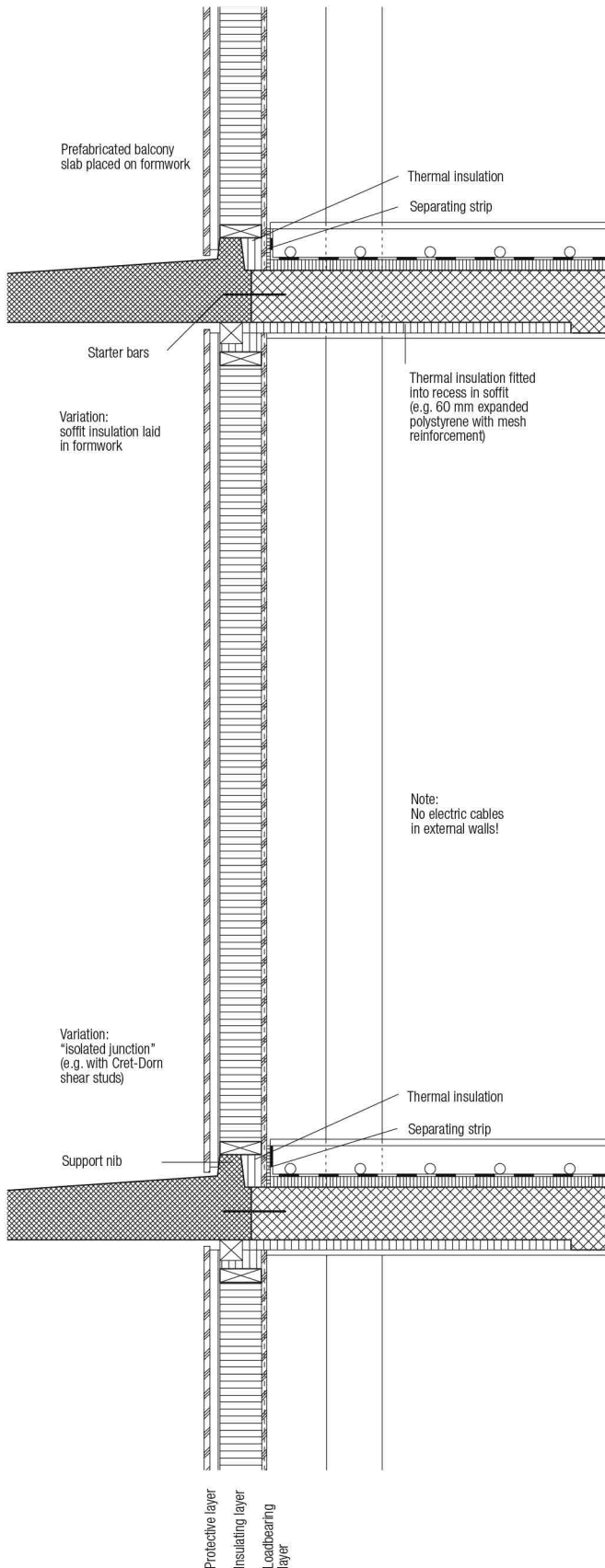
Fastener in vertical joint, grouted in



Plan

Non-loadbearing external wall

1:20



Wall construction (timber box-frame construction)

- Wood-cement particleboard (e.g. Duripanel, for painting)	20 mm
- Ventilated cavity	25 mm
- Hardboard	8 mm
- Thermal insulation (cellulose wool, e.g. Isofloc)	120 mm
- Plywood (vapour check)	15 mm
Total	188 mm

Floor construction

- Ready-to-lay parquet flooring	20 mm
- Screed (with underfloor heating)	80 mm
- Separating layer (e.g. 1 mm plastic sheet)	
- Impact sound insulation	30 mm
- Concrete slab	180 mm
- Thermal insulation (e.g. expanded polystyrene)	30 mm
- Plaster to soffit	10 mm
Total	350 mm

Example:

Morger & Degelo: Müllheimer-Strasse residential development, Basel (CH), 1993

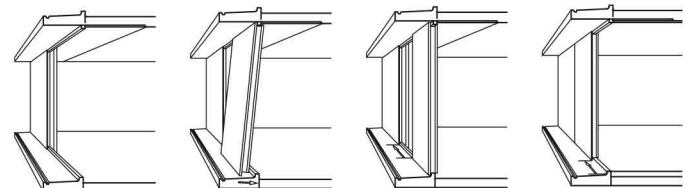
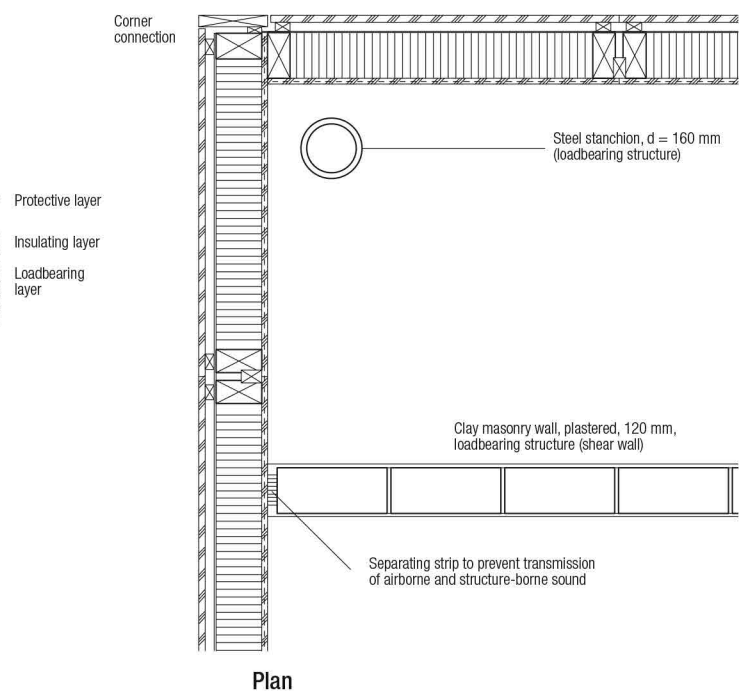
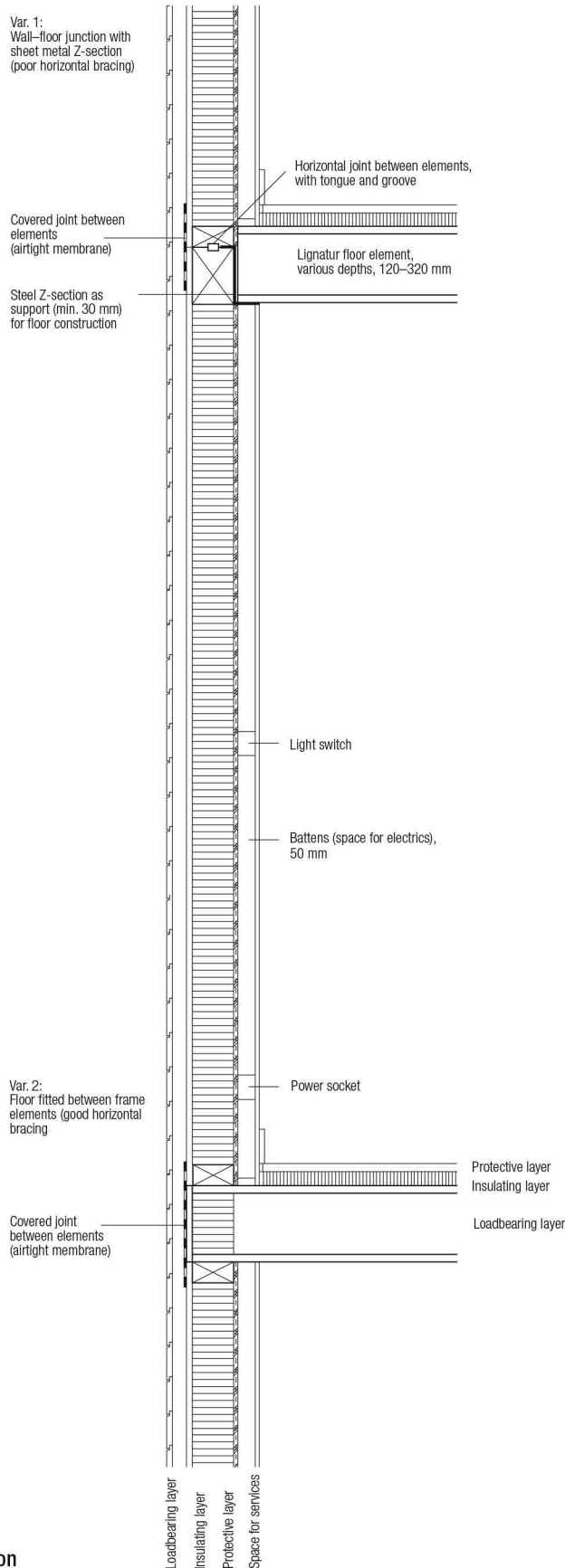


Fig. 1: Erection and fixing of a facade element



Timber platform frame construction

1:20



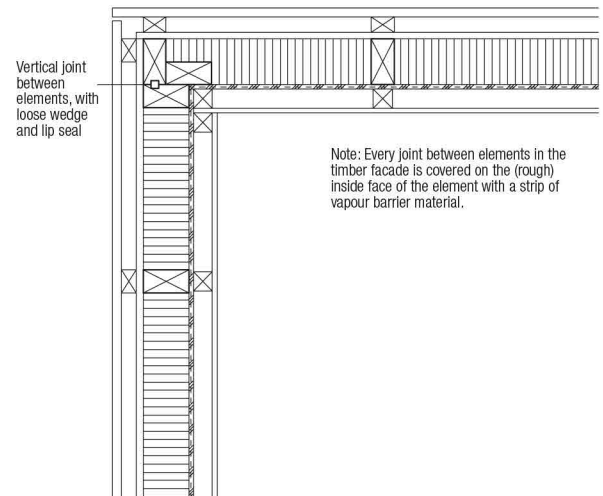
Section

Wall construction

- Horizontal boards	24 mm
- Vertical battens (ventilated cavity)	40 mm
- Bitumen-impregnated softboard (airtight membrane)	18 mm
- Timber studding, insulation (cellulose wool, e.g. Isofloc)	120 mm
- Wood-based board (plywood, vapourproof)	12 mm
- Vertical battens (space for services)	50 mm
- Wood-cement particleboard or fibre-reinforced plasterboard	12 mm
Total	276 mm

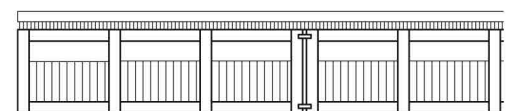
Floor construction

- 3-ply core plywood, floating, with tongue and groove	27 mm
- Impact sound insulation	40 mm
- Lignatur timber box element, soffit left exposed	220 mm
Total	287 mm



Plan

Lignatur element, 100 cm wide, insulated or uninsulated, depth depends on span

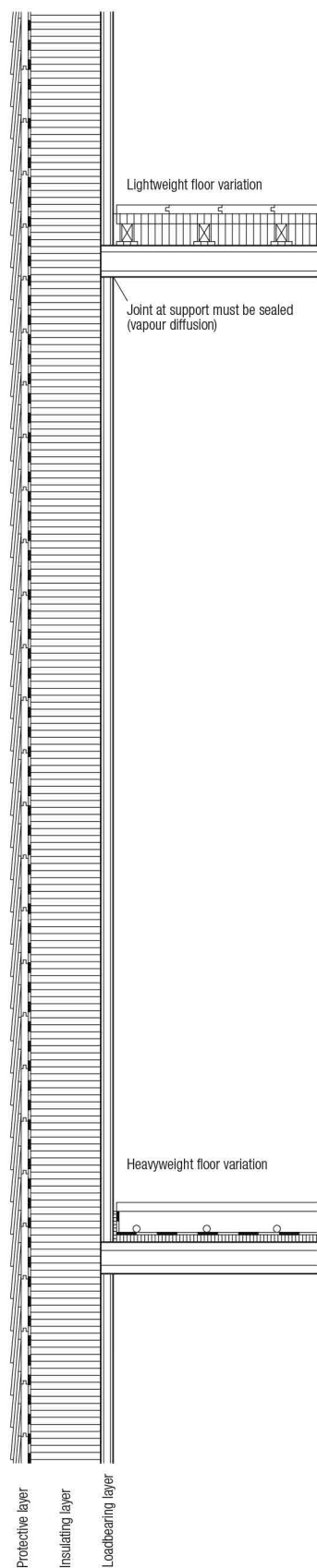


Joint between elements with loose plywood tongue

Schematic section

Solid timber panel construction

1:20



Section

Wall construction

- Larch shingles (without ventilated cavity), double-lap arrangement 20 mm
- Spruce boards (tongue and groove), horizontal 20 mm
- Airtight membrane
- Thermal insulation (around the transverse ribs) 200 mm
- Solid timber panel (loadbearing, incl. vapour check function due to adhesive) 35 mm
- Total 275 mm**

Floor construction, "lightweight"

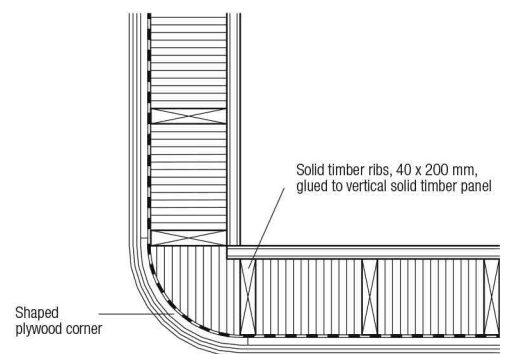
- Solid timber floorboards (tongue and groove, concealed nailing) 24 mm
- Counter battens, 40 x 30 mm (with insulation between) 30 mm
- Battens, 50 x 30 mm (with insulation in between) 50 mm
- Rubber strips as separating layer beneath battens (for impact sound insulation) 10 mm
- Solid timber panel (span: 3 m) 90 mm
- Total 204 mm**

Floor construction, "heavyweight"

- Hard-fired floor tiles 30 mm
- Screed (with underfloor heating) 60 mm
- Separating layer (fleece) 2 mm
- Impact sound insulation 40 mm
- Solid timber panel (span: 3 m) 90 mm
- Total 222 mm**

Example:

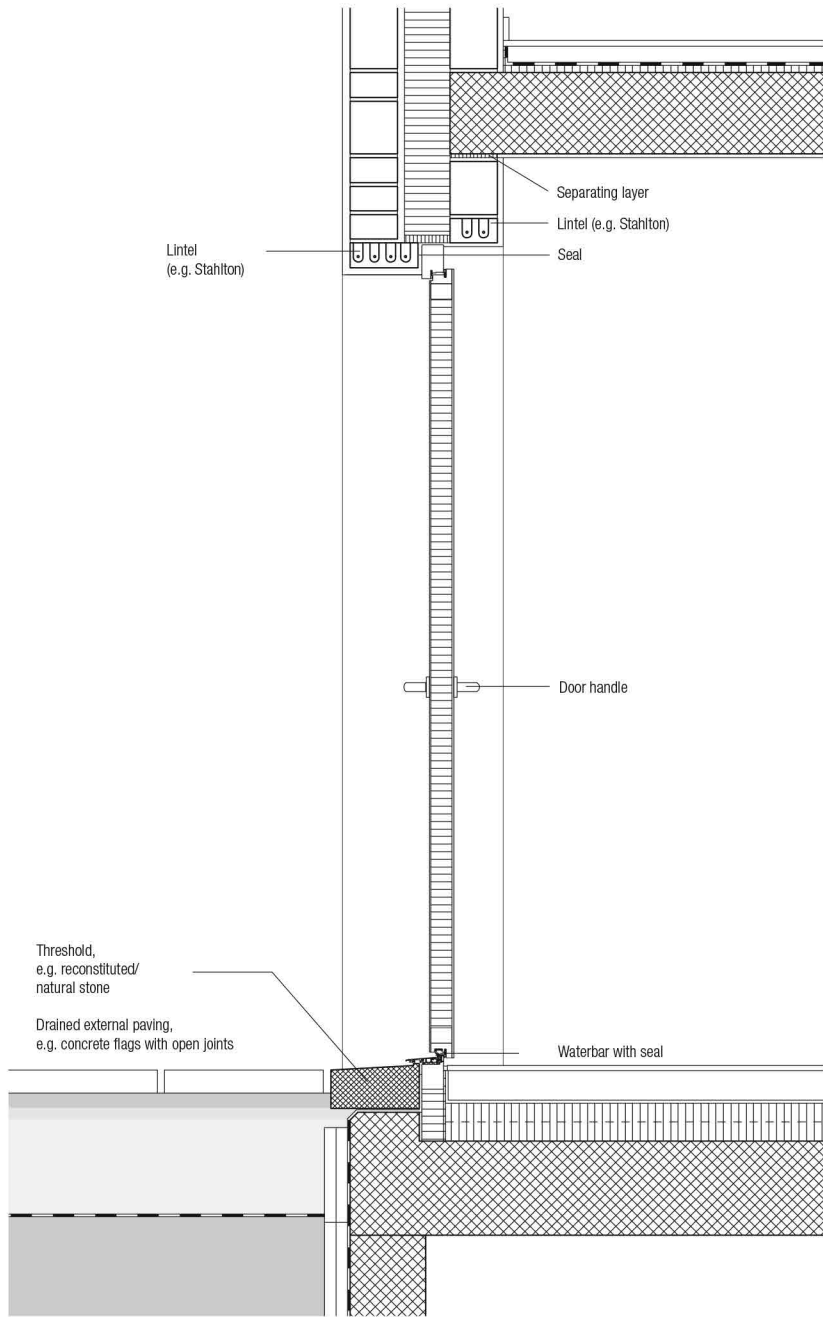
Bearth & Deplazes: private house (Bearth-Candinas), Sumvitg (CH), 1998



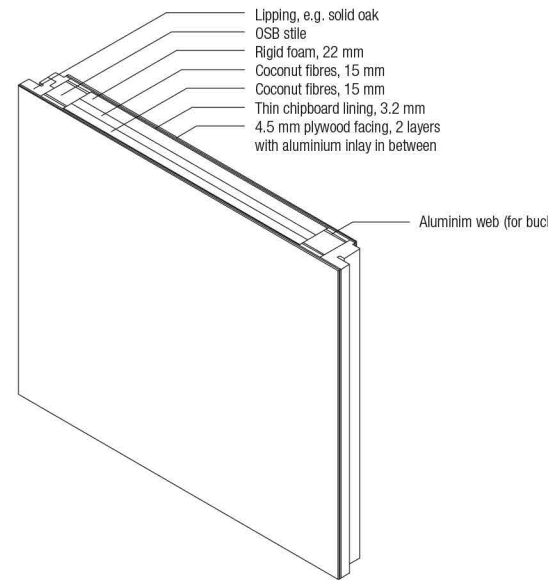
Plan

Hinged door, external – wood

1:20

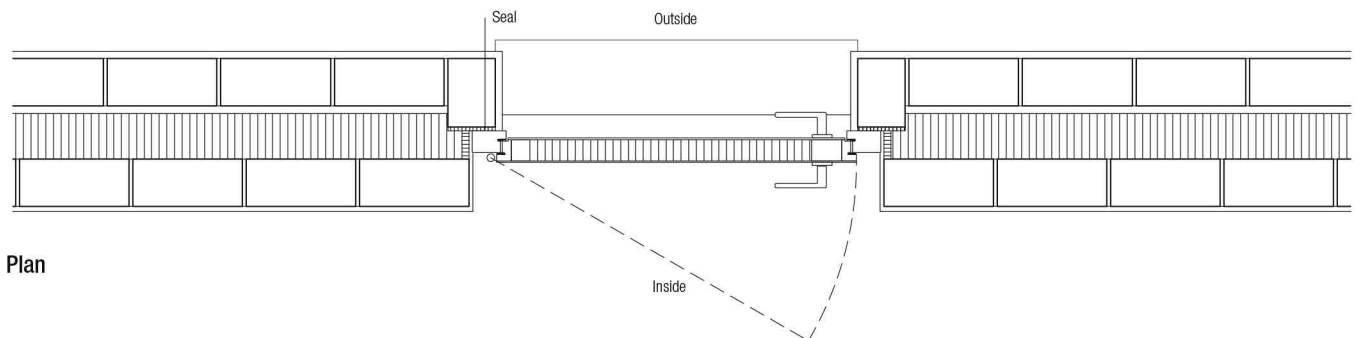


Entrance door with frame, double-leaf masonry, rendered hinges on left, opening inwards rebated leaf, including thermal and sound insulation frame and leaf designed for fire resistance class T 30



Leaf construction: Riwag-Isotherm 65 mm Facing for painting or with various wood veneer finishes

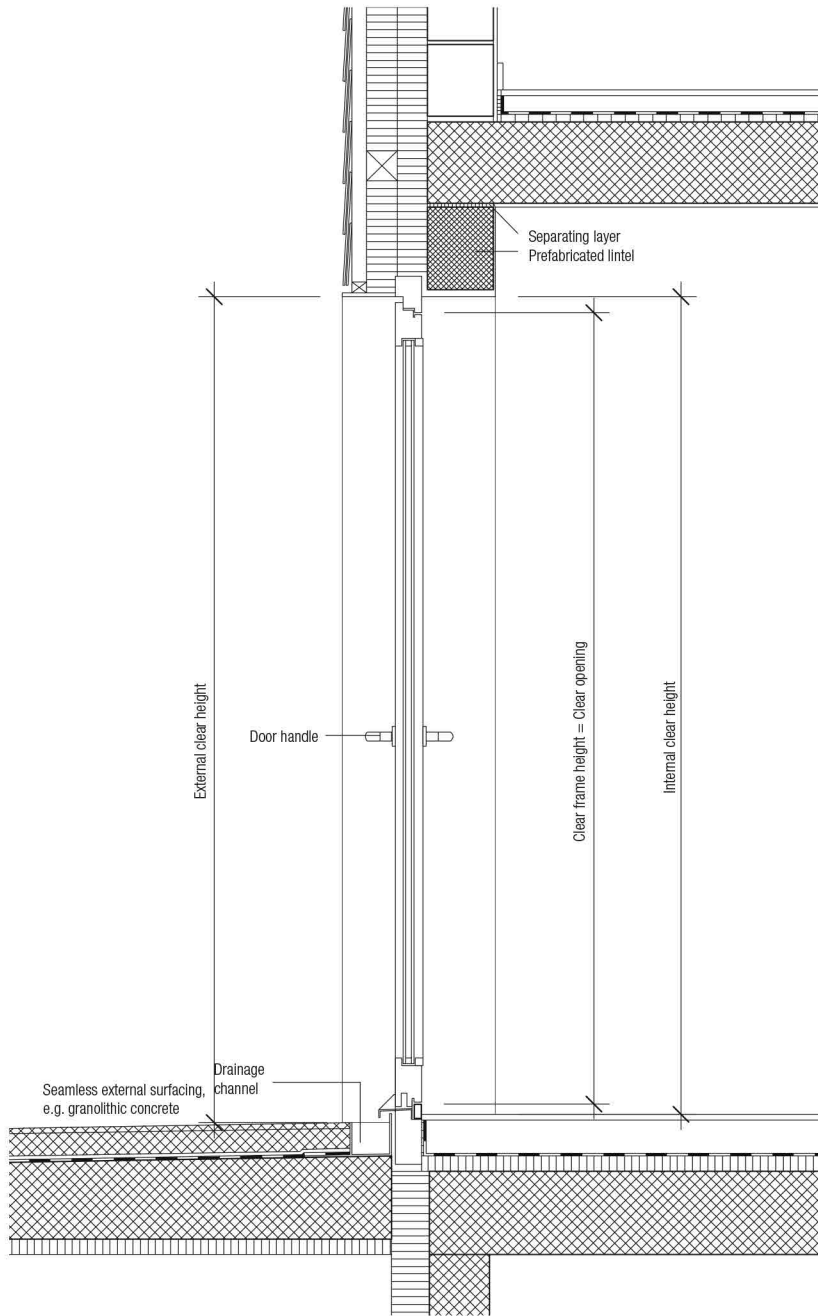
Section



Plan

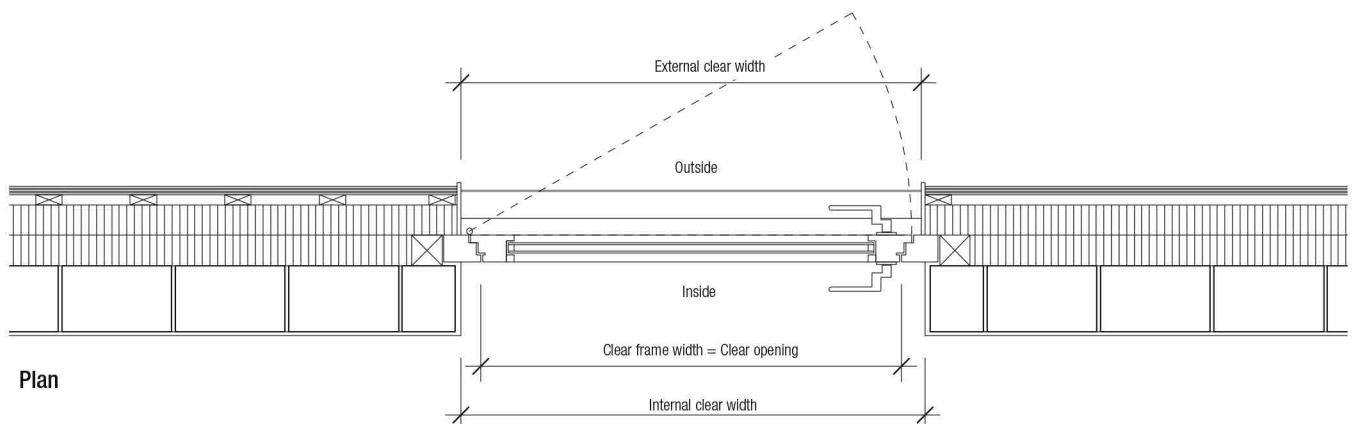
Hinged door, external – wood/glass

1:20



Entrance door
with frame, external cladding, lightweight
hinges on right, opening outwards
glazed leaf, rebated, fits flush with frame

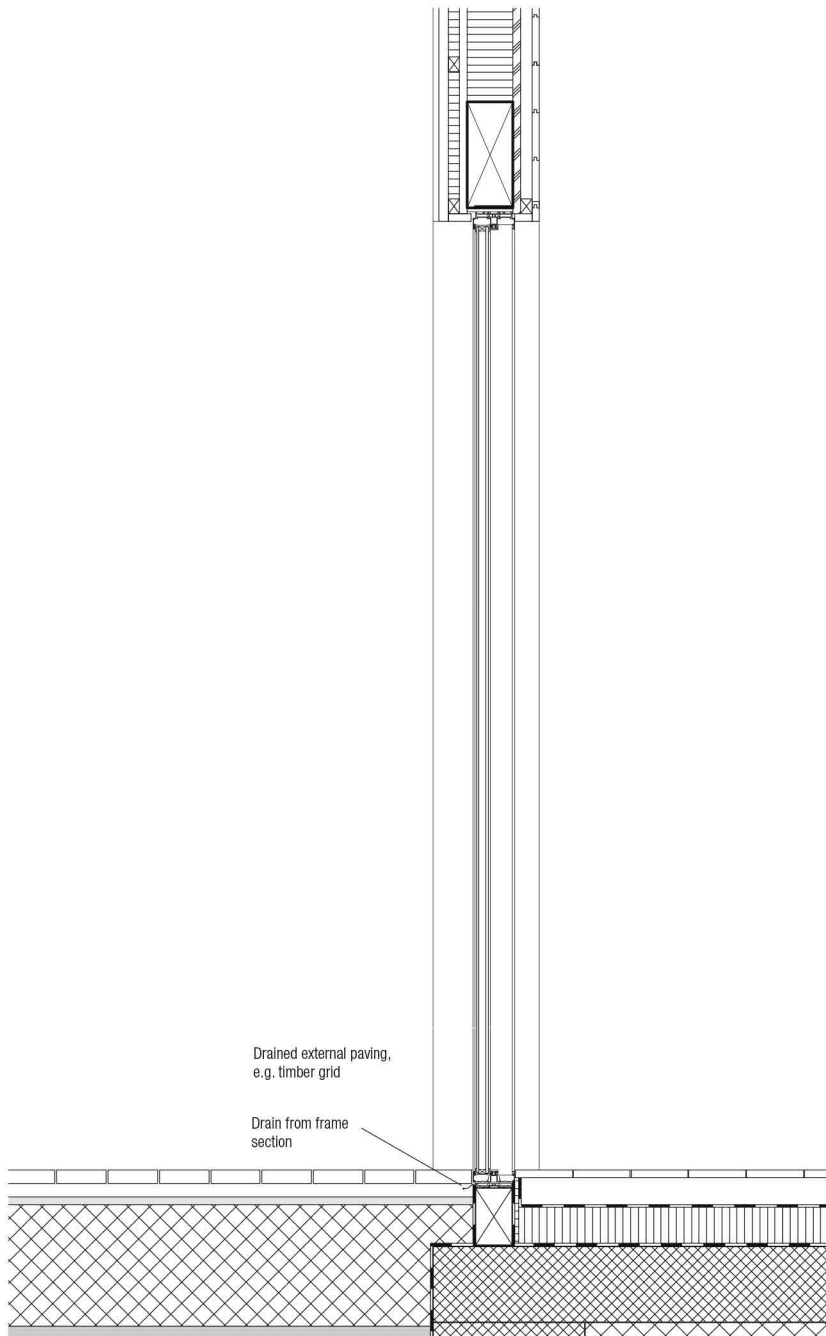
Section



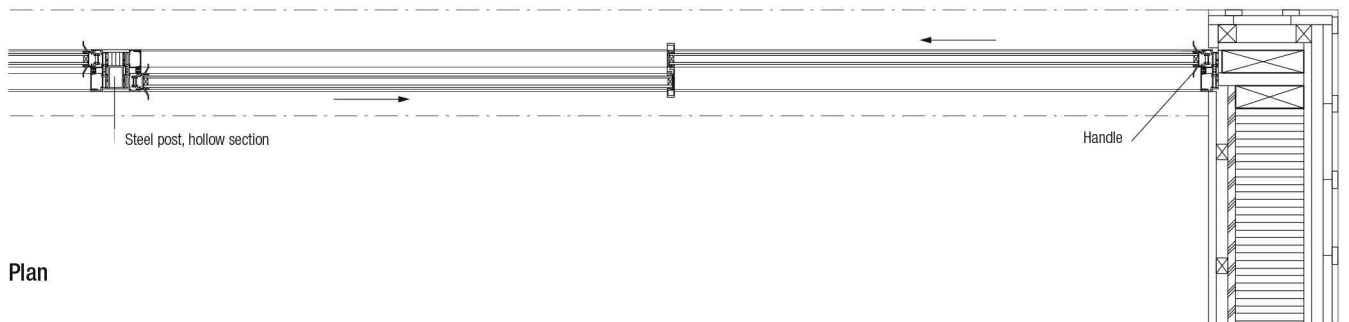
Plan

Sliding door, external – metal/glass

1:20



Section



Plan

Glazed patio door
 Special design, brand: "sky-frame"
 Double sliding aluminium door with thermal break

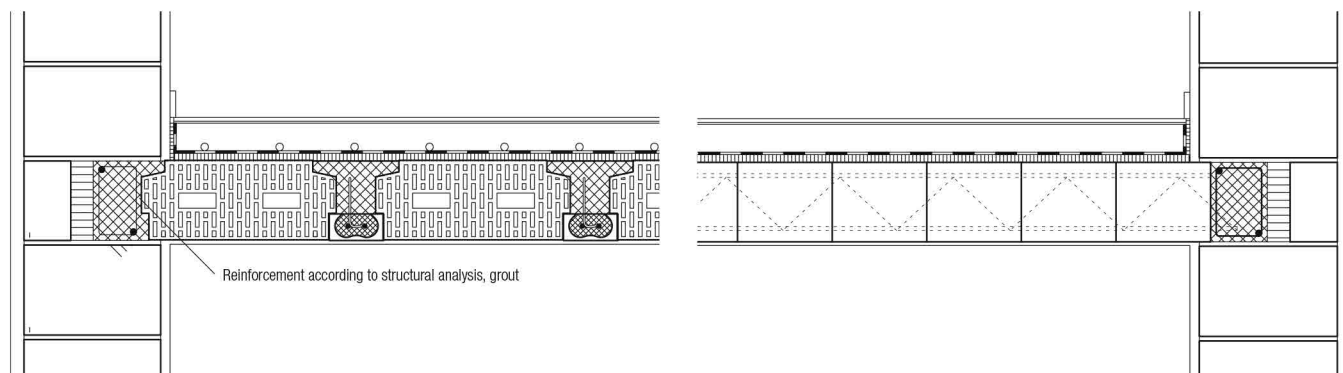
Glass elements attached to aluminium frame fitted into threshold, jambs and head. The sliding elements run on ball-bearing trolleys with little rolling resistance.



Fig. 1: Peter Kunz: private house, Winterthur (CH), 2003

Hourdis-type hollow clay block floor

1:20



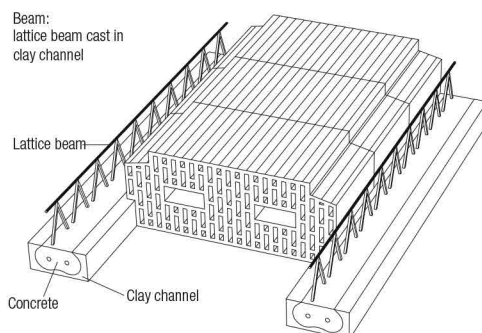
Wall construction

Single-leaf masonry

- Render 35 mm
- Single-leaf masonry, 36.5 x 24.8 x 23.8 cm 365 mm
- Plaster 25 mm

Floor construction

- Floor covering, e.g. plain clay tiles 10 mm
- Tile adhesive
- Screed with underfloor heating 80 mm
- Separating layer (e.g. 1 mm plastic sheet) 20 mm
- Impact sound insulation 20 mm
- Hourdis-type hollow clay block floor 210–250 mm
- Plaster to soffit 10 mm



Structure

- 1-way span (2-way possible: waffle systems)
- Same material for the soffit
- With or without concrete topping, depending on loads
- Cantilevers not possible
- Not suitable for point loads
- Span with in situ reinforcement: up to 7 m
- Span with prestressing: up to 7.5 m

Features

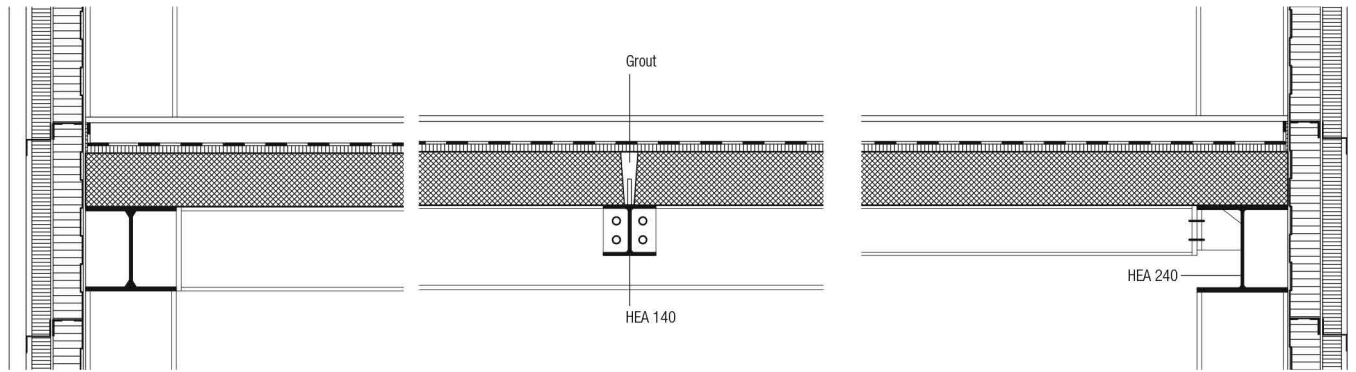
- In situ reinforcement: adaptable flooring system
- Prestressed: beams (tension chords) are prestressed; most systems fall into this category.
- No formwork
- Little propping needed



Fig. 2: Fitting the individual Hourdis-type elements between the reinforced concrete beams

Steel floor

1:20



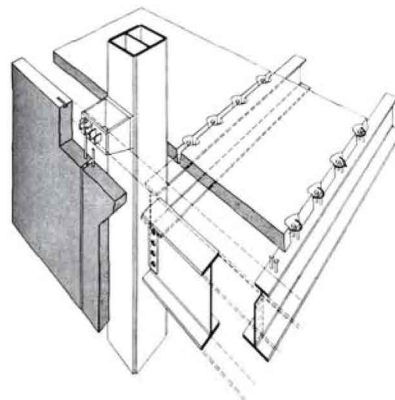
Wall construction

External cladding, with ventilated cavity

- Corrugated metal sheeting, galvanised varies
- Ventilated cavity (vertical sheeting) > 40 mm
- Thermal insulation 50 mm
- Thermal insulation in sheet steel trays (galvanised) 80 mm
- Steel columns, steel beams varies

Floor construction

- Floor covering, e.g. magnesite 10 mm
- Screed 60 mm
- Separating layer (e.g. 1 mm plastic sheet)
- Impact sound insulation 20 mm
- Concrete 150–300 mm
- Steel primary/secondary beams (e.g. HEA or HEB sections) varies



Structure

- 1-way span
- Modularity (for standard plate widths)
- Prefabrication
- Services can be routed along steel beams
- Low weight
- Steel beams limit fire resistance
- Spans of up to 6 m

Features

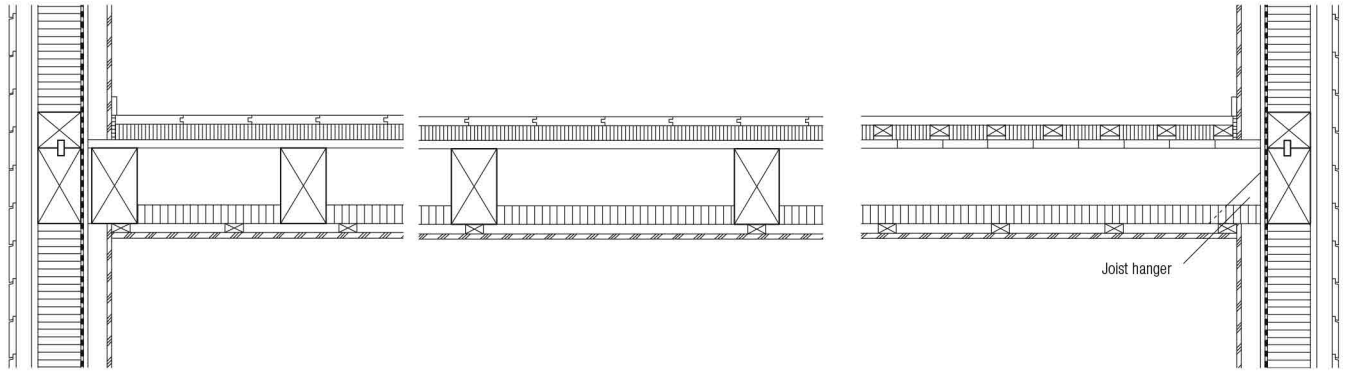
- Dry construction
- No formwork and no propping
- Fast assembly



Fig. 12: Primary structure of (solid) rolled sections, secondary structure of (open) lattice beams

Timber joist floor

1:20



Wall construction

Platform frame construction

- Weatherboarding	24 mm
- Battens, ventilated cavity	40 mm
- Softboard (airtight membrane)	18 mm
- Thermal insulation, frame	120 mm
- Vapour check	
- Plain angled connections	
- Battens (space for services)	50 mm
- Wood-cement particleboard	12 mm

Floor construction

- Wooden floorboards (tongue and groove)	24 mm
- Impact sound insulation, battens, rubber strips as separating layer beneath battens (for impact sound insulation)	40 mm
- Counter-floor (e.g. diagonal boarding with butt joints)	20 mm
- Joists (depth depends on span)	
120 x 200 mm	200 mm
- Sound insulation	50 mm
- Battens	24 mm
- Wood-cement particleboard	15 mm

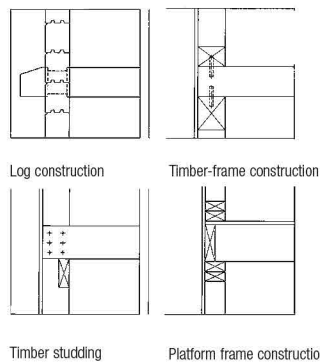


Fig. 9: Various types of timber construction

Structure

- 1-way span
- Joist spacing: 50–80 cm
- Susceptible to vibration
- Greater load-carrying capacity when joist ends are built in
- Additional measures, e.g. diagonal boarding (counter-floor, soffit) required in order to achieve stiffening effect
- Spans: up to 5 m

Features

- Dry construction
- Simple assembly
- Fast assembly
- Labour-intensive

Sound

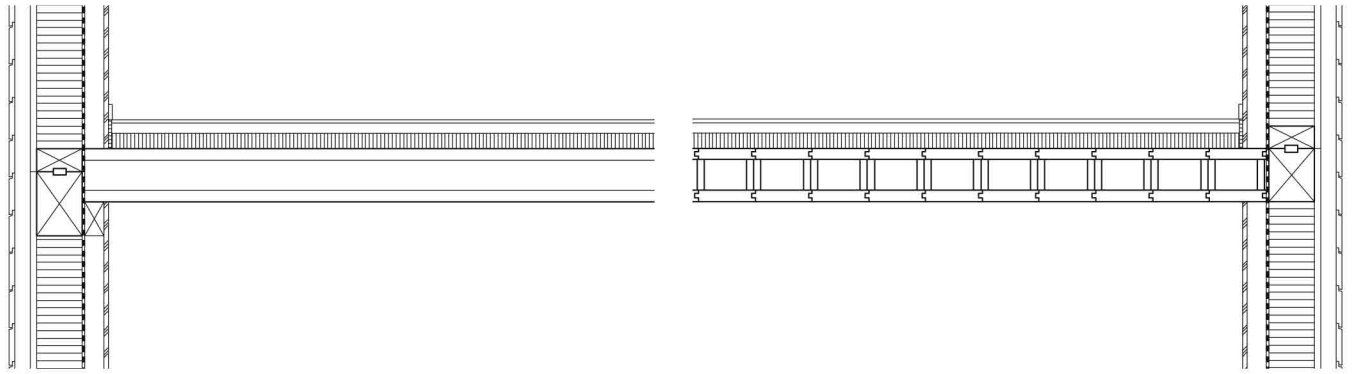
- Problematic airborne and impact sound insulation



Fig. 10: Daniele Marques: private house (Ober-Riffig), Emmenbrücke (CH), 1993

Timber box element floor

1:20



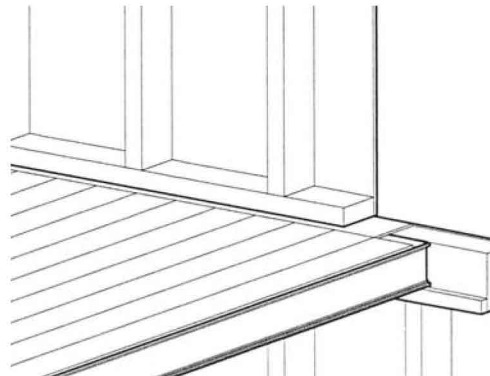
Wall construction

Platform frame construction

- Weatherboarding	24 mm
- Battens, ventilated cavity	40 mm
- Softboard (airtight membrane)	18 mm
- Thermal insulation, frame	120 mm
- Vapour check	
- Plain angled connections	
- Battens (space for services)	50 mm
- Wood-cement particleboard	12 mm

Floor construction

- Floor covering, e.g. ready-to-lay	
parquet flooring	10 mm
- 3-ply core plywood	27 mm
- Impact sound insulation, 2 layers each 20 mm	40 mm
- Timber box element floor on supporting members	
(structural depth depends on span)	120–320 mm
- Glaze finish	



Structure

- Timber box elements made from solid planks (e.g. Lignatur)
- High loadbearing capacity coupled with low self-weight
- 1-way span
- Rigid floor without vibration problems
- Spans of 4–8 m
- Depths of 12–32 cm

Features

- Simple erection
- Dry construction
- Timber box elements prefabricated individually or in larger subassemblies
- Fast erection

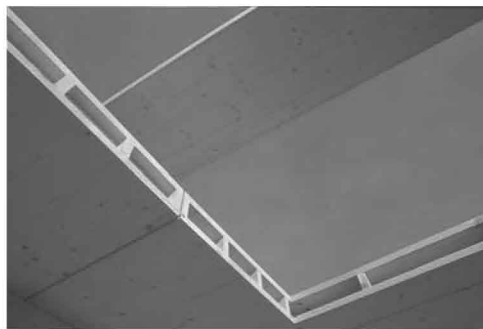


Fig. 11: Opening in timber box element floor, with voids not yet closed off

Flat roof – warm deck

Bitumen – double-leaf masonry, rendered

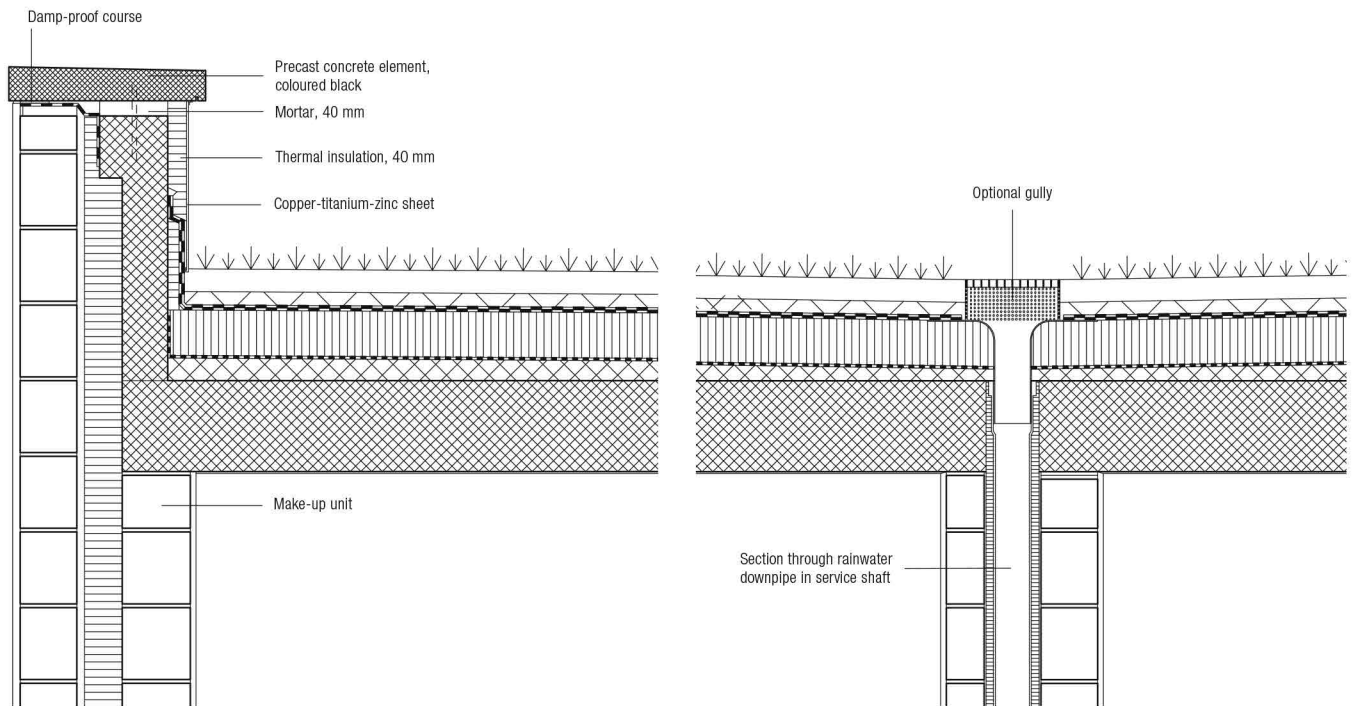


Fig. 5: Ackermann & Friedli: Ackermännli School, Basel (CH), 1996

Roof construction

- Topsoil	60 mm
- Drainage/protection mat	35 mm
- Calendered polymeric roofing, 2 layers	
- Thermal insulation	120 mm
- Vapour barrier (Reasons: residual moisture in concrete, temporary roof during construction, protection, against vapour diffusion, especially at cracks and penetrations)	
- Screed laid to falls	30–60 mm
- Concrete slab	240 mm
- Plaster	5 mm
<i>Total</i>	<i>490–520 mm</i>

Wall construction

- Render	20 mm
- Clay masonry, B, 29 x 15 x 19 cm	150 mm
- Cavity (construction tolerance)	20 mm
- Thermal insulation	100 mm
- Clay masonry, B, 29 x 17.5 x 19 cm	175 mm
- Plaster	15 mm
<i>Total</i>	<i>480 mm</i>

Flat roof – warm deck

Plastics – external cladding, heavyweight

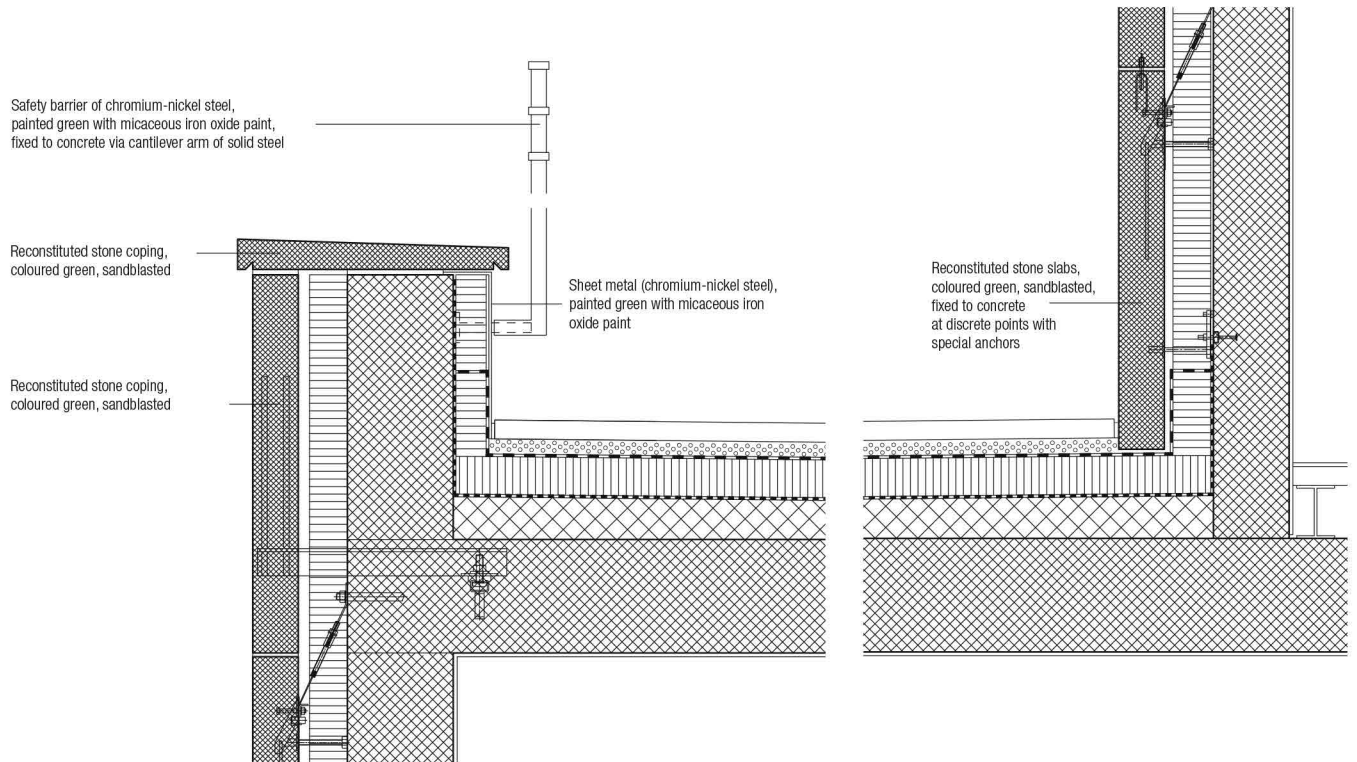


Fig. 7: Diener & Diener: Warteckhof mixed residential and commercial development, Basel (CH), 1996

Roof construction

- Concrete flags	50 mm
- Gravel	40 mm
- Synthetic roofing felt	
- Thermal insulation	100 mm
- Vapour barrier	
- Screed laid to falls	20–80 mm
- Concrete slab	300 mm
- Plaster	5–10 mm
<i>Total</i>	<i>515–580 mm</i>

Wall construction

- Reconstituted stone slabs, coloured green, sandblasted	120 mm
- Cavity (construction tolerance)	30 mm
- Thermal insulation	100 mm
- Concrete wall	200 mm
- Plaster	10 mm
<i>Total</i>	<i>460 mm</i>

Flat roof – warm deck, e.g. KompaktDach

Bitumen – non-loadbearing external wall

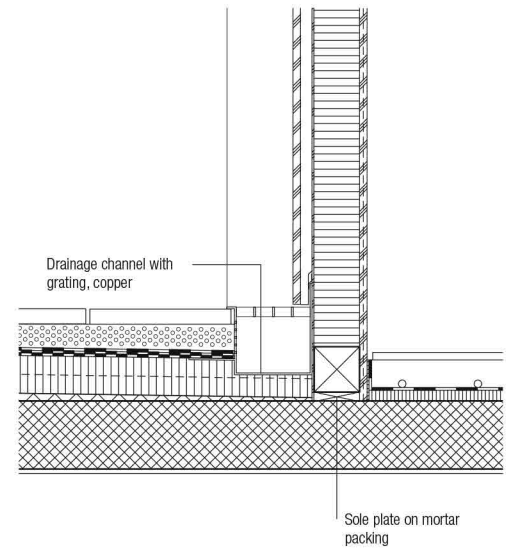
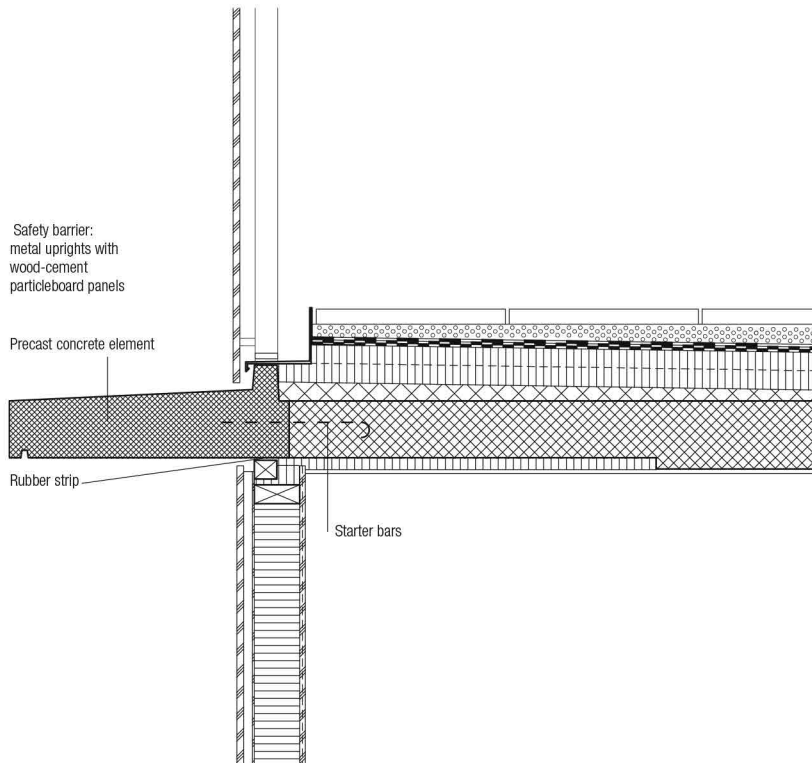


Fig. 8: Morger & Degelo: publicly assisted housing, Basel (CH), 1993

Terrace construction

- Concrete flags laid horizontally	40 mm
- Chippings (to compensate for falls)	min. 30 mm
- Protective fleece	
- Waterproofing, 2 layers, bituminous, fully bonded	
- Cellular glass laid in hot bitumen	100 mm
- Screed laid to falls, 1.5%	20–60 mm
- Concrete slab	180 mm
- Plaster	10 mm
<i>Total</i>	<i>380–420 mm</i>

Wall construction

- Wood-cement particleboard	18 mm
- Ventilated cavity	23 mm
- Hardboard	5 mm
- Thermal insulation	120 mm
- Plywood	15 mm
<i>Total</i>	<i>181 mm</i>

Flat roof – upside-down roof

Bitumen – external insulation, rendered

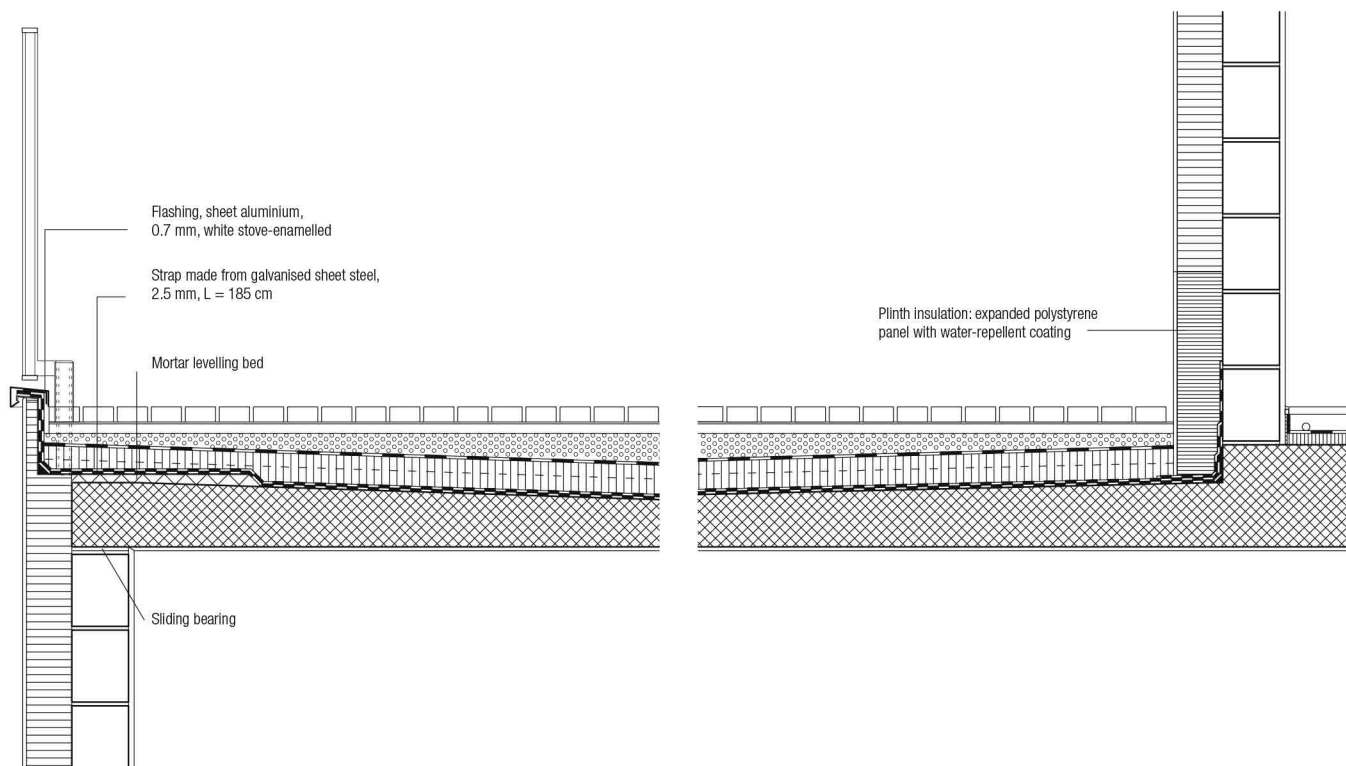


Fig. 9: Oliver Schwarz architectural practice: Peter apartment block, Rüschlikon (CH), 1997

Roof construction

- Okoume battens	40 mm
- Okoume supporting battens	30 mm
- Fine chippings, bonded	40–90 mm
- Protective fleece	
- Thermal insulation, expanded polystyrene	80 mm
- Calendered polymeric roofing, 2 layers	
- Concrete slab laid to falls	120–170 mm
- Plaster	5–10 mm
<i>Total</i>	<i>315–420 mm</i>

Wall construction

- Render (depends on system)	5 mm
- External insulation, extruded polystyrene	120 mm
- Clay masonry	150 mm
- Plaster	15 mm
<i>Total</i>	<i>290 mm</i>

Flat roof – cold deck, uncoated roof
 Bitumen – timber platform frame construction

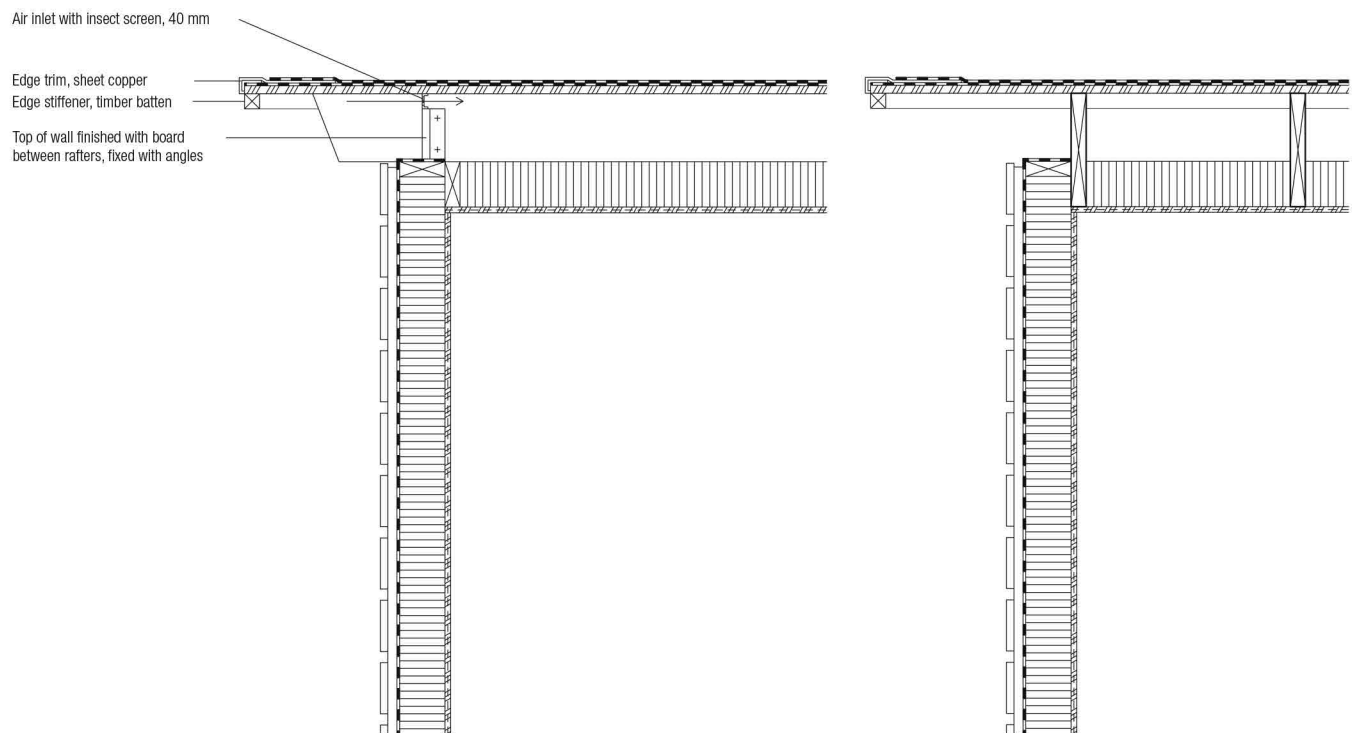


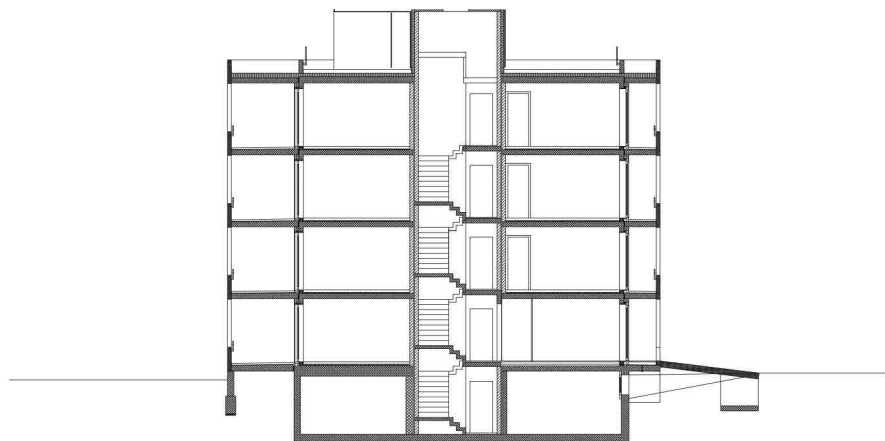
Fig. 10: Morger & Degelo: temporary nursery school, Basel (CH), 1993

Roof construction

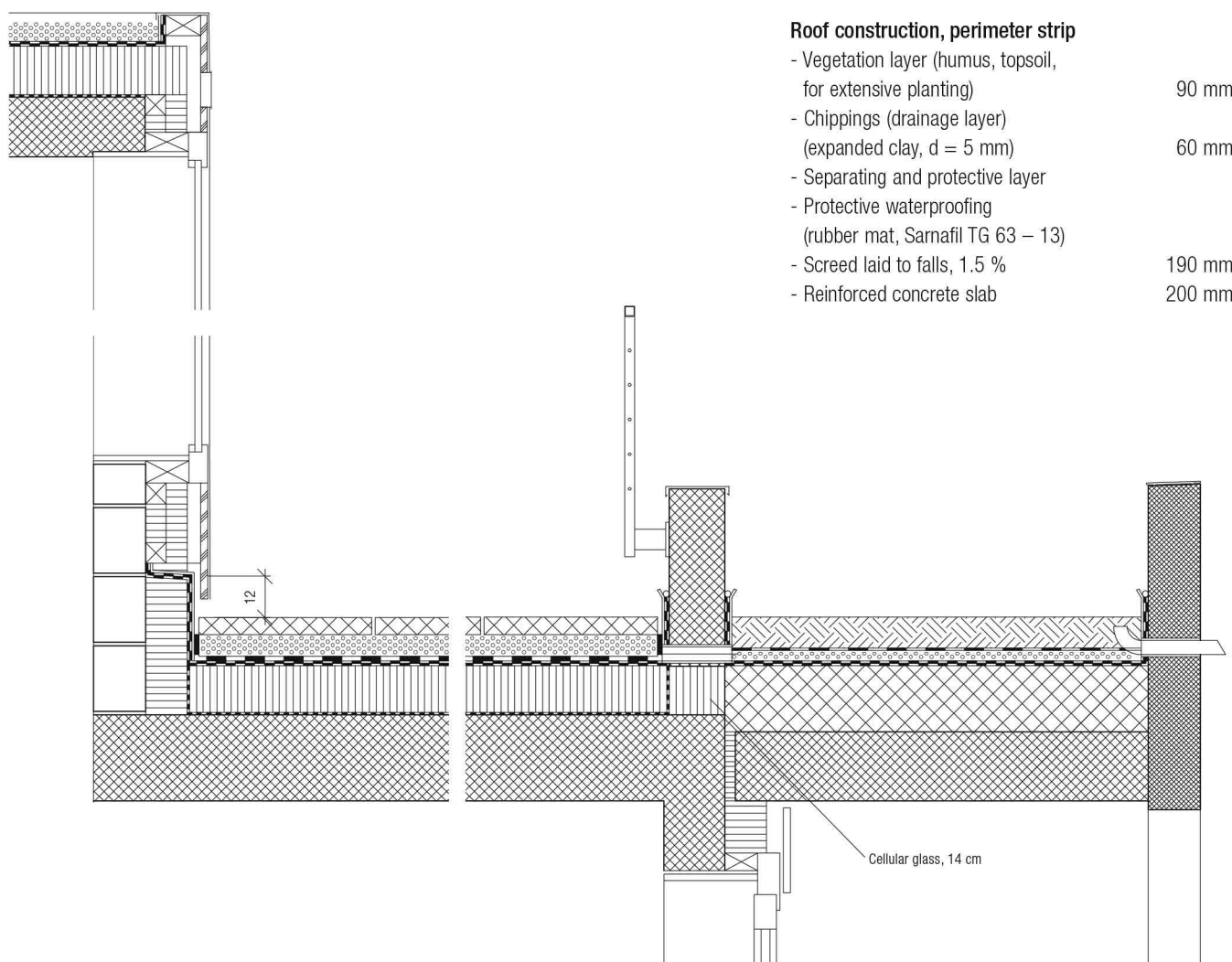
- Granule-surfaced bitumen felt, 2 layers	
- Plywood	21 mm
- Timber joists, 40 x 300 mm with 180 mm cavity, and 120 mm thermal insulation in between	300 mm
- Plywood (airtight membrane)	15 mm
<i>Total</i>	<i>336 mm</i>

Wall construction

- Horizontal boarding externally, rough finish	21 mm
- Vertical boarding with ventilated cavity	24 mm
- Protective layer to thermal insulation	
- Timber frame, with thermal insulation in between	120mm
- Plywood (airtight membrane)	15 mm
<i>Total</i>	<i>180 mm</i>



Section



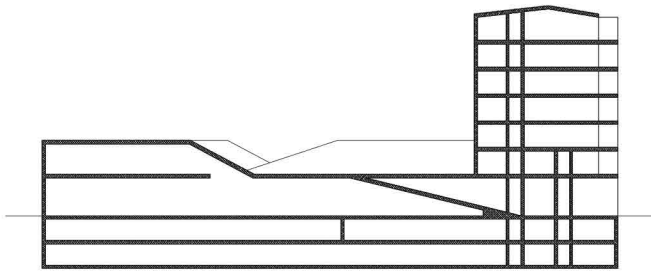
Roof construction, perimeter strip

- Vegetation layer (humus, topsoil, for extensive planting) 90 mm
- Chippings (drainage layer) (expanded clay, d = 5 mm) 60 mm
- Separating and protective layer
- Protective waterproofing (rubber mat, Sarnafil TG 63 – 13) 190 mm
- Screed laid to falls, 1.5 % 190 mm
- Reinforced concrete slab 200 mm

Warm deck, suitable for foot traffic, terrace

Roof, perimeter strip, with planting
Section

Flat roof – upside-down roof
with rooftop planting



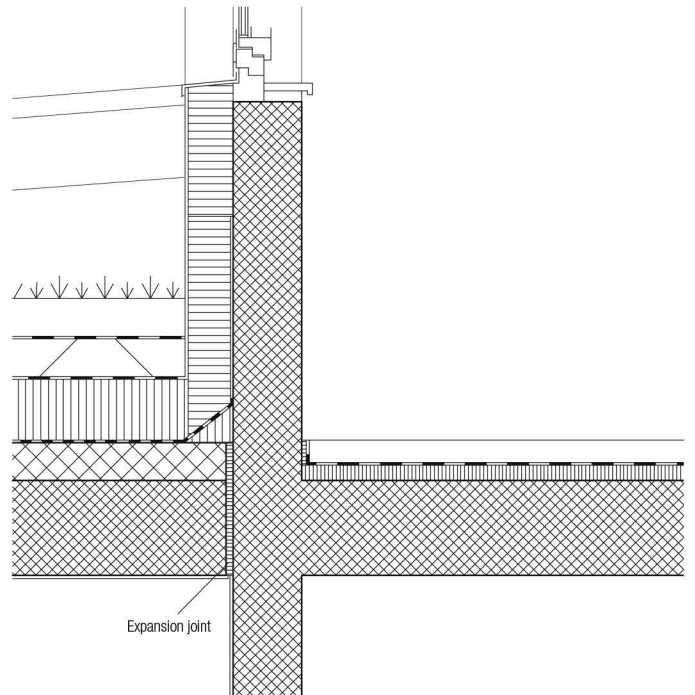
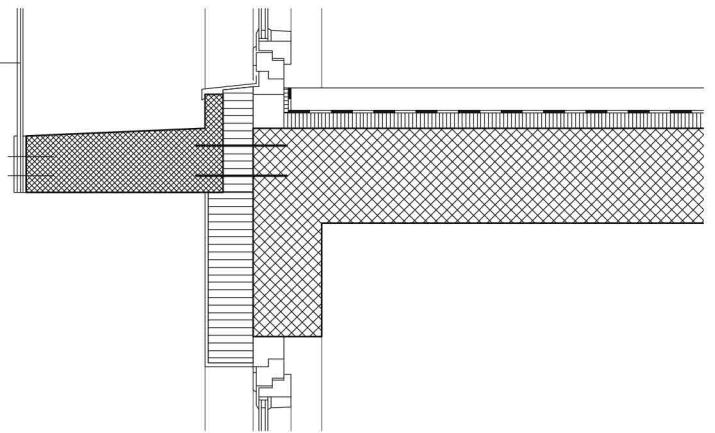
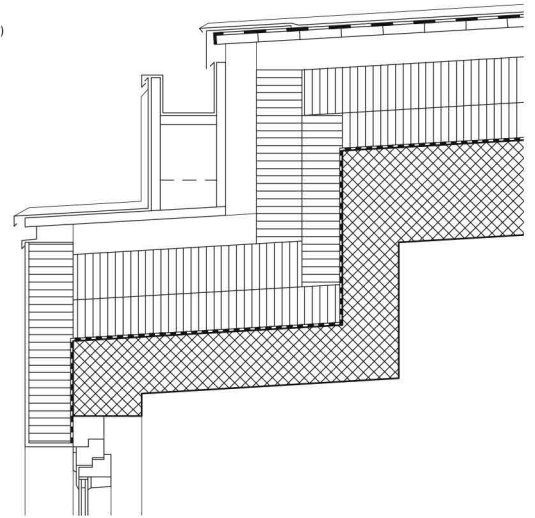
Section, 1:750



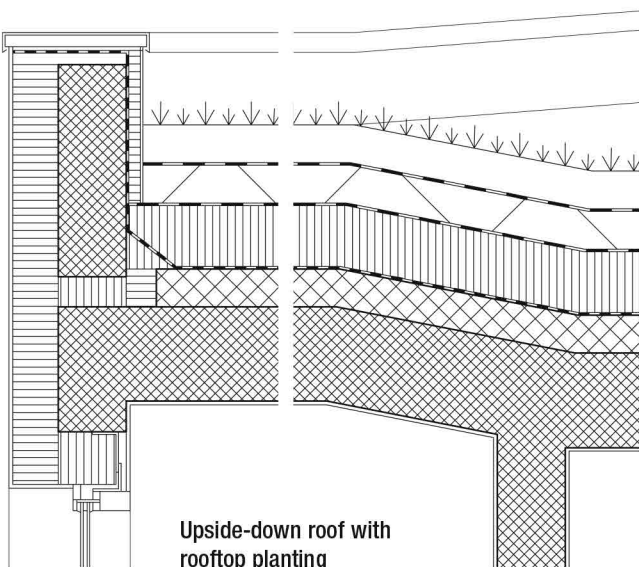
Fig. 13: Delugan & Meissl: mixed residential and office development, Vienna (A), 2001

Top storey

Safety barrier,
16 mm laminated safety glass,
rigid base fixing

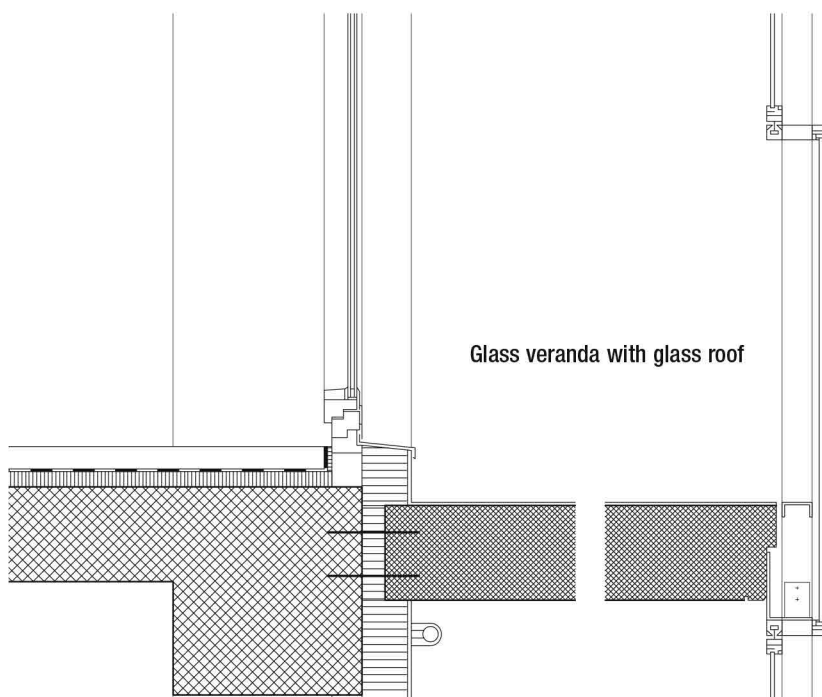
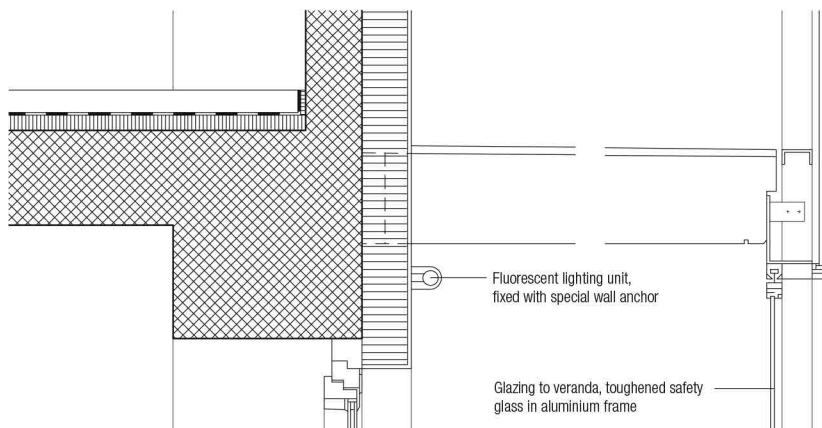
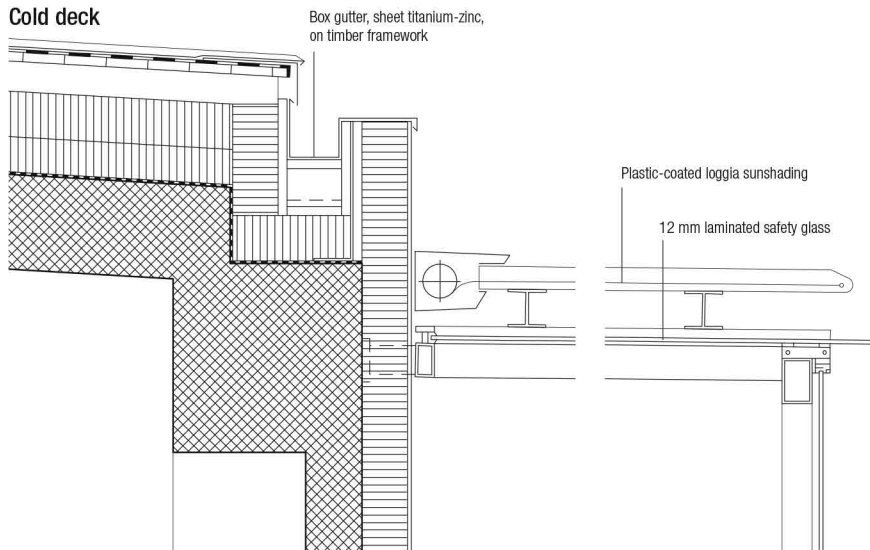


Expansion joint



Upside-down roof with
rooftop planting

Cold deck



Roof construction, cold deck

- Sheet titanium-zinc (standing seam roof with sealing tape in seam)
- Separating layer
- Roof decking 24 mm
- Rafters, 50 x 280 mm 280 mm
- Ventilated cavity 80 mm
- Thermal insulation, mineral felt 120 mm
- Thermal insulation, mineral felt 100 mm
- Vapour barrier
- Reinforced concrete, plaster skim finish to soffit 250 mm

Wall construction

- Synthetic resin render 5 mm
- Thermal insulation, extruded polystyrene 120 mm
- Reinforced concrete, plaster skim finish internally 160 mm

Roof construction, upside-down roof

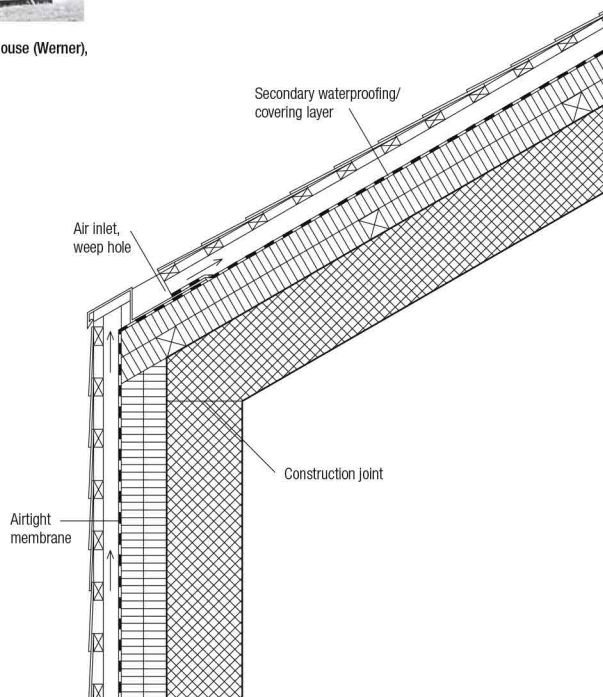
- Vegetation layer 100 mm
- Filter fleece
- Drainage layer 100 mm
- Filter fleece
- Thermal insulation, extruded polystyrene 160 mm
- Root barrier
- Bitumen roofing felt
- Screed laid to falls 40–150 mm
- Reinforced concrete slab 250 mm
- Plaster 10 mm

Pitched roof – warm deck

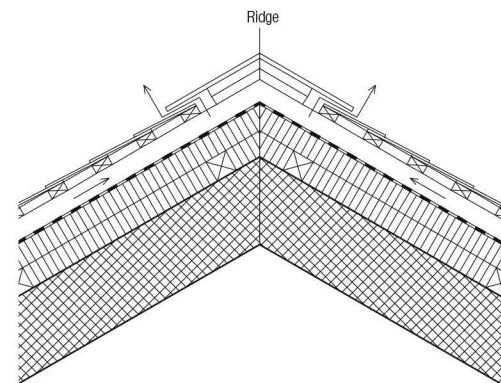
Fibre-cement – external cladding, lightweight



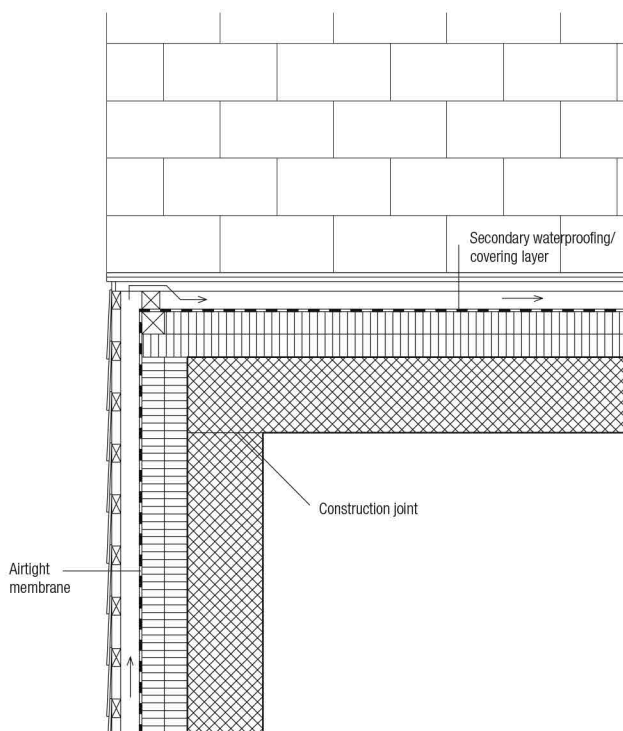
Fig. 1: Bearth & Deplazes: private house (Werner, Trin (CH), 1994



Eaves



Ridge



Verge

Roof construction

- Slates (Eternit) approx. 3.5 mm
- Battens, 24 x 48 mm 24 mm
- Counter battens, 48 x 48 mm, ventilated cavity 48 mm
- Secondary waterproofing/covering layer on battens 3 mm
- Thermal insulation and battens (in both directions) 120 mm
- Concrete roof 200 mm
- Total* *approx. 400 mm*

Wall construction

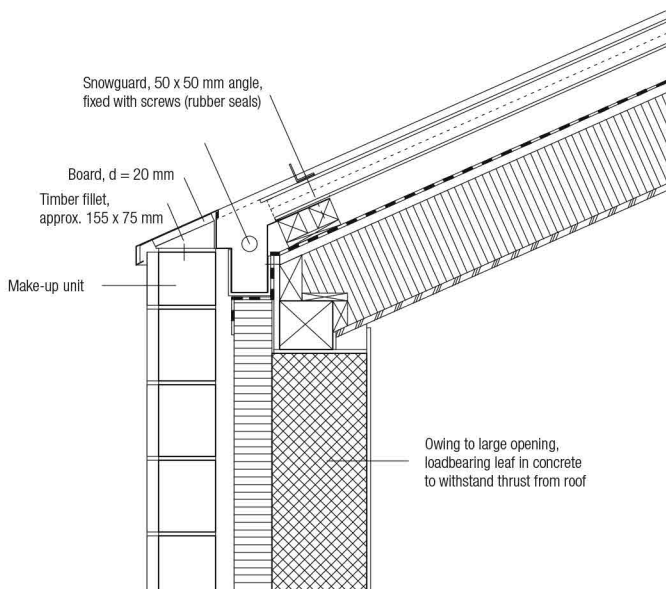
- Slates 35 mm
- Battens 24 mm
- Counter battens, ventilated cavity 48 mm
- Airtight membrane 1 mm
- Thermal insulation and battens (in both directions) 120 mm
- Concrete wall 200 mm
- Total* *428 mm*

Pitched roof – warm deck, monopitch roof

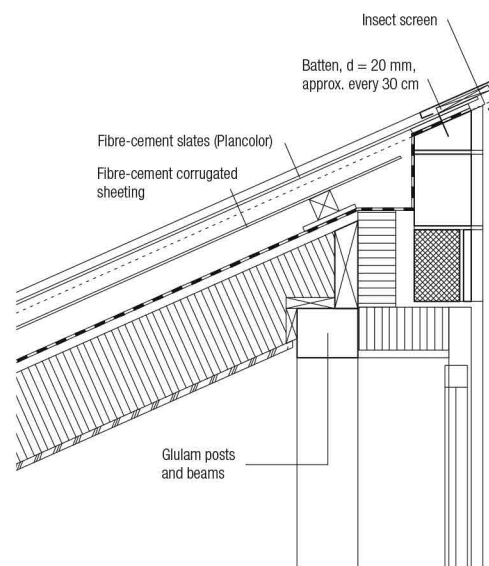
Fibre-cement – facing masonry



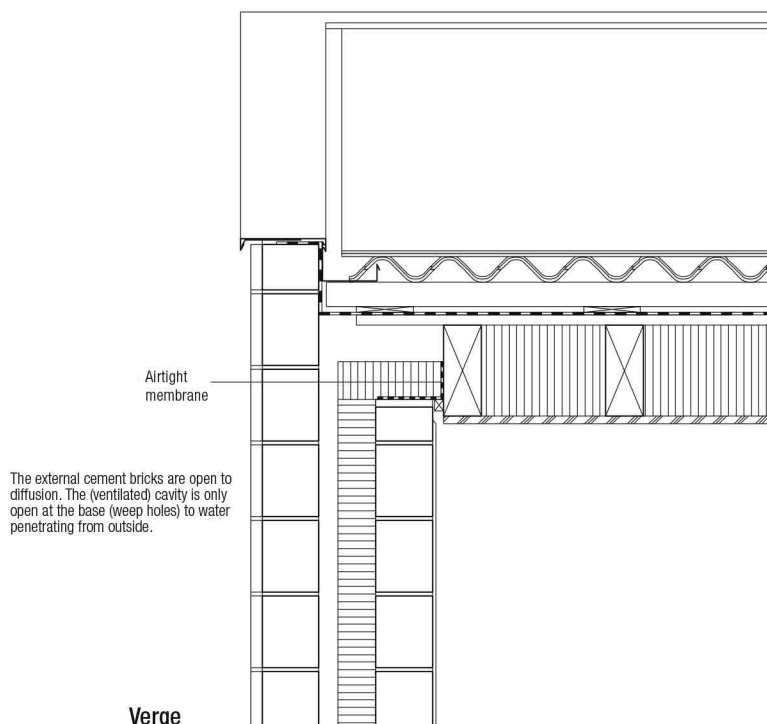
Fig. 2: Beat Rothen: private house (Leilundgut), Uhwiesen (CH), 1997



Eaves



Ridge



Verge

Roof construction

- Roof covering: Eternit "Integraldach" system
- Fibre-cement slates (Plancolor) 7 mm
- Secondary waterproofing/covering layer of fibre-cement corrugated sheeting (Welleternit) 57 mm
- Horizontal battens, 60 x 60 mm 60 mm
- Birdsmouth rafter connection 20 mm
- Secondary waterproofing/covering layer (Pavatex)
- Rupli timber elements: Gutex softboard, structural timber members with Isofloc thermal insulation in between, 3-ply core plywood spruce (vapourproof) 260 mm
- Total* 404 mm

Wall construction

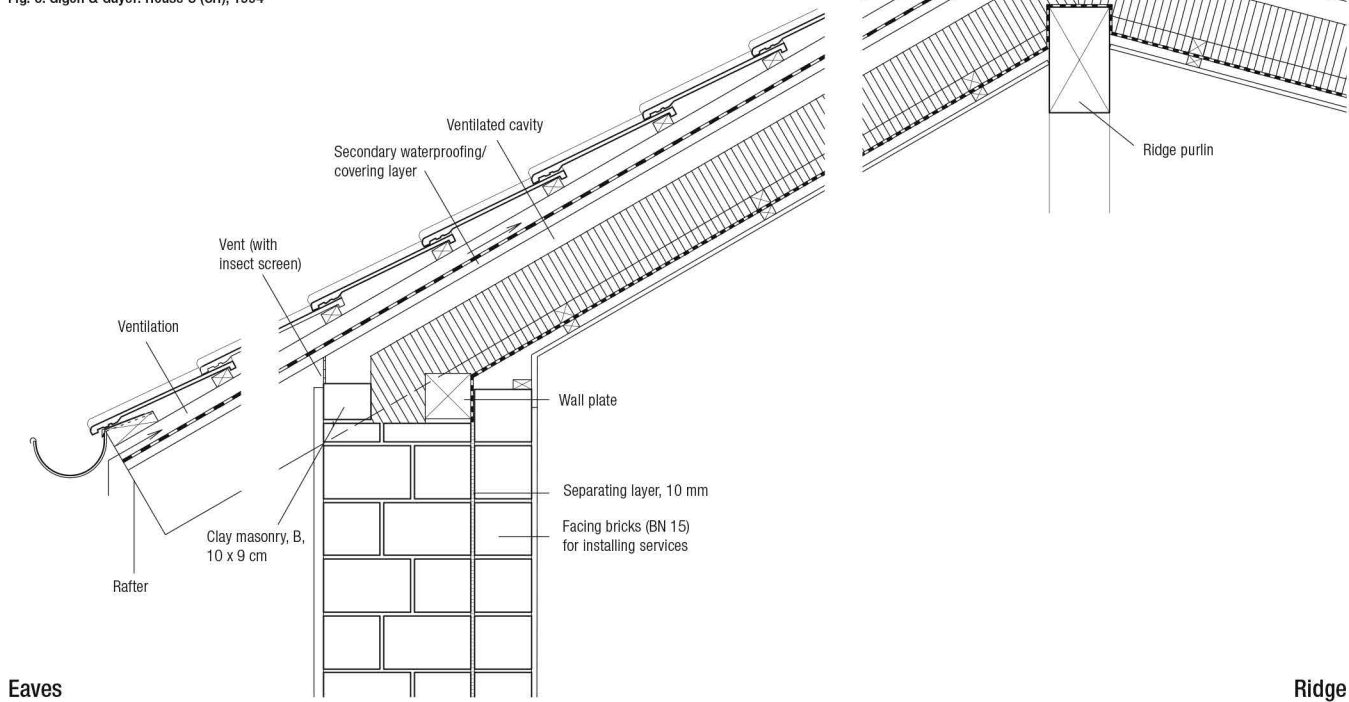
- Facing masonry, cement bricks, 18 x 19 x 30 cm 180 mm
- Cavity 50 mm
- Thermal insulation 100 mm
- Clay masonry 150 mm
- Plaster 10 mm
- Total* 490 mm

Pitched roof – cold deck

Roof tiles – masonry in brickwork bond

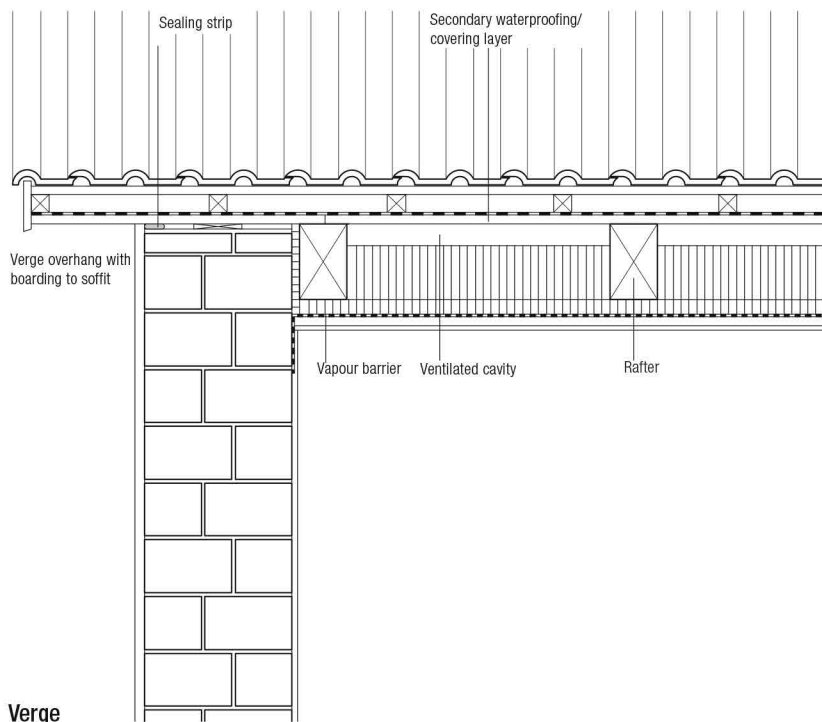


Fig. 3: Gigon & Guyer: House C (CH), 1994



Eaves

Ridge



Verge

Roof construction

- Concrete interlocking tiles	approx. 70 mm
- Tiling battens, 30 x 50 mm	30 mm
- Counter battens, 45 x 50 mm	45 mm
- Seamless secondary waterproofing/covering layer on roof decking	22 mm
- Ventilated cavity	60 mm
- Thermal insulation, rockwool	140 mm
- Thermal insulation, rockwool	40 mm
- Vapour barrier	
- Battens, 24 x 48	24 mm
- Lining (plasterboard)	12.5 mm
<i>Total</i>	<i>approx. 440 mm</i>

Wall construction

- Render	25 mm
- Masonry in brickwork bond, Optitherm 15 and 23	390 mm
- Plaster	15 mm
<i>Total</i>	<i>430 mm</i>

Pitched roof – cold deck
Sheet metal – single-leaf masonry

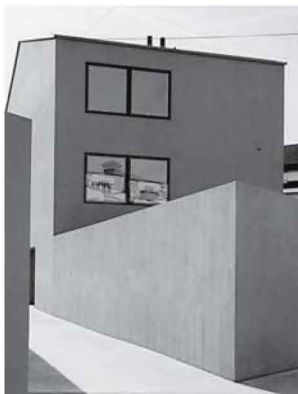
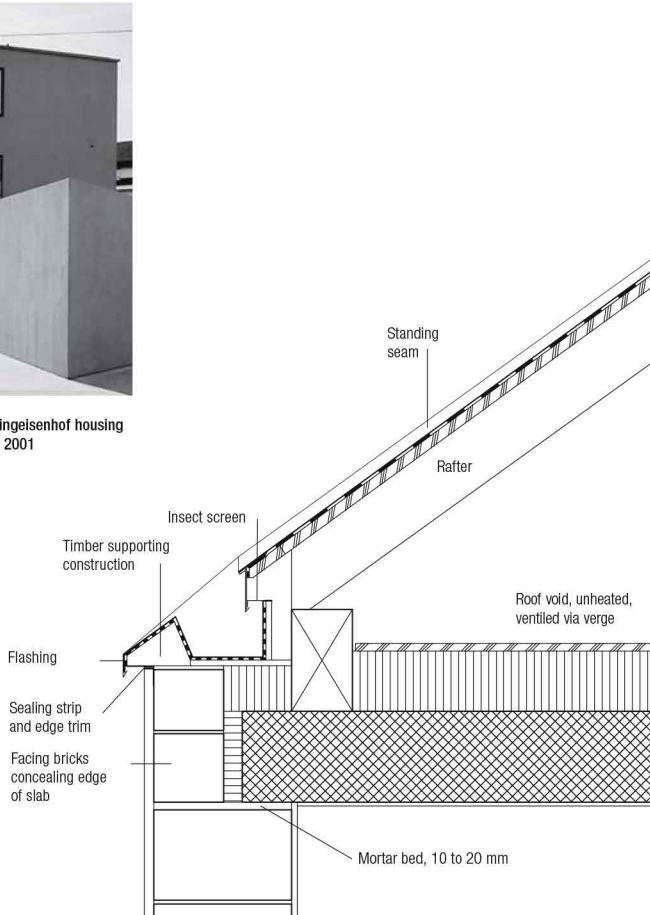
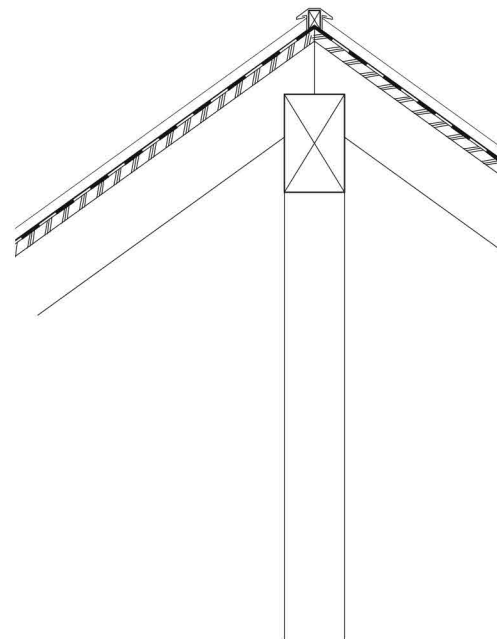


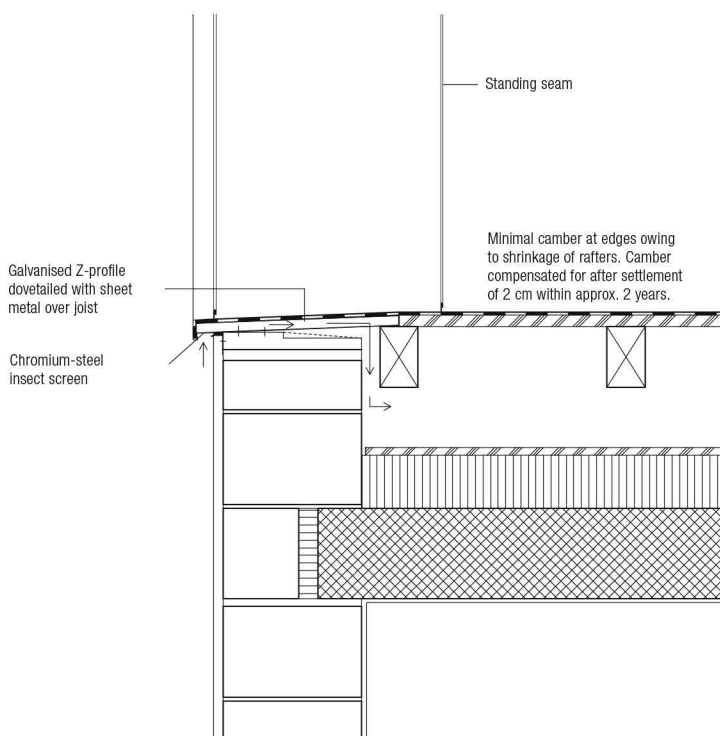
Fig. 4: Morger & Degelo: Singeisenhof housing development, Riehen (CH), 2001



Eaves



Ridge



Verge

Roof construction (cold deck)

- Sheet copper, in bays with standing seams 0.6 mm
- Secondary waterproofing/covering layer, F3 film
- Roof decking 27 mm
- Rafters, 100 x 160 mm 160 mm
- Total 188 mm*

Floor construction (insulated)

- Chipboard 20 mm
- Insulation, rockwool 160 mm
- Concrete slab 240 mm
- Plaster 10 mm
- Total 430 mm*

Wall construction

- Render 25 mm
- Single-leaf masonry, ThermoCellit 365 mm
- Plaster 15 mm
- Total 405 mm*