FARNSWORTH HOUSE

architecural engineering : production and parts - choice of a technical detail

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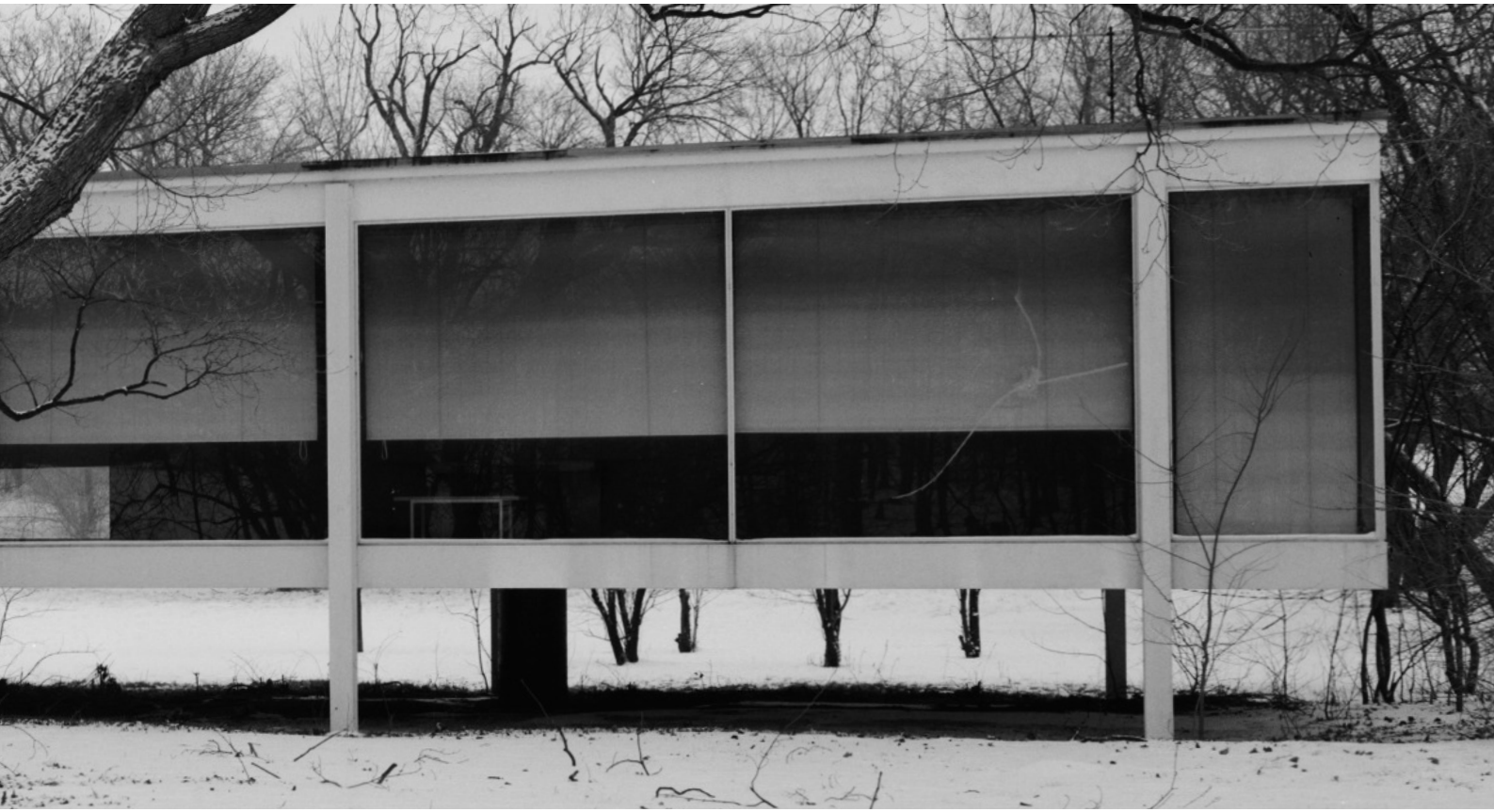

the Farnsworth House
1951

architect
Ludwig Mies van der Rohe

location
near Plano, Illinois, United States of America

function
house/living space

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LUDWIG MIES VAN DER ROHE

It is without doubt that Ludwig Mies van der Rohe has had an huge impact on architecture in the 20th century. In the early 1920's he became one of the leaders of the modern movement. He was influenced by the 'honest' architecture of Berlage. No cover-ups and the materials as they are. He started experimenting with elements of architecture like independent walls and ceilings. He experimented with the composition of space and the reduction of the elements to their essence: shapes in space. This experimenting resulted into the design of the world famous German Pavilion at the Barcelona World Expo in 1929. The pavilion is composed of rectangular shapes in an orthogonal grid. It is actually a simplification of earlier designs of dwellings. The shapes and composition of dwellings is brought back to basic shapes to form a perfect composition. The rational architecture of this pavilion is one of the most recognised projects of the modern architecture.

Before the second world war, Mies van der Rohe moved to the United States of America. After the war, the world started rebuilding and Mies van der Rohe realised a great amount of projects. His ideas changed the way that architects looked at buildings and the use of materials. He created a style of steel and glass. As a result these materials took the place as expressive materials from stone or concrete in tall buildings. The stone and ornaments dissapeared and made place for huge glass facades that are still the standard for skyscrapers.

His style can be described as minimalistic and rational. 'Less is More' is a term often used with his architecture. The use of materials, elements and shapes to make or to continue a space causes a very careful view on the composition.

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The horizontal lines of ceilings and floors are gestures that try to continue the space beyond the obvious borders that walls often are. The elements and materials are brought back to their essence, and with that expression, they create spaces and structures of great quality.

In 1938 Mies van der Rohe stated the following:

'In its simplest form architecture is rooted in entirely functional considerations, but it can reach up through all degrees of value to the highest sphere of spiritual existence into the realm of pure art.'

This sentence describes his stand towards design. When a building is to be designed, functional considerations of structure and materials have to be made. With elements and materials you create the design, regarding the essence of the building. The detailling of the structure and the expression of the materials is then to be refined, so that the whole of the elements and materials goes beyond their technical use and origin, until a state of art is created that is a perfect composition of space and structure.

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FARNSWORTH HOUSE

The Farnsworth House near Plano, Illinois in the United States of America is one of the most interesting and important architectural designs of the 20th century. Mies van der Rohe experimented with the concept 'house' and the composition of structure, materials and space. The Farnsworth project might just be his ultimate creation in this building type. The building is as an object a perfect balance between it's function, surroundings and materials. In this balance, the aesthetics of the house emerge.

Although the white building contrasts with the darker brown of the trees or the green grass next to it, it does fit perfectly on the location. Besides the obviously transparant character of the building, created by the use of glass as the only material to border the inside living space with the living space outside, the building also uses the strength of the reducement of materials and elements to it's primairy use and essence. No element is covered up or used in such a way, that its primairy function in the whole of the building is ignored. The transparant and elementary character of the building causes it to both blend in and stand out in the area and the nature surrounding it. The big tree right in front of the house is so close to it, that its leaves constantly scrape the roof and windows. The fact that this big tree is so close to the house, adds to the total composition of the house in nature.

The border between the nature and the living space of the house is also caused by the shape of the building and not just the materials. The rectangular shape contrasts with the organic shapes of nature. For a great part, the fact that the building relates to the shape of a prism, causes a feeling of seperation between inside and outside. Even the

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terrace on the higher plane, which is outside, is bordered by the rectangular shape of the floor and ceiling and therefore could be considered as an area in between the outside and the inside.

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The I-beams that carry the house are together with the horizontal planes the most important elements of the building. It's geometrical design is shaped by these vertical and horizontal elements. In the area next to the Fox River, which sometimes overflows the banks, houses are lifted up above the flood level. Often poles are used to manage the gap between the ground and the floor. Mies van der Rohe used this aspect that the location carried into the design and made these elements into some of the most important, eye-catching elements. This is a good example of using an element for it's purpose, how it's meant to be used. But by refining the detailling and giving the material or element a certain expression, the composition, and therefore the building, benefits of this necessary element. The element exceeds it's basic purpose of carrying the building and becomes an eye-catcher in the composition of horizontal and vertial elements. But it still is, however, just a plain I-beam painted white.

The I-beams make the floating of the living space possible by carrying the floor and ceiling. However, they are not put directly under the floor and ceiling, as you would expect. Instead, they are placed alongside the horizontal elements. The I-beams therefore make a gesture of enclosing the floating living space. The horizontal planes are placed between de I-beams. The living space is not interrupted by structural elements but instead is enclosed by them. The floating part is the living area. The I-beams keep the volume of this area on its place.

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CHOOSING A TECHNICAL DETAIL

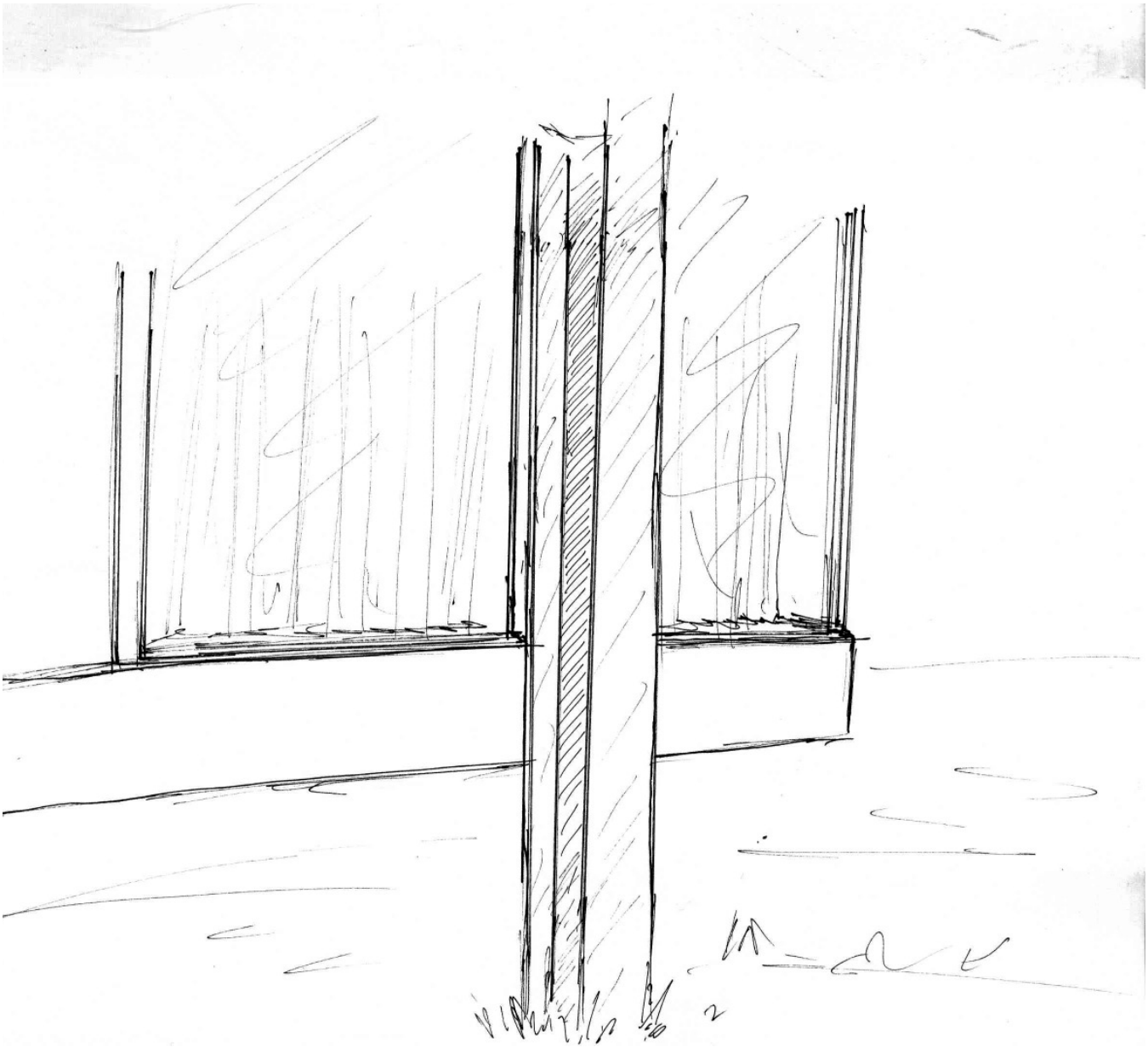
For this assignment the Farnsworth House was chosen for its composition of materials, elements and space. The minimalistic approach makes the building really pure. The materials are brought back to their essence and this shows itself in the detailling.

The drawing of figure 9 shows the “simplicity” of the house. The frame of the house consists of just three horizontal beams, some vertical elements and a stairs. The house is white, but this drawing in black and white emphasizes the simple geometric shape of the building, just as the white does in real-life.

What the drawing does not show, is the way the horizontal elements are levitating above the ground, and by that, how the vertical elements are placed alongside the horizontal planes. And this aspect of the building is what makes the game between horizontal and vertical so special.

If you would take a small part of the right side of the house. Just the part with the beam, the floor and the glass, like in figure 10. This part seems a little bit unreal. The horizontal part doesn’t really ‘connect’ to the vertical. The I-beam is just there. There is no reason to think that the horizontal element is being carried by the I-beam, as you cannot see how the rest of the house looks like. It could just be a floor that is placed behind the I-beam, without any structural relation. But then again, the floor would be, in that case, levitating. This is the strength of this part of the house.

The detailling of this part has to be good enough to keep up the illusion of the floating horizontal plane. The connection between the profiles must not show any connecting



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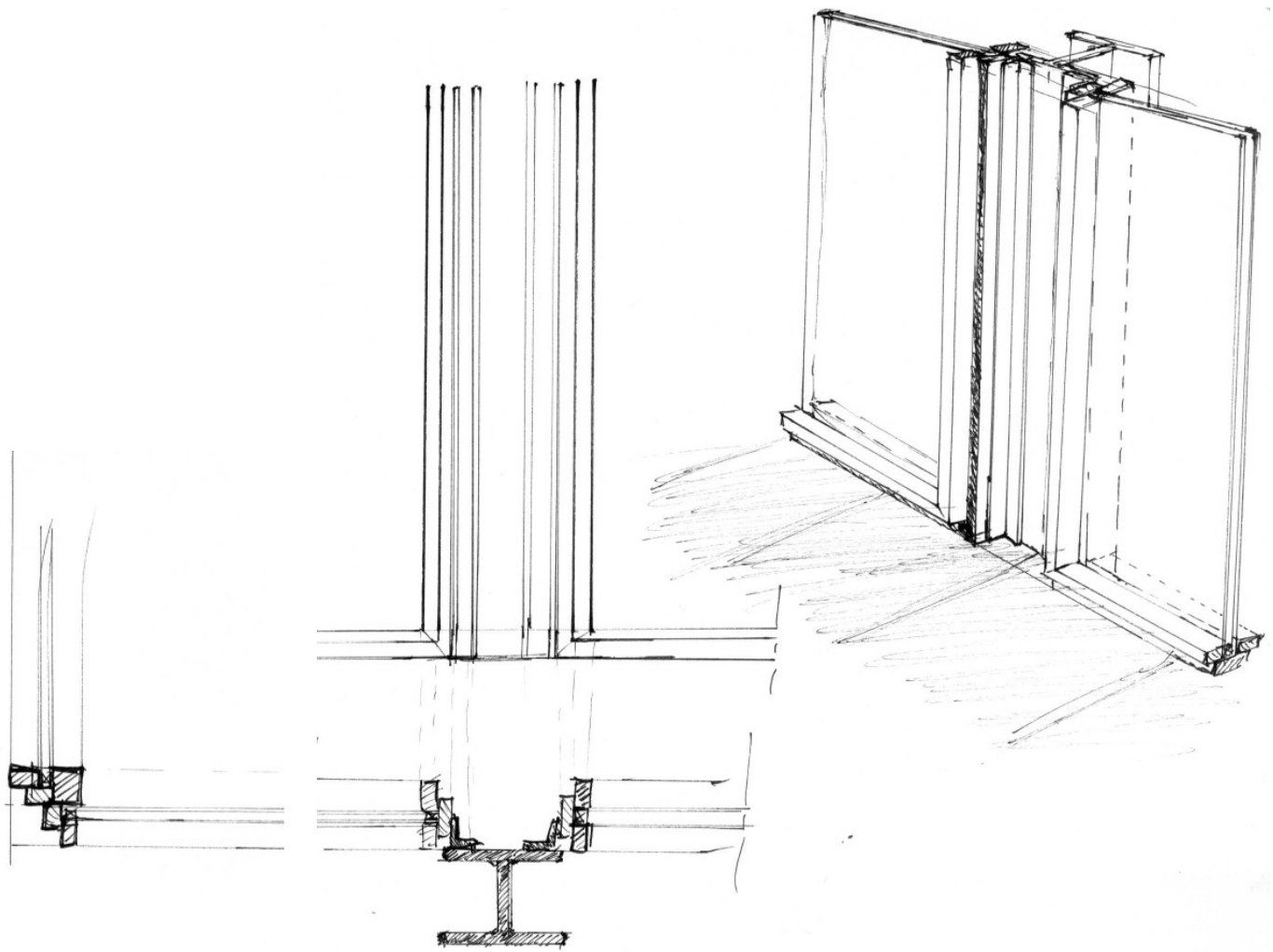
mechanical elements or welds. Even underneath the building, the house does not give a clue about this connection.

Besides the connection between the vertical and horizontal structural elements, this part also contains almost every detailling of the glass wall. The window frames of the Farnsworth House are really basic and simple. As the drawings in figure 13 show, they consist of three wooden parts: a bat on which the glass is placed and two smaller bats that keep the glass in its place. And those three elements are actually all you need for a window frame. Mies van der Rohe has reduced the complexity of a window down to three bats. The connection with the I-beam shows a really simple and straghtforward way of connecting. A steel angle bar is used to connect the bat to the steel I-profile. Simple, but effective.

Less is More goes up for the detailing of the Farnsworth House. The materials are used in exactly that way as that they are needed to do the job and there aren't any elements that are not needed for the structural or technical design of the building. Every element is exactly as it is. There are no cover-ups. By doing this, de Farnsworth House has become more than just a house. It is a piece of art in which it is all about bringing the design back to basic, to the simplicity of its function. And that of course is not a simple thing to do.



15

Steel frame

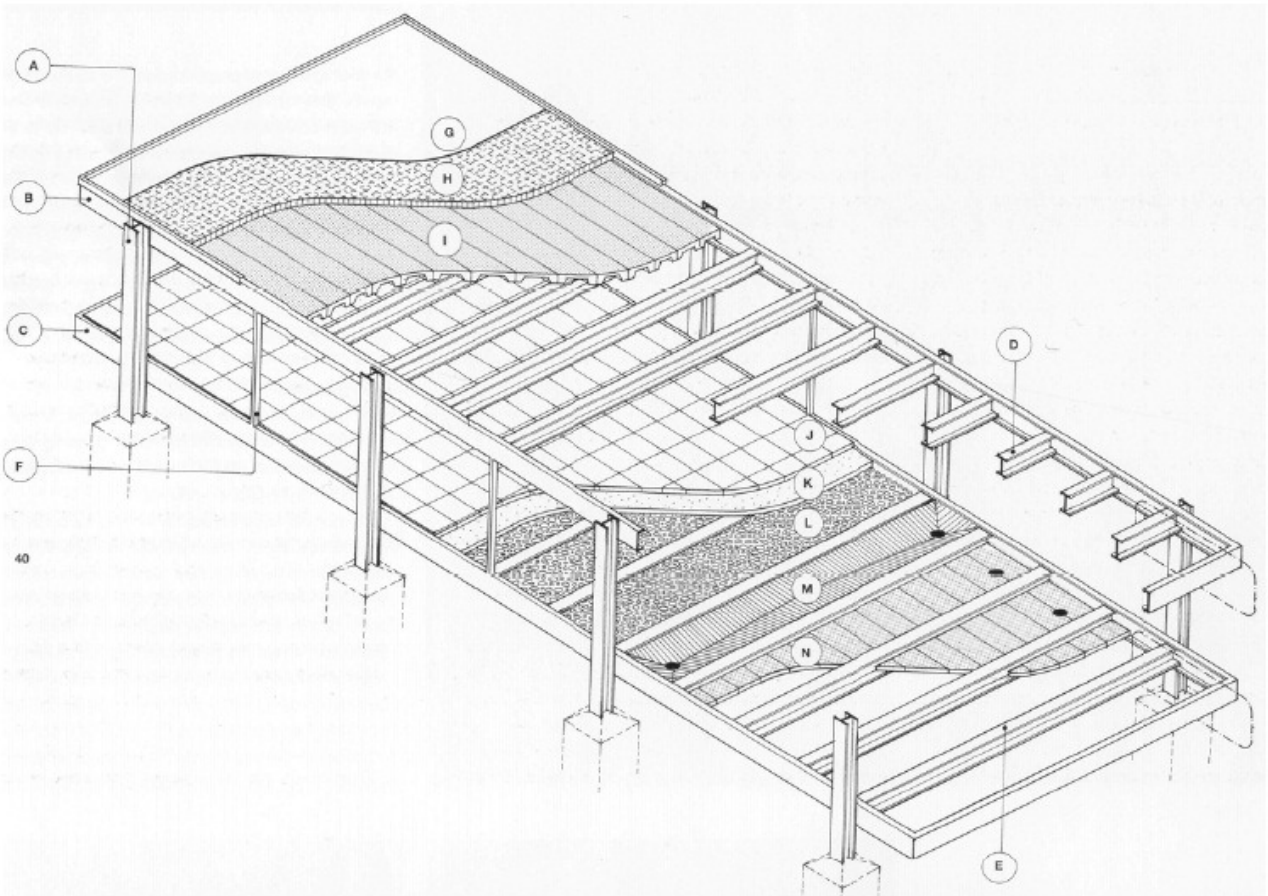
A Steel stanchion
B Steel channels forming perimeter frame at roof level
C Steel channels forming perimeter frame at floor level
D Steel cross-girders at roof level
E Steel cross-girders at floor level
F Intermediate mullion built up from flat steel bars

Roof construction

G Waterproof membrane on
H Foam glass insulation on
I Precast concrete planks

Floor construction

J Travertine slabs on
K Mortar bed on
L Crushed stone on
M Metal tray on
N Lightweight concrete fill on precast concrete slabs



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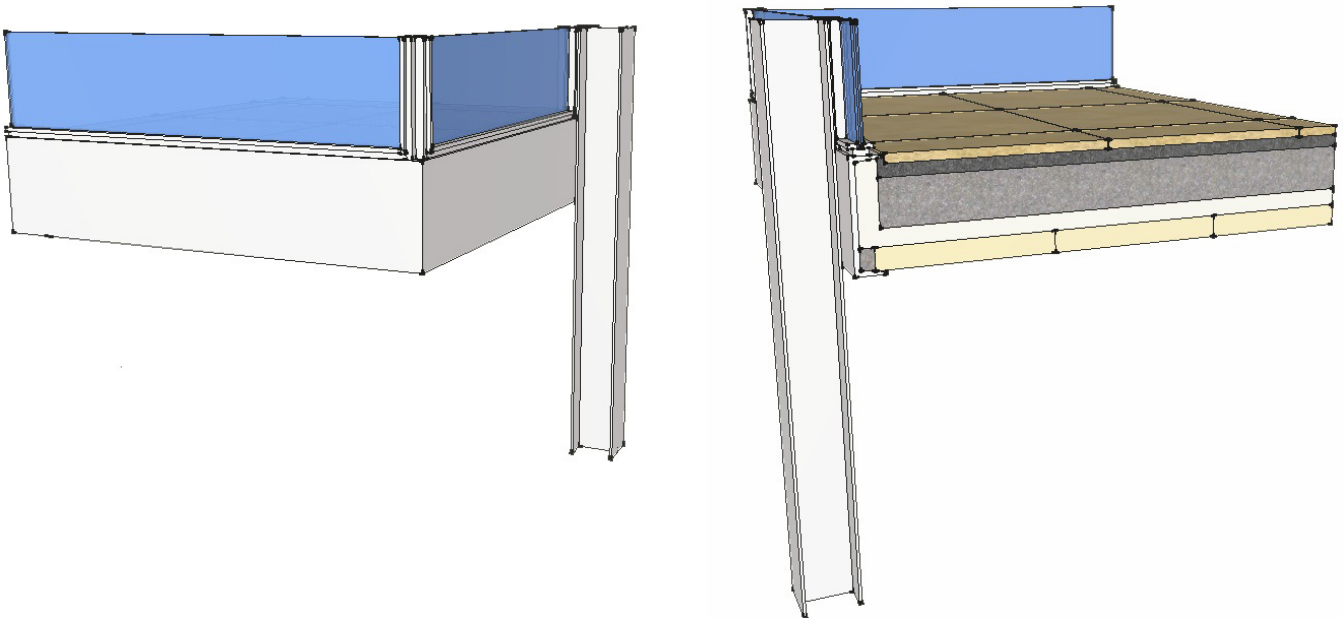

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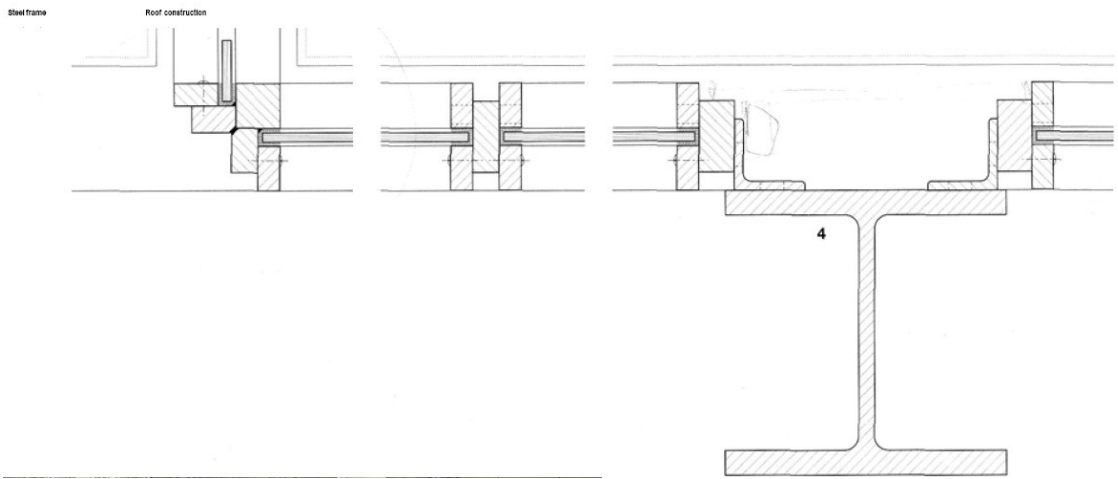

18

IMAGES

1 Ludwig Mies van der Rohe
2 Barcelona Pavilion
3 860 Lake Shore Drive, Chicago
4 Nationalgalerie, Berlin
5 the Farnsworth House, front
6 the Farnsworth House, terrace view
7 the Farnsworth House during flood
8 the Farnsworth House, corner
9 the Farnsworth House, I-profile alongside plane
10 the Farnsworth House, staircase view
11 hand drawing of the Farnsworth House
12 hand drawing floating corner
13 the Farnsworth House, bottom side
14 the Farnsworth House, interior
15 hand drawings window frame
16 structural layout
17 sketchup model technical detail
18 the Farnsworth House, window frame - I profile connection

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