

Notes on the Construction and Technological Design of Villa Tugendhat

This chapter presents the original design documentation for the building by means of 42 selected plans. They have been supplemented with texts, photographs and newly drawn plans for improved comprehensibility.

All of the drawing documentation has been transformed into practical scales — 1:200, 1:50, 1:25, 1:10, 1:5.

For purposes of comparison the ground plans and perspectives on a scale of 1:200 are placed in the same position on the pages, allowing for a comparison of the particular details when turning the pages.

For example, the original ground plan for the 3rd floor from page 77 has its 'impression' on page 141.

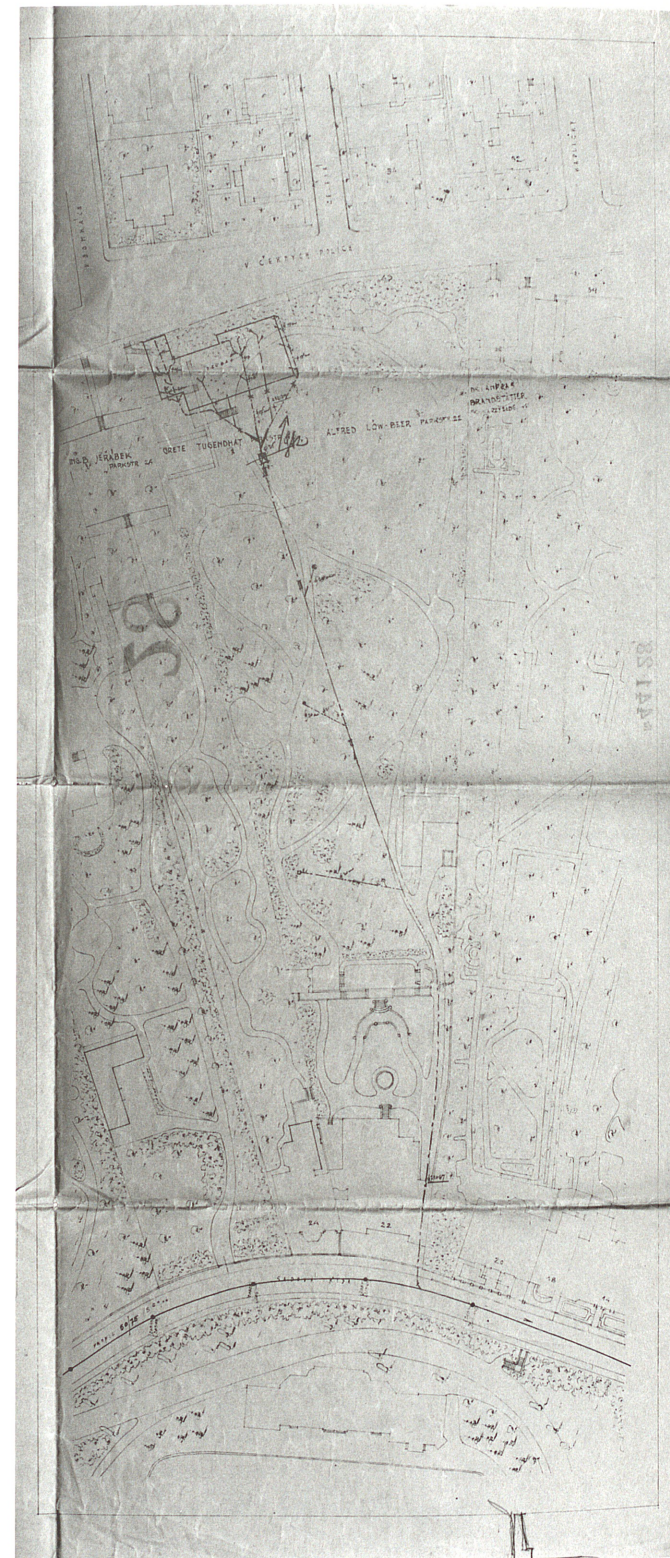
The chapters are divided as follows:

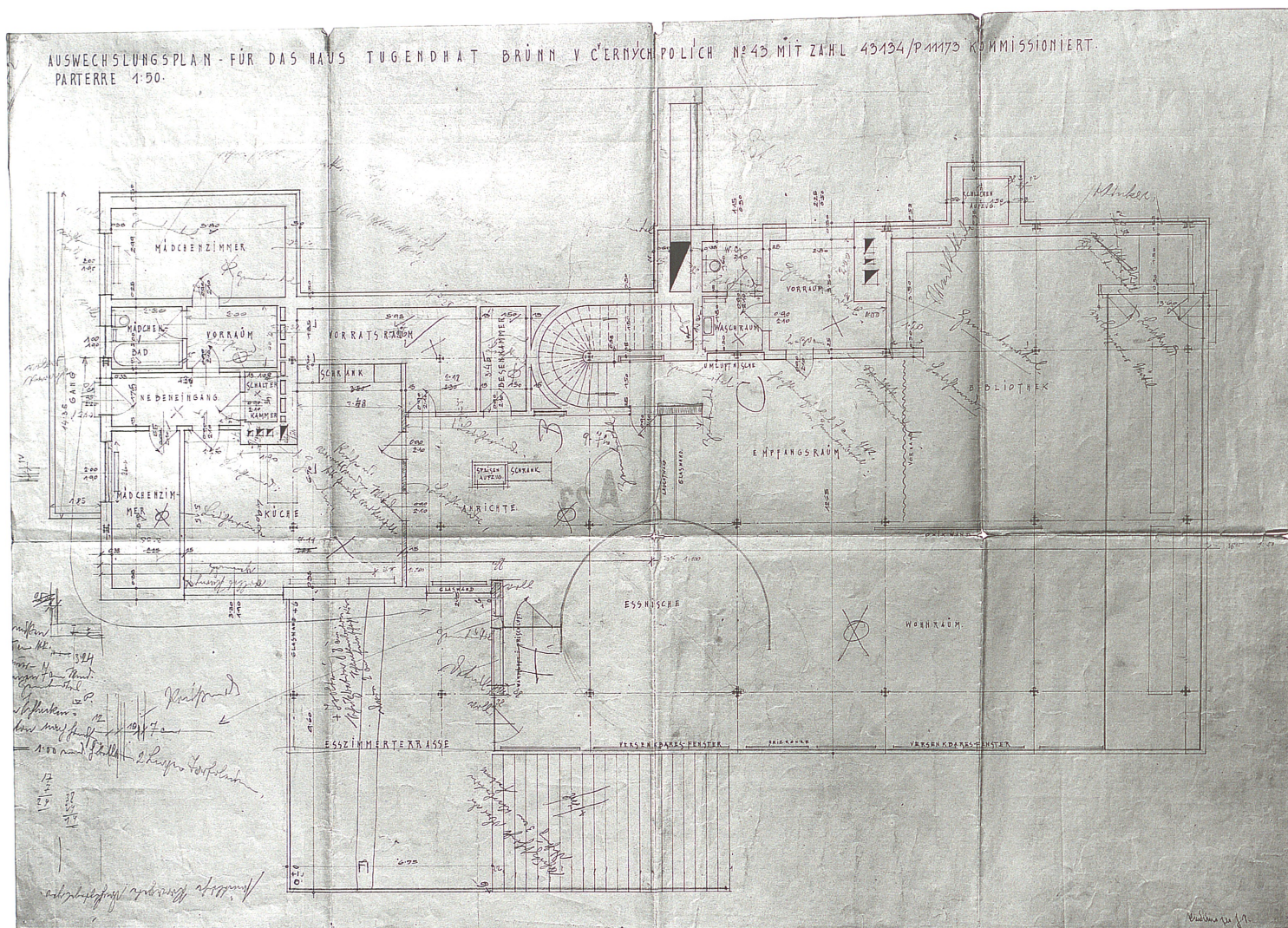
Placements	pp. 72–73
Ground plans, Perspectives	pp. 74–81
Foundations, Roof, Terrace and Parapet	pp. 82–85
Retractable Windows	pp. 86–91
Cladding of the Steel Column and Plans for	
Stone Masons	pp. 92–95
Doors	pp. 96–99
Steel Elements	pp. 100–101
Heating and Air Technology	pp. 102–107

IW

24/
Placement — drawing of the pipe lines
Original scale 1:500, reduced to the scale 1:2000.
Archive MuMB Brno.

Placement of Villa Tugendhat with a drawing of the pipe lines leading from the upper part of the plot of land across house no. 22 on Sadová street (Parkstrasse 46, currently Drobňého) the Löw-Beer family — Grete Tugendhat's parents.



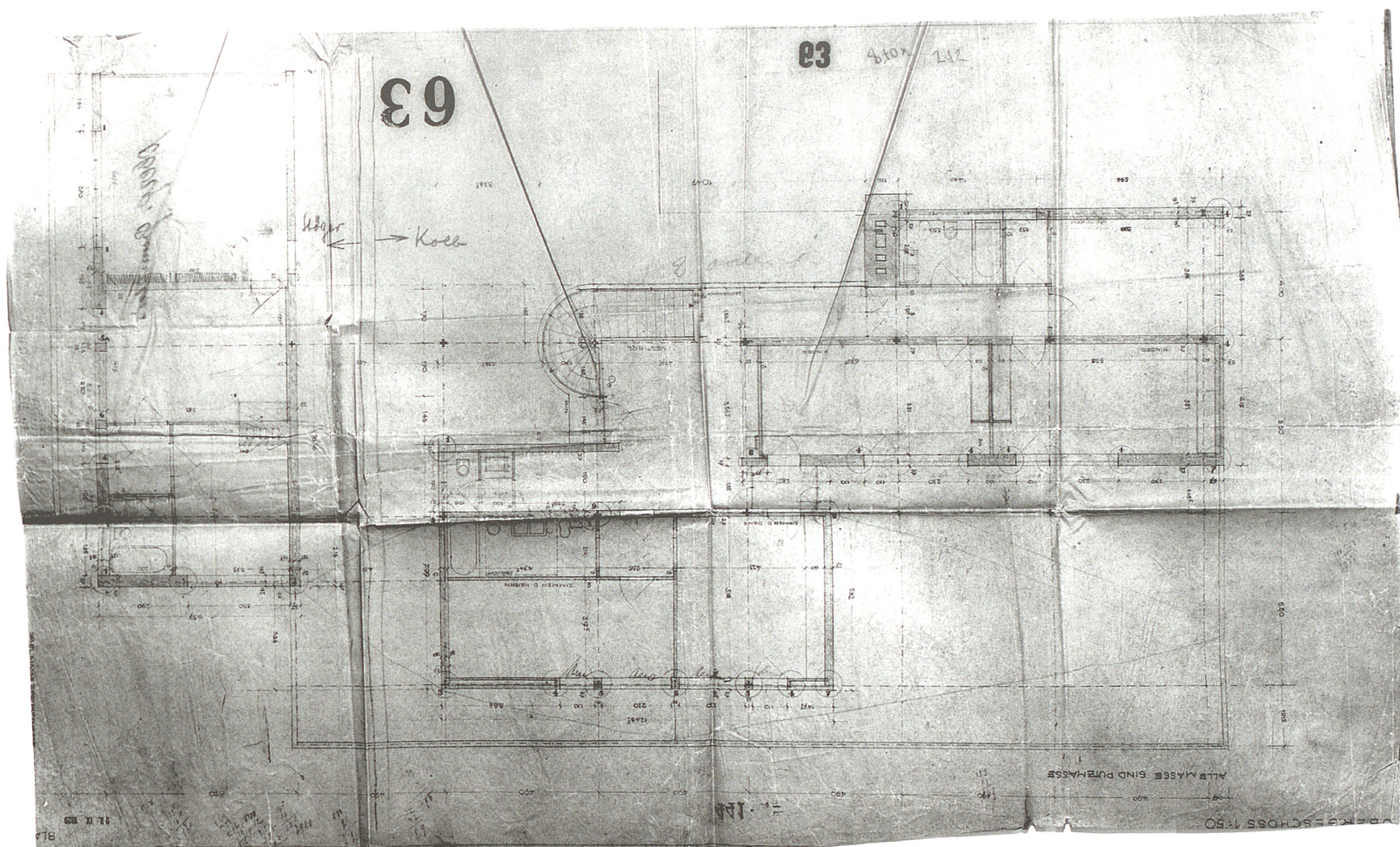


28/
Ground plan for the 2nd floor — main living floor (Auswechslungsplan)
Original scale 1:50, reduced to the scale 1:200.
Signed in all probability by Friedrich Hirz.
Archive MuMB Brno.

The ground plan of the main living space is clearly described and also includes the staircase which is not divided by doors. The living space is divided up into a receiving part (Empfangsraum), the library (Bibliothek), the living room (Wohnraum), the dining corner (Essnische) and the dining terrace (Esszimmerterrasse).

The demarcating elements are also named. The library with the study is divided by a curtain (Vorhand) from the reception space and the onyx wall (Onix Wand) divides the living space from the library. Additional named elements are the glass wall (Glasswand) — the lit up glass wall in the reception area, the glass wall (window) looking out from the prep room (Anrichte) onto the dining terrace and the screening wall situated on the edge of the terrace. Etched glass was in all probability made use of in all of these cases. In terms of the naming of the technical elements, there are the heating pipes (Heizrohre) in front of the glazed southern wall, the retractable window (Versenkbare Fenster), the intake passage for

warm fresh air (Warm frische Luft), the niche for the exhaust for used air (Umluftnische) and the dumb waiter in the kitchen areas (Speisen Aufzug). This plan does not yet contain the expanded chimney which was in all probability carried out for composition reasons. The underground passage way and supporting wall adjacent to the street are also not drawn in.

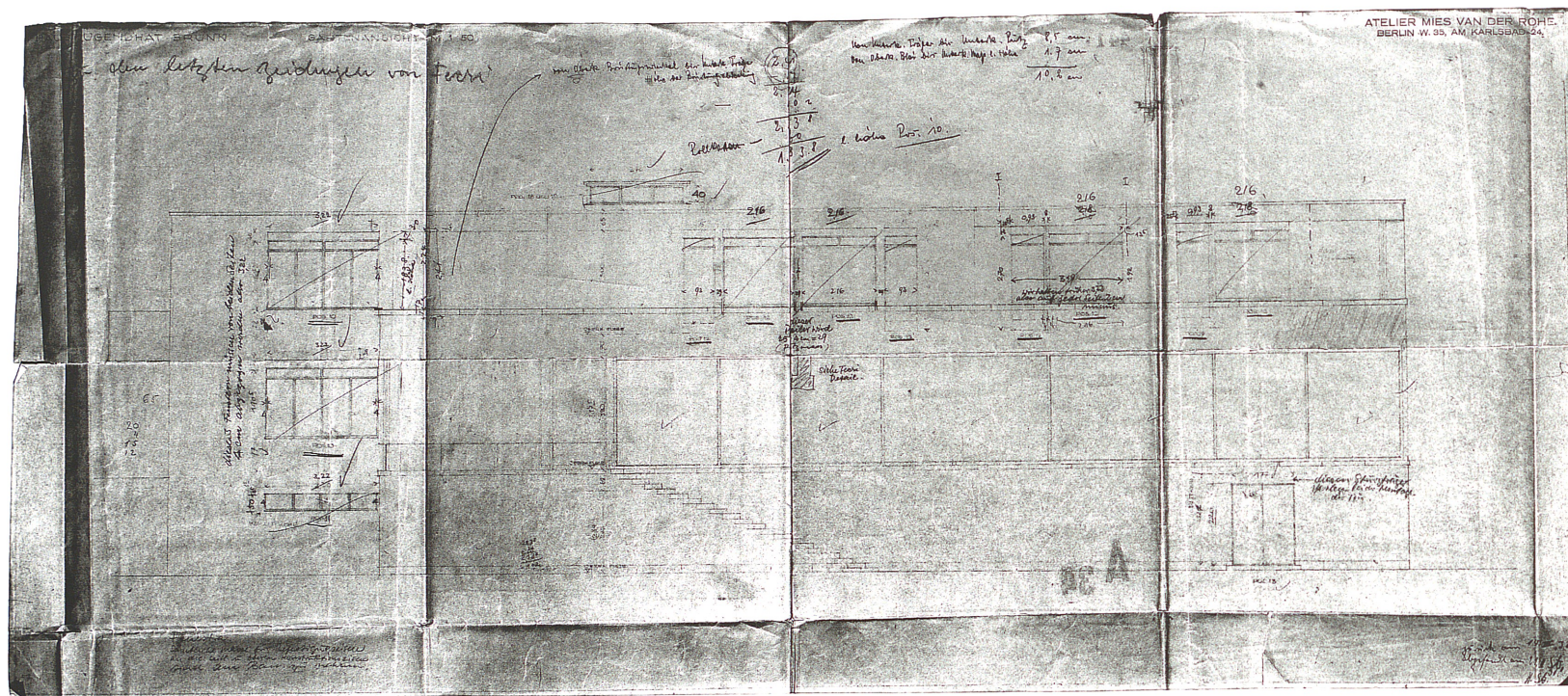


29/
Ground plan 3rd floor — entrance bedroom floor (Obergeschoss)
Original scale 1:50, reduced to the scale 1:200.
Dated: Berlin 23 September 1929.
Archive MuMB Brno.

There are only several variations from the final realized state of the building in this the entrance floor. The rosewood wall of the entrance hall is situated here on a smaller scale between two walls and is designed with a view

of the terrace through the bedrooms of the children via the annex with the double doors. This motif was substituted for by a continuous rosewood wall with full "wall-papered" doors which were part of the wall. The glazed doors leading into the halls with the children's rooms are drawn as symmetrical double doors as opposed to asymmetrical single leaf. A three-part window which was later replaced by a four-piece is drawn in the room of the governess and the side wall at the terrace adjacent to the parapet is not drawn in as yet in front of the daughter's room. The drawings of the travertine

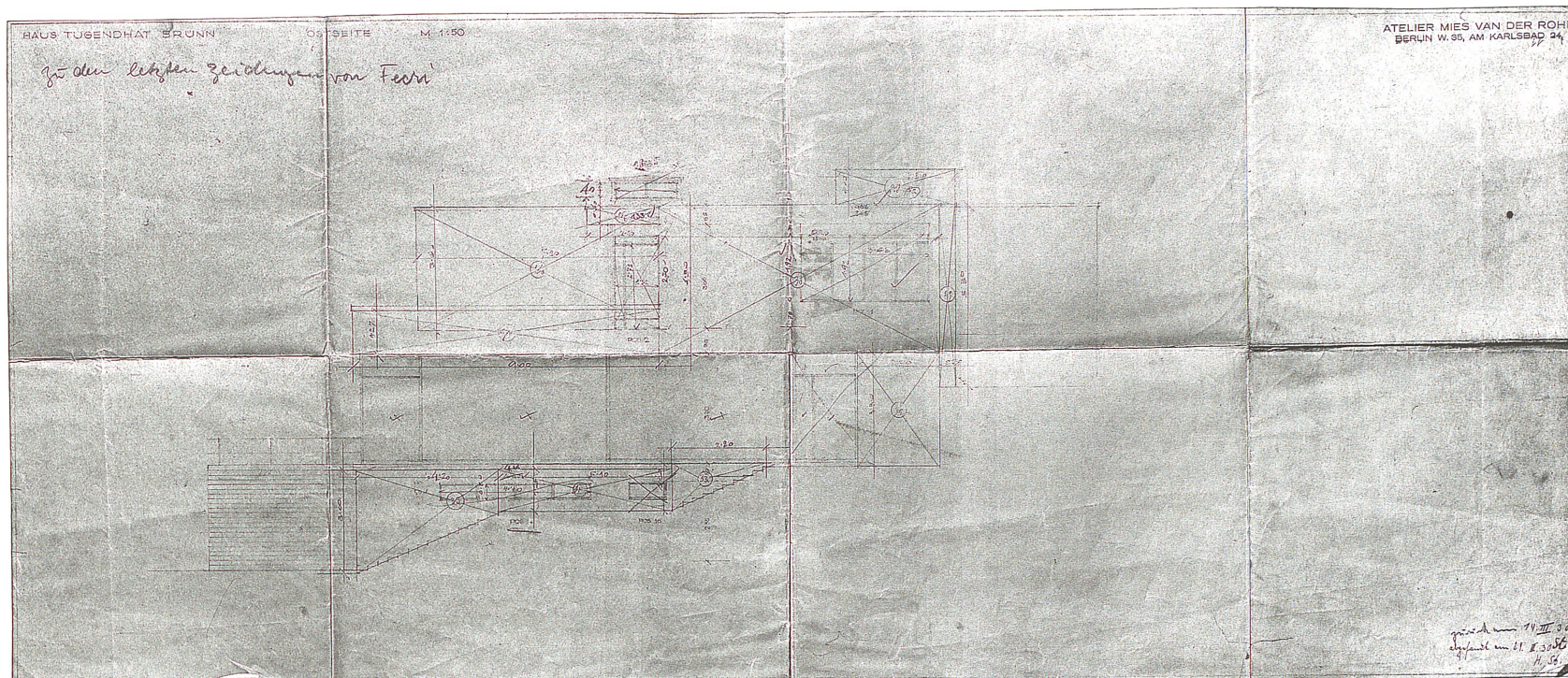
heads of the parapet of the railings of the terrace are also missing. The particular details which are drawn onto the consequent drawings on a scale of 1:1 are marked with circles and numbers. The insulation cavities are also drawn on the southern wall of the bedrooms of the parents. The formal expansion of the chimney in the direction of the street appears for the first time on the plans with the built-up mass of a full wall. This was in all probability due to the perspective composition emphasizing the verticality of the chimney in relation to the marked horizontal lines of the entrance façade.



30/
South-west perspective — garden (Gartenansicht)
Original scale 1:50, reduced to the scale 1:200.
Dated: 14 March 1930, 29 March 1930, signed: H. St., stamp of the studio
of Mies van der Rohe.
Archive MuMB Brno (a similar copy of the drawing is in the archive of MvdR
MoMA, New York, invent. no. 2.342).

Realization plan with small distinctions from the actual realized structure.
There is not, for example, the drawn in railings for the large garden stairway
or the travertine socle for this stairway. The height for the steps of the garden
stairway is 146 mm. Both travertine cornices arise out of this height. This
consequently led to the flowing connection between the cornice in front of
the windows of the living floor with the stairs. The side pillar flush with the

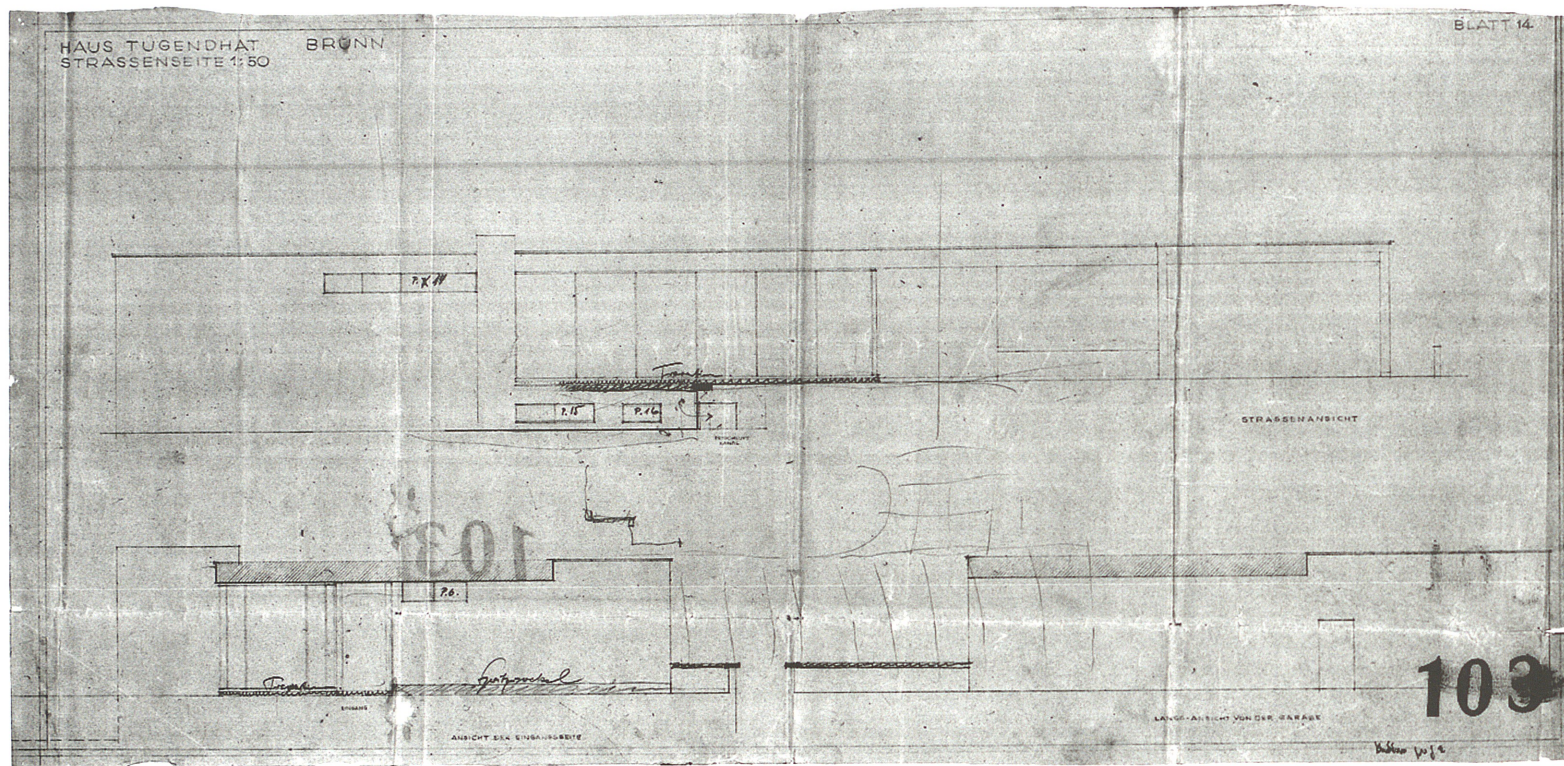
parapet above the children's bedrooms is not yet drawn on the souther-east
side on the entrance floor. The height of the parapet is approximately 63 cm
from the lintel of the bedroom window in the realized form.



31/
South-east perspective (Ostseite)
Original scale 1:50, reduced to the scale 1:200.
Dated: 14 March 1930, 29 March 1930, signed: H. St., stamp of the studio of Mies van der Rohe.
Archive MuMB Brno (a similar copy of the drawing is in the archive of Mvdr MoMA, New York, invent. no. 2.351).

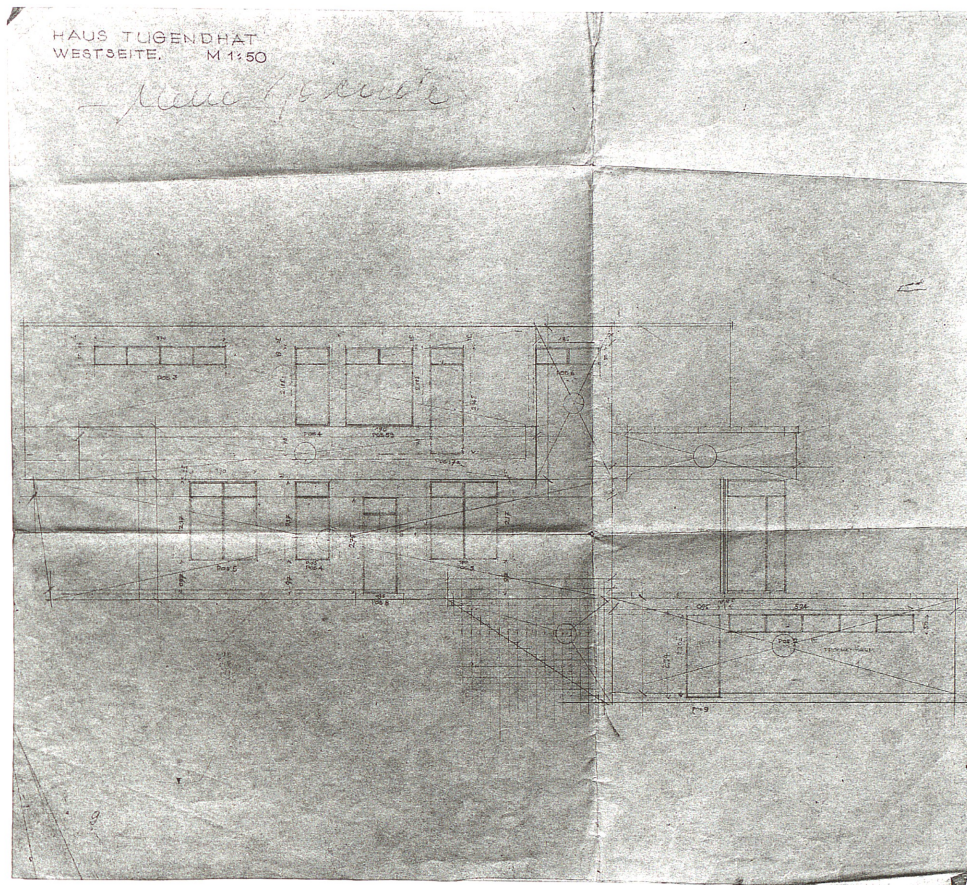
The façade with the pronounced horizontal motif of the conservatory and the narrow stone garden stairway underneath. It is drawn with an intermediate landing in the drawing in contrast to the final realized state. The chimney is now designed as projecting out from the level of the street façade of the main living space thereby making up a vertical accent. The side wall connecting with the parapet at the children's bedroom is

once again missing. The supporting columns bearing up the parapet above the terrace are evident in this perspective, but are not drawn in. A basilica skylight above the bathroom for the parents is apparent, as in the previous drawing, on the roof.



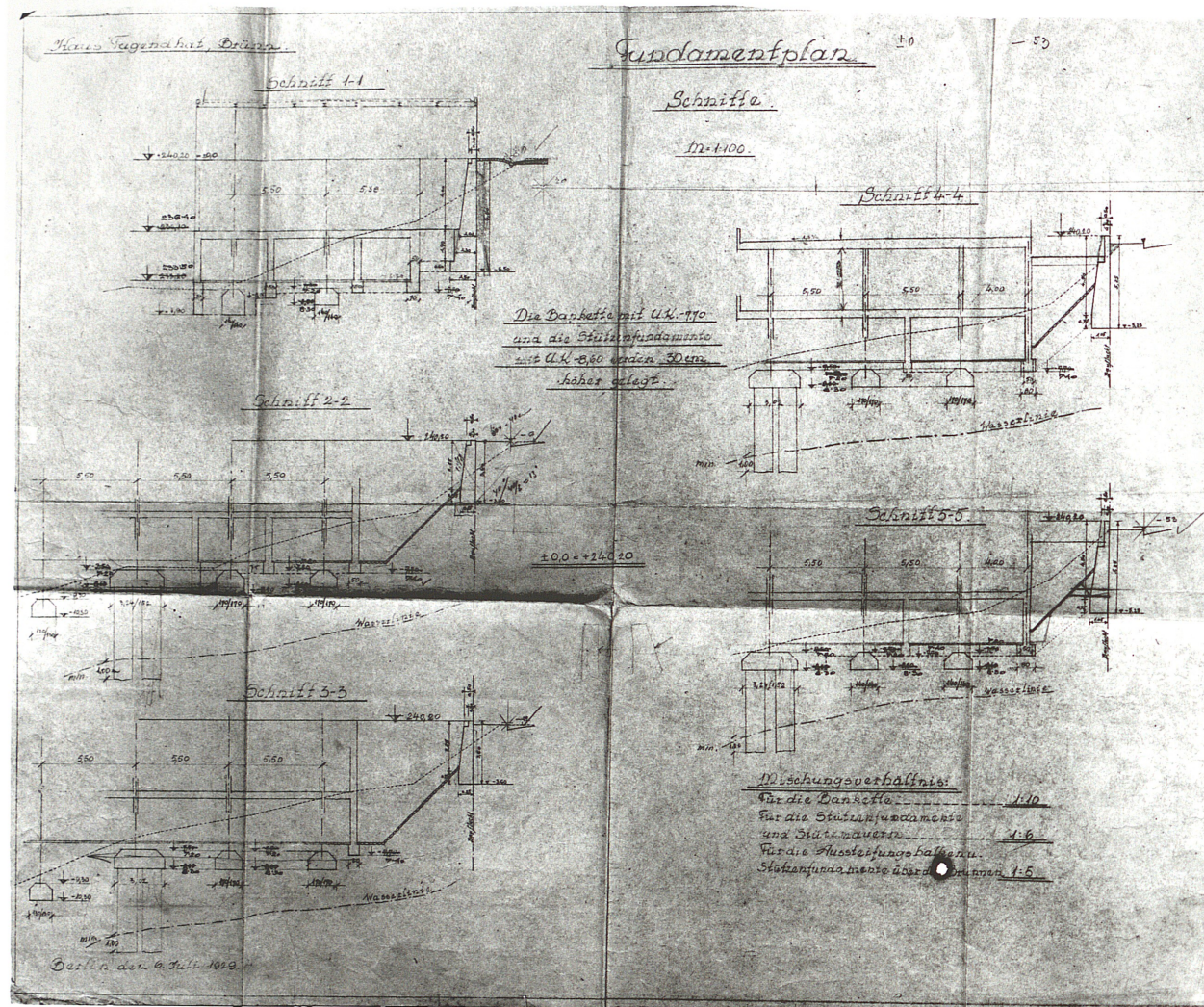
32/
North-west perspective — street (Strassenseite)
Original scale 1:50, reduced to the scale 1:200.
Archive MuMB Brno (a similar copy of the drawing is in the archive of MvDR
MoMA, New York, invent. no. 2.350 and 2.346).

The northeast street façade is drawn into the upper part of the drawing and two smaller sections of the third level entrance passage are in the lower part. The travertine socle and the one-piece travertine head on the parapet of the bedroom terrace are emphasized with hand written marks. Two horizontal windows from the toilet and the annex (P15 a P16) adjacent to the large living space are drawn in under the travertine one-piece socle of the glazed wall of the entrance hall. The suction part of the air technology passage for introducing fresh air, marked with an arrow, is next to this.



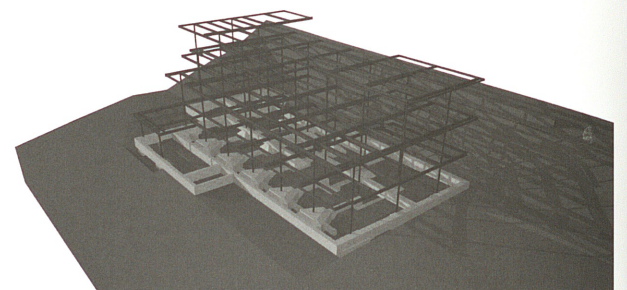
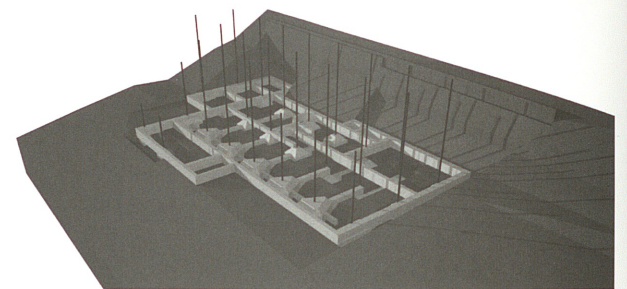
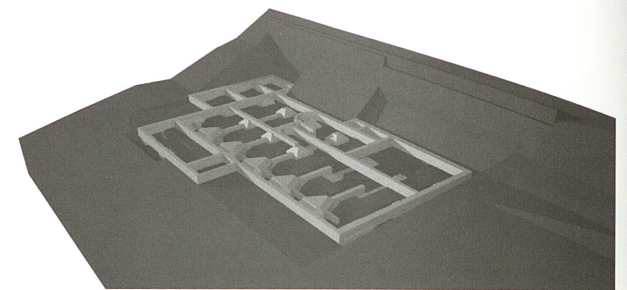
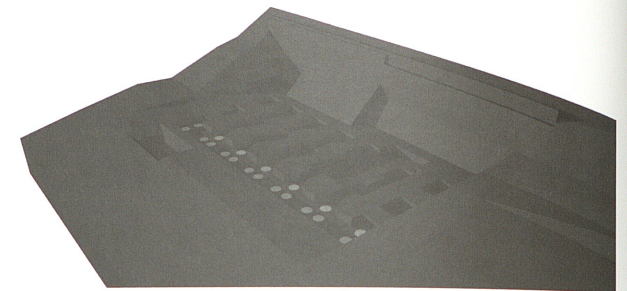
33/
North-west perspective (Westseite)
Original scale 1:50, reduced to the scale 1:200.
Archive MuMB Brno (a similar copy of the drawing is in the archive of MvDR
MoMA, New York, invent. no. 2.344).

The façade is not depicted as a whole on any of the original period photographs. There are hardly any differences here from the final realized appearance. The drawings of the minor details are only missing, for example, the railings of the terrace or the roof basilica skylight over the bathroom of the parents.
The sawn joint of the stone travertine head on the railings of the bedroom terrace is drawn in detail along with the one-piece travertine skirt of the dining terrace on the living floor.



34/
Sections
Original scale 1:100, reduced to the scale 1:400.
Dated: Berlin 6 July 1929.

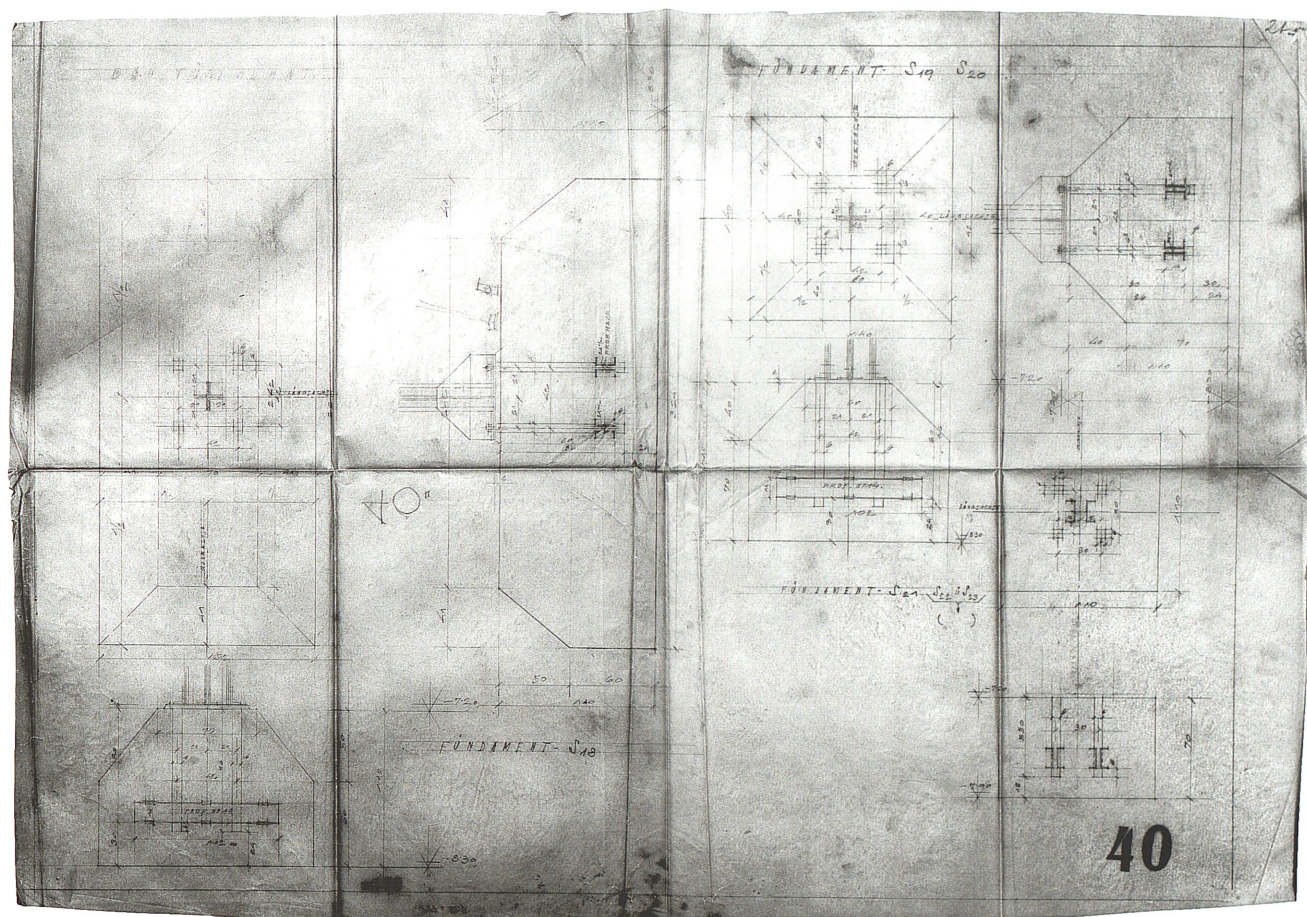
The drawing contains 5 sections with a detailed drawing of the supporting wall holding up the slope with the pavement. The placement of the steel columns is clearly apparent here with the bases at the columns of the garden façade being supported by circular piles anchored at a depth reaching down to the supporting terrain under the level of the ground water. The bases for the garden terrace are drawn on the far left at the section numbers 2 and 3 which were eventually in the year 2011 later anchored with additional posts. The regular steel skeleton is already designed here. A reduced field of a size of 4 m is situated perpendicular closest to the slope on Černopolní street, while further are two standard fields of a size of 5.5 m and behind them the console.



Four axonometric schemes for the posts, foundations and the steel skeleton in a realization sequence.

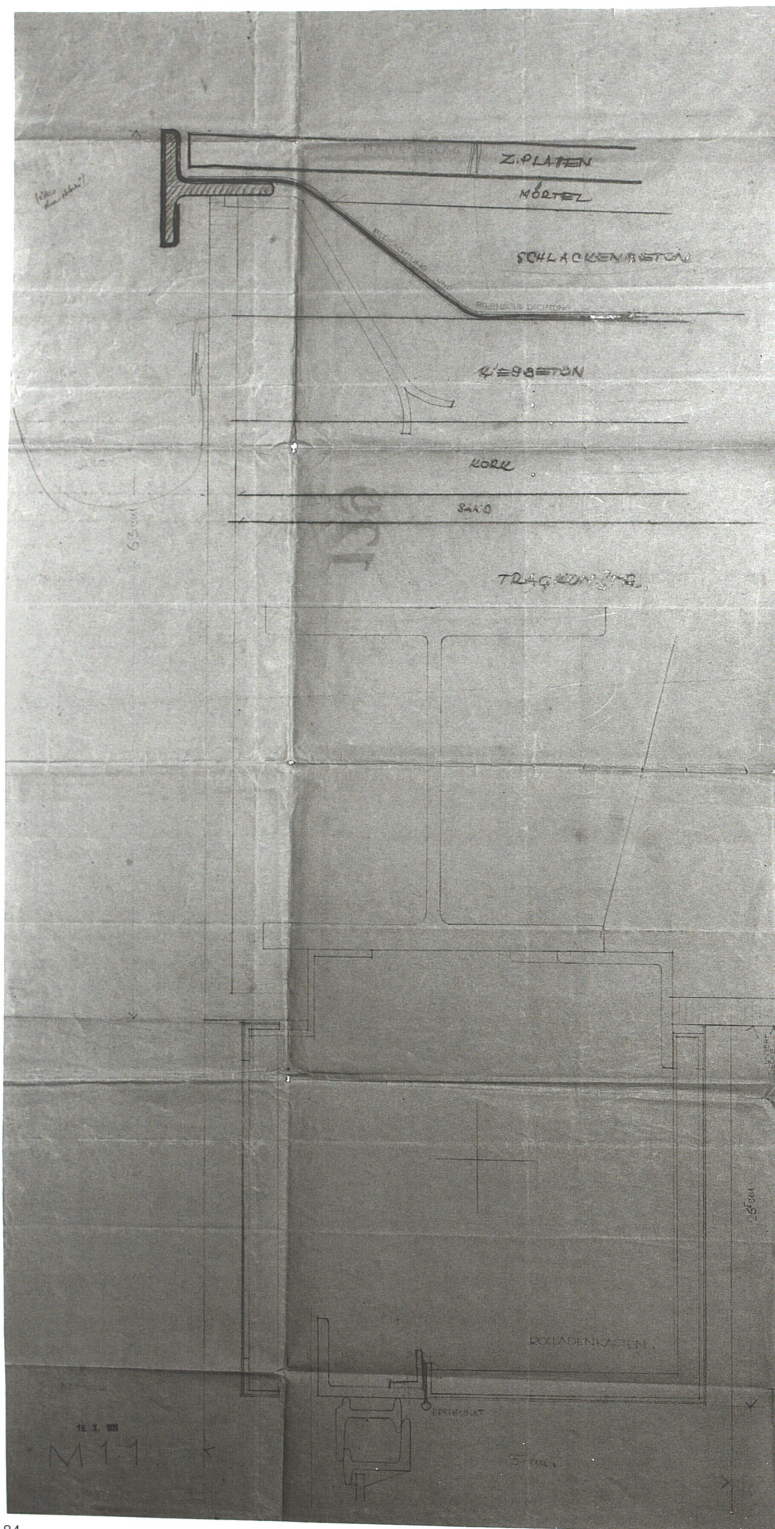


Two photographs of the steel column with the base supporting the garden terrace, at the time of the new laying of foundations at the new depth 'well' in the year 2011.



35/
Drawing of the rectangular foundation base
Scale undetermined — probably 1:20.
Archive MuMB Brno.

The square base is supported by a central row of columns and the rectangular base is supported by the two side columns of the garden façade. A square cross steel column composed of L profiles of 90x90x10 mm and flanges located on the anchored reinforcement of the base. The upper side of the posts is laid 0.5 m under the level of the bare floor. All of the steel skeleton, anchored into these bases, was supplied by the Berlin foundry and bridge construction company H. Ghossen.



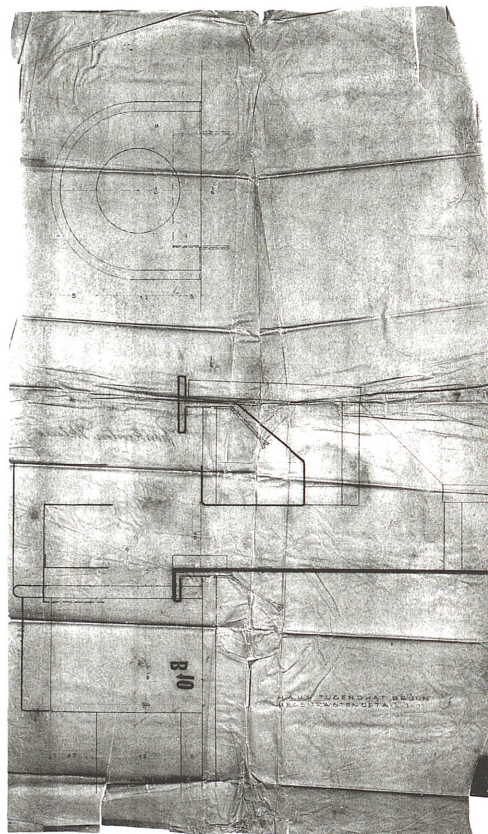
36/
Detail of the parapet above the parents' bedrooms
Original scale 1:1, reduced to the scale 1:5.
Dated (stamp used in Brno): 15 October 1929.
Archive MuMB Brno.

The roof construction and in particular the low height of the parapet made a significant contribution to the final expression of the structure. The slope of the roof was extremely slight in a similar manner as with Mies' other buildings. A horizontal steel rolled H profile is drawn in the middle of the drawing. This 240 mm high beam is set upon riveted columns and consists of a girder into which the supporting construction of the ceiling (Tragkonstr.) from ceramic fittings is clamped. A sanitation layer (Sano) of a thickness of 55 mm and with warm cork insulation (Kork) of a thickness of 70 mm, covered with gravel concrete (Kiesbeton) on a slope with water insulation from lead strips was placed on this ceiling. The lead sheet culminates by winding around the steel T profile 80x80 mm, placed onto the edge of the parapet. The final layers involving the hydro-insulation are from concrete slag (Schlackenbeton) of a width of 75 mm and in all probability the final

surface layer of zinc plates (Z. Platen) in a mortar bed (Mörtel). Four drains serve the roof. Since there was a lack of a brick parapet, all of the layers of the roof composition were led up to the face of the main living space and consequently plastered (according to a detailed drawing). Due to the varying physical qualities of the particular layers, horizontal cracks soon began to appear at certain points in the plastering.

The composition of the roof and parapet is extremely restrained in terms of height, with this testified to by the drawn figure 63 cm from the plaster in the springer of the window up to the surface of the parapet made up of a steel profile with lead cladding. Over the course of the 1930s, the construction of the roof was revealed to be problematic and was consequently repaired.

The roof was supplied with a temporary raised sheet metal parapet after the year 1945 due to leakage. Over the course of the reconstruction work in the 1980s, the parapet was traditionally concreted and raised by 12 cm from the original height. As a result of the newly introduced heat insulation from foam glass, introduced during the final reconstruction in 2012, the original height of the parapet was successfully restored.



37/
Detail of the rain spout with water with an accumulation half-circular rainwater head with an opening across the parapet
Original scale 1:1, reduced to the scale 1:10.
Archive MuMB Brno.

Ground plan and section opening of the rain spout with the accumulation rainwater head across the parapet (Regenkasten Detail). 4 visible rain spouts, which are fixed into the façade, draw water off the flat roof above the bedroom floor. The passage for the horizontal opening of the construction and the vertical are made up of rainwater heads for trapping impurities. When placed on flat walls, the accumulation rainwater heads have a half-circular shape, while in the internal corners at the chimney and at the garage the rainwater heads have square shapes. The drains lead into the water sewage without additional above-ground sediment traps.

38/

Section for the garden façade

Original scale 1:10, reduced to the scale 1:50.

Sections from one of the original drawings prepared for the designing of the cross-section of the garden façade are on the right.

We also present here the drawing of the realized state in the year 1930 on a scale of 1:25 for comparison.

Archive MuMB Brno.

The hollow track for the sliding windows is drawn into the lower part of the original drawing. To the right of these is the concrete base with the fitted steel column. The lead water-insulation is drawn in between the two concrete layers. The construction of the ceramic ceiling above the basement sits on the concrete heads cemented onto the steel cross girders. The thin perimeter wall at the first level of the southern façade has a drawn-in culminating form of sheet metal instead of the realized travertine cornice. The thinness of this perimeter wall is a result of the placement of the retracting window. The construction of the ceiling above the second level is designed at two height levels. The ceiling on the terrace is clad in a shortened position due to placement of insulation and cambered layers. As a result of this shortening, one can only move from the bedroom to the terrace along the low travertine stairs. Torfoleum was used as heating insulation, insulation material on the basis of a peat-bog, the water-insulation was lined with lead. This insulation was covered with concrete at the slope with the final surface layer made up of the concrete paving format 825x825x55 according to the drawing. In order to prevent the various height levels of the ceiling construction from impacting the interior, the ceilings are equipped with reed under-views with plaster.

The dimensions correspond to the final realized version. The floor to ceiling height for the bedroom floor is 3000 mm, the dimensions for the floor to ceiling height for the main living floor are 3200 mm (in actuality 3175 mm).

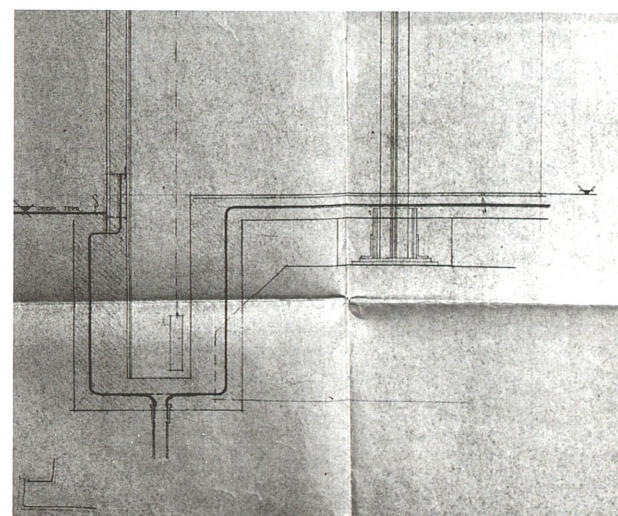
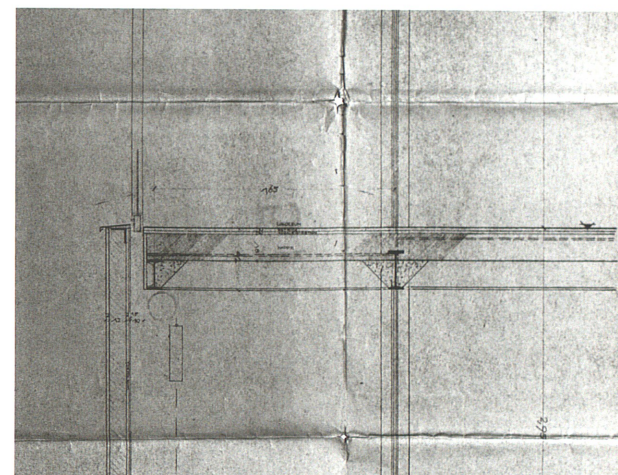
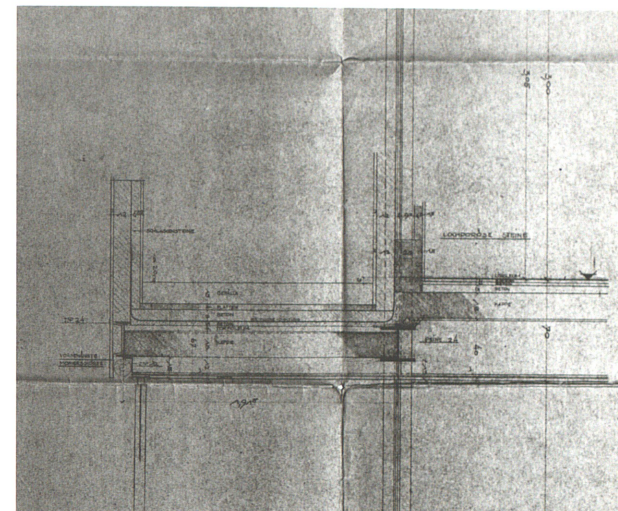
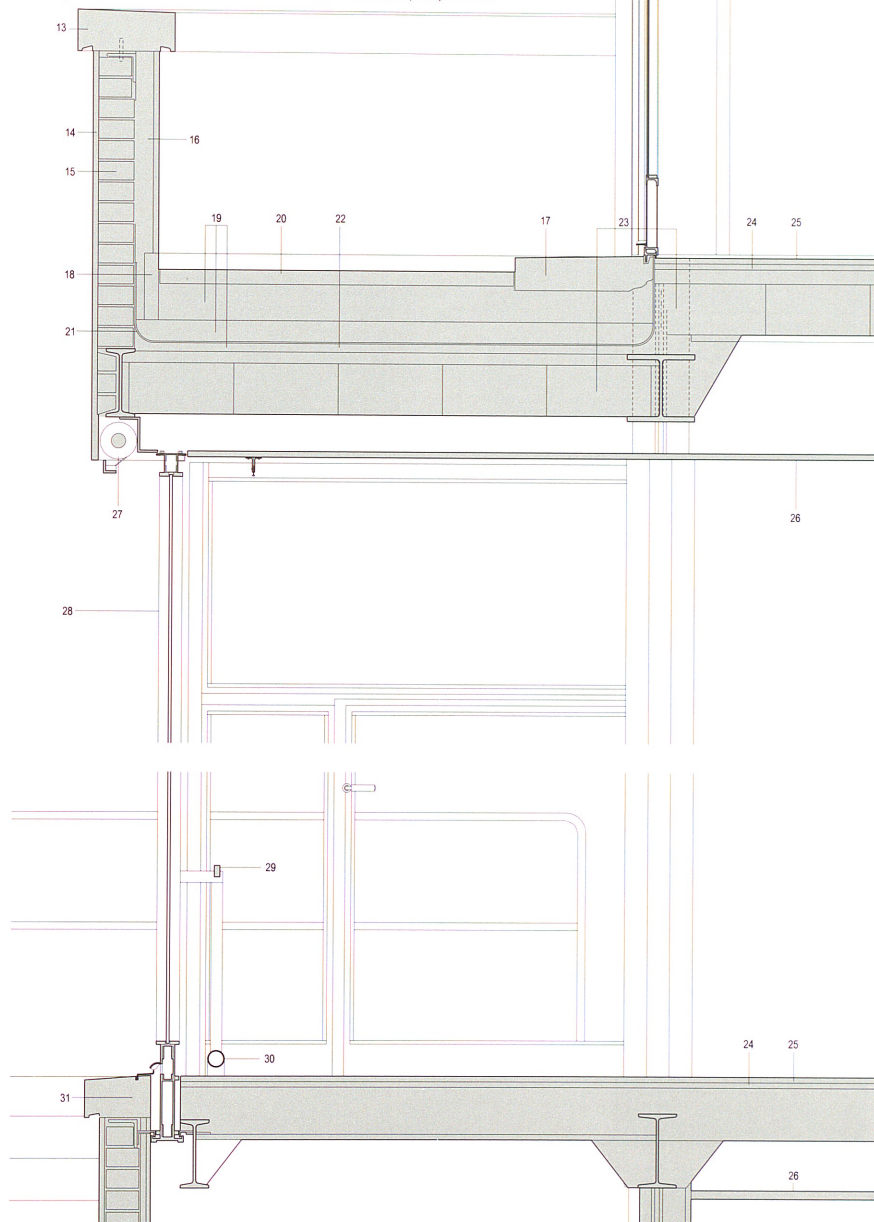
The ceiling constructions are made up of steel profiles most frequently in the I shape (80–450 mm) and HEB (240–320). U profile shapes (200–300) are also used in a supplementary manner.

The supporting horizontal girders are fixed in the structure in both orthogonal directions with their regular network disturbed by frequent joists. The infilling of the roof construction consists of hollow ceramic insertions of a height of 145 mm cast in concrete.

Linoleum with the neutral colour of ivory bone, of a width of 3.2 mm and produced by the German company DLW, is used in the living areas. The joints of the particular belts of linoleum are linked with the axes of the steel columns. The linoleum was laid all the way up to below the chrome-plated cladding of the columns. This detail was lost, however, during the later reconstructions and the linoleum was placed and cut up to the columns. The base layer of the linoleum consists of traditional xylolite of a thickness of 20 mm. It was probably used due to its quality heating and acoustic qualities. This consisted of a type of floor mortar containing a mix of chloride and magnesium oxide with wood chips used as a filler. It was oiled and consequently polished and waxed. This was carried out on the floors once more in 2011 and laid with linoleum.



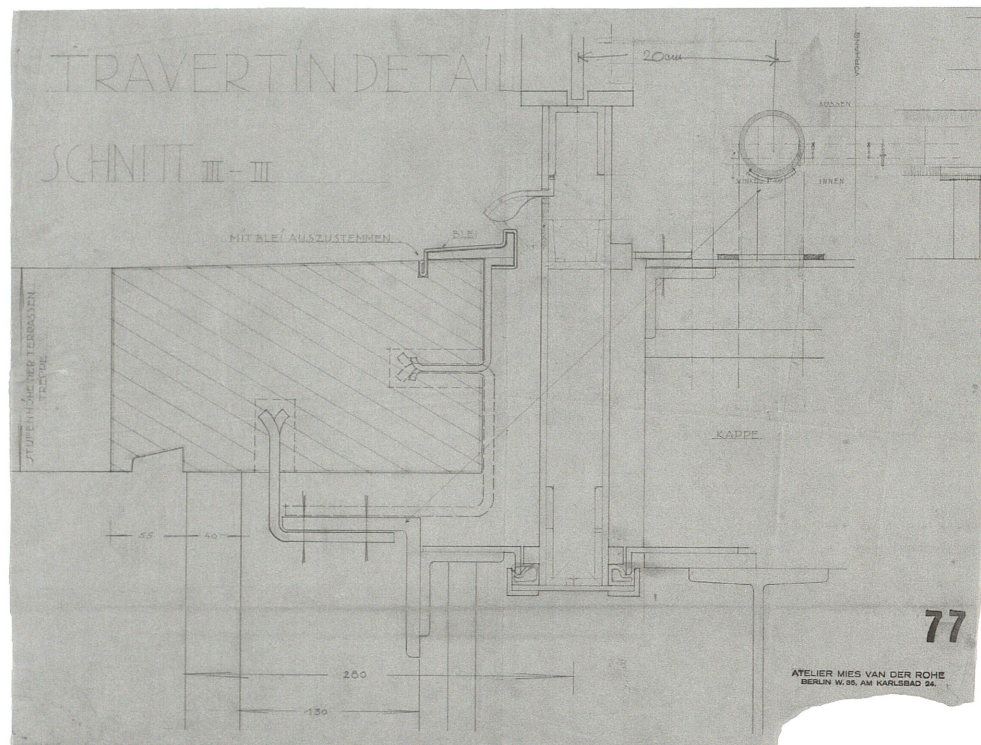
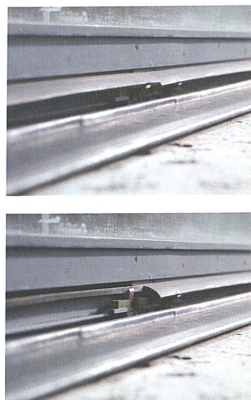
- | | |
|--|---|
| 1 zinc plates (Z. Platen) | 16 light protecting wall |
| 2 mortar | 17 travertine step |
| 3 slag concrete (Schlackenbeton) | 18 travertine baseboard |
| 4 lead water insulation | 19 concrete |
| 5 steel T profile wound with lead insulation | 20 concrete paving |
| 6 gravel concrete (Kiesbeton) | 21 lead water insulation |
| 7 cork | 22 torfoleum heating insulation |
| 8 sano | 23 supporting structure for the ceiling |
| 9 supporting structure for the ceiling | 24 xylolite |
| 10 steel plate covering | 25 linoleum |
| 11 roll-up shading wooden blinds | 26 underview |
| 12 steel casement window | 27 shading textile shutter |
| 13 travertine head of the railing | 28 retractable window |
| 14 plaster | 29 chrome-plated railings |
| 15 parapet brickwork | 30 heating pipe |
| | 31 travertine parapet block |



39/
Detail of the travertine parapet and lower frame of the retracting window
Travertine, detail Schnitt III-III
Scale of the original 1:1, reduced to the scale 1:5.

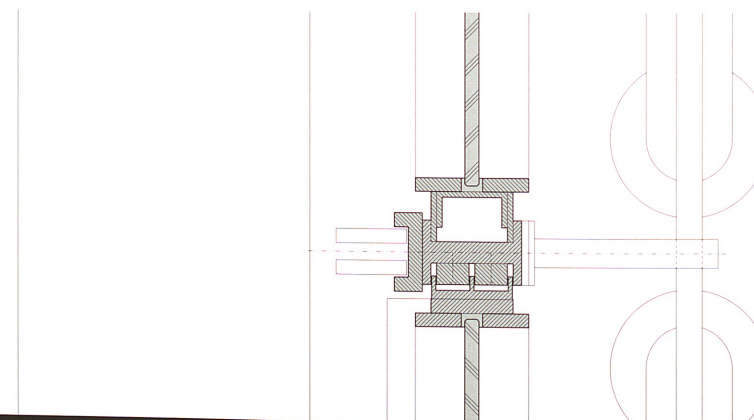
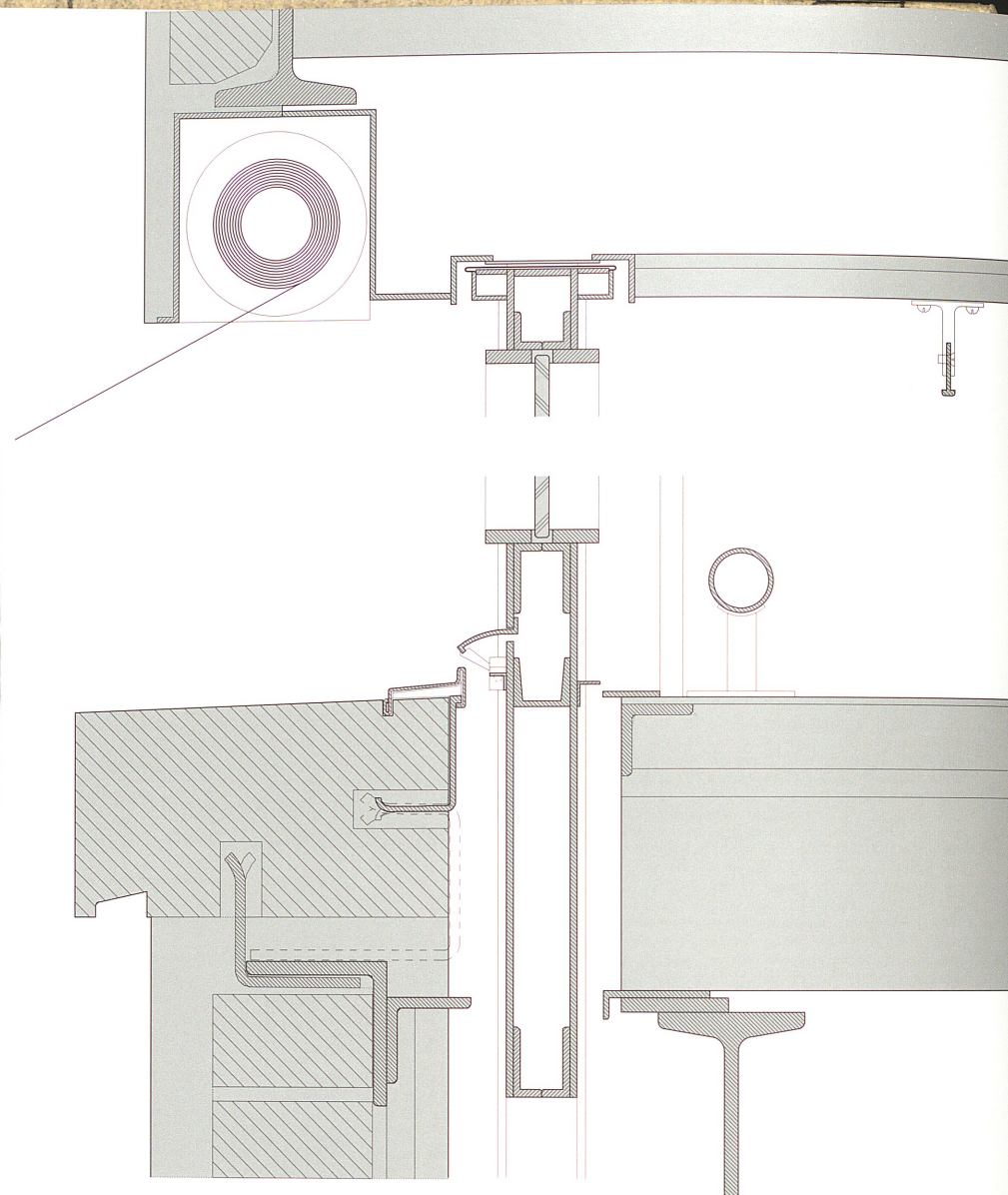
Detail of the lower part of the retracting window and the travertine parapet – cross-section.
Archive MvDR MoMA, New York, invent. no. 2.92 (ibid, similar drawing invent. no. 2.2)

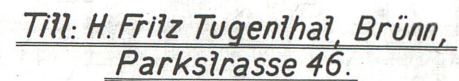
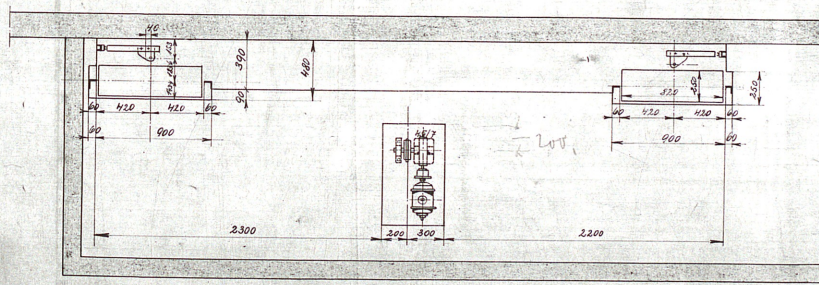
The lower frame of the retracting window is drawn in detail along with the sealing elements and the rotating half-circular slats which prevent water from leaking into the house. This sealing design was carried out in a significantly simpler way in the final realization. The mechanism of the rotating slats was in all probability developed at the time of the production of the frame (a number of the deviations of the realized design are depicted on the newly performed plan to the right).



Two of the windows on the south-west wall of the main living space could be completely retracted into the floor, thereby achieving an impressive connecting up of the interior with the exterior. The profiling of the frames was designed so ingeniously that there is no shape difference between the sliding and the firm frames. This resulted in a geometric unification and symmetry.

The engine room for retracting the windows is located under the glazed wall on the technical floor equipped with independent drives for each window. The window in the steel frame moves in bronze track slats and in order to optimize the power mechanism is balanced by two cast-iron weights. The production was carried out by the company Alex Hermann from Berlin. Cut glass with a remarkable transparency and clarity was used for the panes. The glass for the retracting panes has dimensions of 4810x3024 mm. The glass was produced at the Weinmann company in Chudeřice near Teplice and supplied by the glass company of the Fuchs brothers. The steel frame has two colours, from the exterior lacquered with a grey colour, to the interior with a white colour.





Villenbau Tugendhal Brunn.
Schwarzfeldstr. 43

Beschreibung einer Fensterhebe-
vorrichtung:

WINDE: 45/7, Modell, 1927
MOTOR: Dreistrom Anschluss-Normalmotor
Skoda Typ N 324/6 0.5 PS dazumund 890 mm
offene Retoführung.

GEGENGEW. FÜHRUNGEN: 60/60/6

GEGEWGEWICHTE: 2 Stück.

KETTENRÄDER: 2 Stk 40 Bkg, $x = 23$, $t = 25$.

KETTENRAD: 1 Stück 40 - 2. 23, 1. 25.

-11- MIT RUTSCHKUPPLUNG:

KETTE, Gall'like Kette, t. 25 mm

UMKEHRSCHÜTZE *E. M.*

BREMSMAGNET: $B E_0$

NOTSHALTER: N. S.

STOCKWERKSCHALTER: *S.S.T.*

linkes Fenster gezeichnet,
rechtes Fenster neben an.

Fensterherabsetzung
 B.Nr. 206/30. Lamm Fritz Fugenthal, Büttel
 Beckstrasse 46
 1.20. 14/II. 1930.

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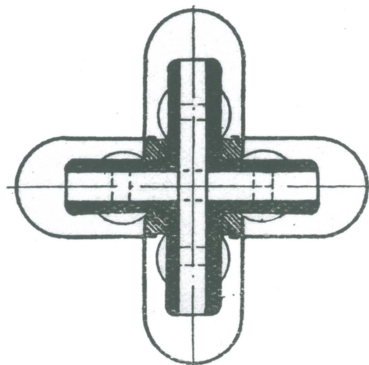
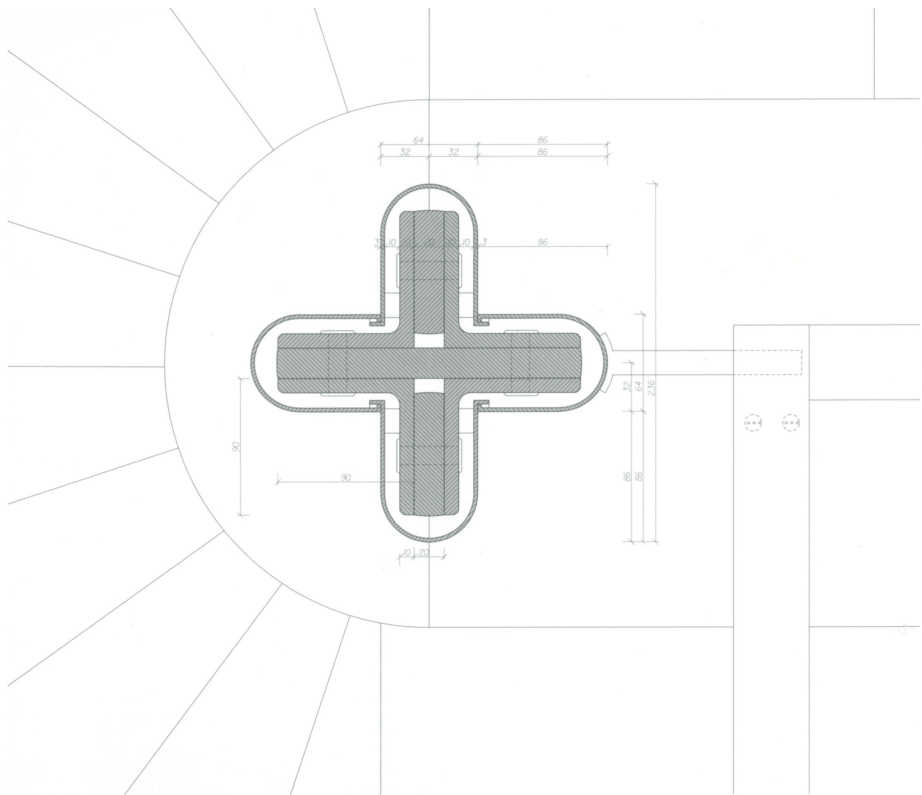
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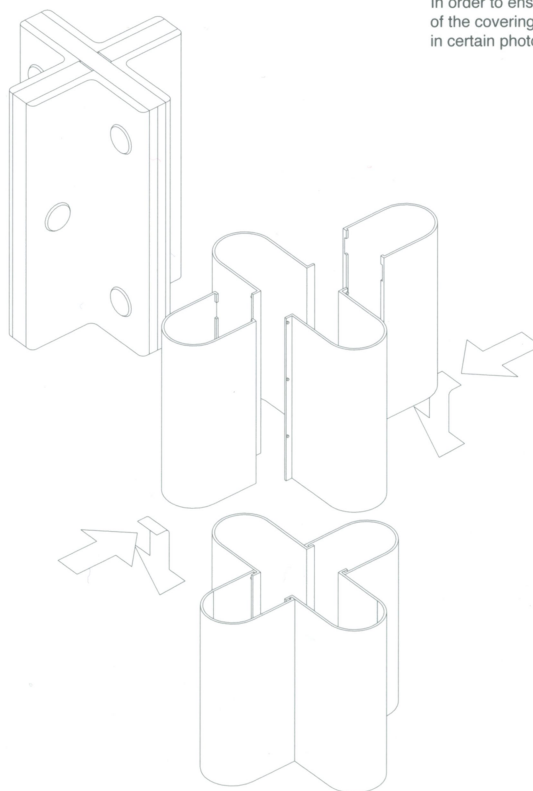
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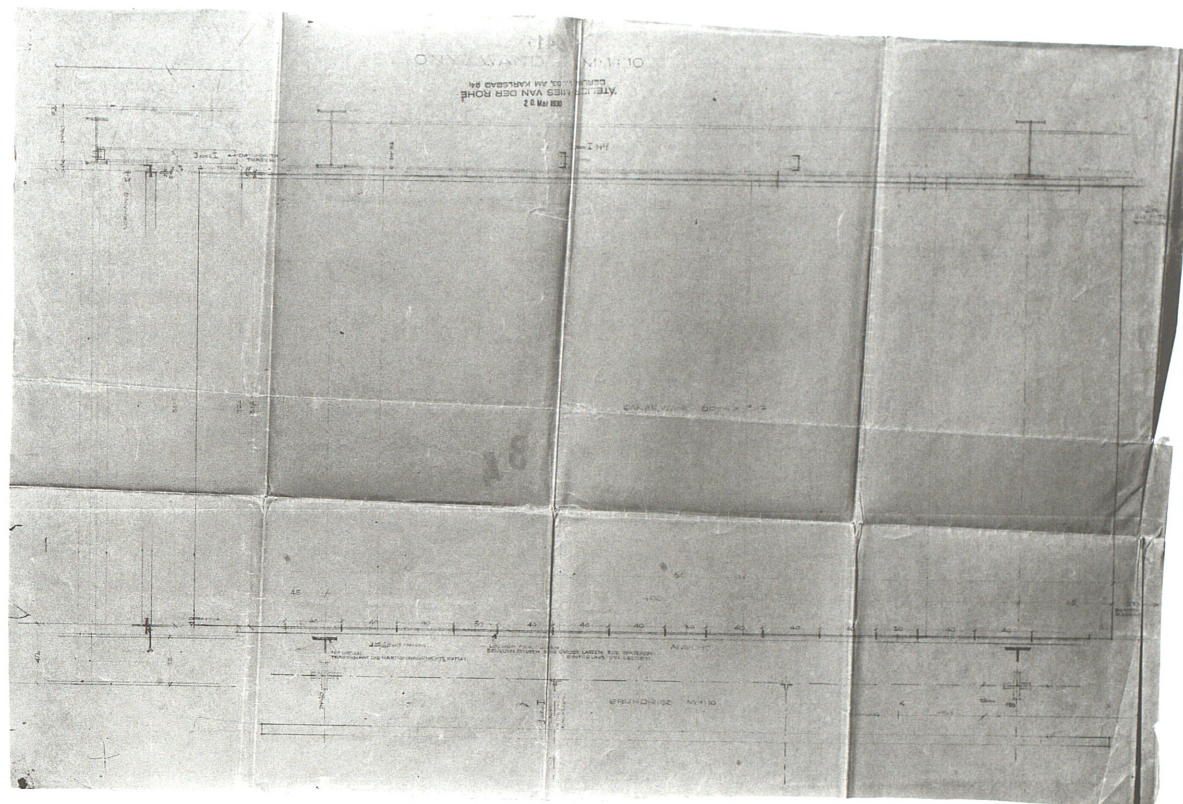
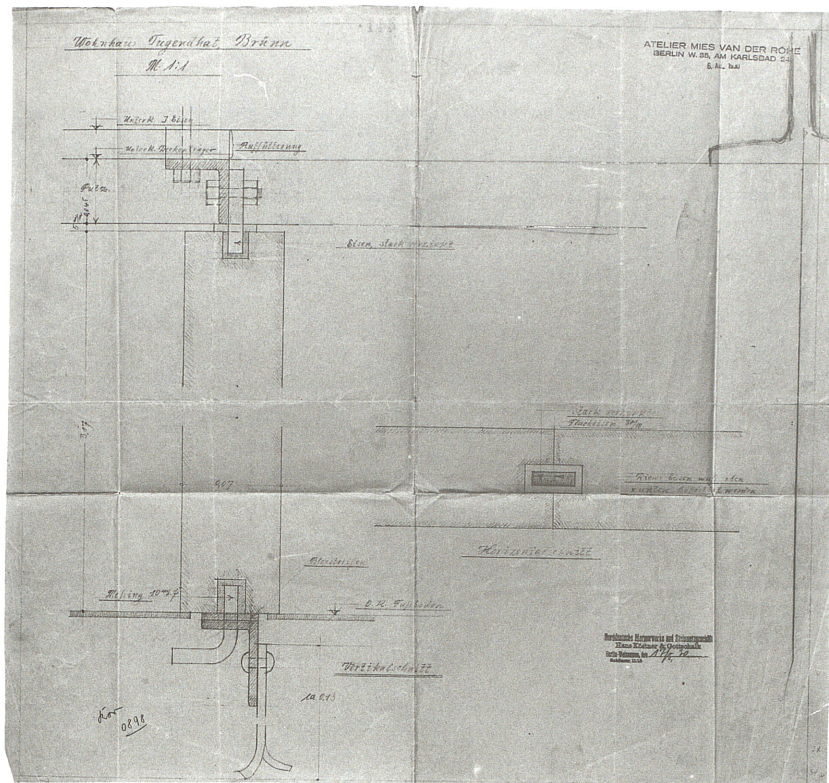
Archive MuMB Brno.



47/
Steel column in the stairway hall – publication plan
(L'Architecture vivante) – enlarged to the scale 1:5

A comparison of the floor plan of the publication plan of the column (in the centre) with its intentional final realized state (on the left) was possible thanks to the reconstruction of the floors in the year 2011. A mirror could be inserted under the cladding of the column, after removing the floor layer, in order to catch a glimpse under the covering made of bent chrome brass surfaces. There was no reason to actually dismantle it. The axonometric scheme depicts in all probability the method of connecting the plates to one another by means of cogs which fit together. In order to ensure sufficient space for the placement of the covering, flat rivets were used as can be seen in certain photographs from the assembly





71/
Detail of the onyx wall – vertical section, horizontal section
Original scale 1:1, reduced to the scale 1:5.
Archive MuMB Brno (also in the archive of MvDR MoMA, New York,
invent. no. 2.206, 2.87).

Cross-section and ground plan. The anchoring of the onyx plates by means of the plotting of a rolled L profile is drawn in the section. The placement of the lower face of the plates at the level of the finished floor made possible the shifting of the linoleum below the onyx wall. 5 mm of hinging have been left at the top below the ceiling. The metal coupling for the particular parts is drawn into the ground plan section. The drawing was carried out 17 May 1930 as the detailed documentation by the Berlin stonemason company Köstner and Gottschalk and authorized by the studio of Mies van der Rohe 6 September 1930.

72/
The onyx wall (Onyxwand) – ground plan, perspective and cross-section
Original scale 1:10, reduced to the scale 1:50.
Dated: 20 May 1930, stamp of the studio of Mies van der Rohe.
Archive MuMB Brno (also in the archive of MvDR, MoMA, New York,
invent. no. 2.209, 2.207).

5 one-piece onyx pieces are drawn. The drawing oddly has the asymmetrical drawing of the placement of the wall in relation to the columns. The wall was finally realized in a symmetric fashion in relation to the two steel columns which stand next to it. Originally, there were in all probability considerations as to a further distance from the glazed wall of the conservatory. The wall is 3200 mm in height, the particular stone blocks have a width of 1233, 1253, 1263, 1273 and 1240 mm.

