The Structure of Form: Le Corbusier's 'The Five Points of a New Architecture'

Mehrdad Hadighi*
Professor of Architecture, Department of Architecture, Stuckeman School of Architecture and Landscape Architecture, The Pennsylvania State University, USA (mzh11@psu.edu)

ORIGINAL RESEARCH ARTICLE

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Abstract

Background and Objectives: Le Corbusier is predominantly recognised for his declarative and often dogmatic writing style, particularly regarding 'The Five Points of a New Architecture'. This paper investigates the parallels between the recorded written histories of these points and Le Corbusier's built works during the 1920s. The primary aim is to provide a nuanced perspective on the development of the 'Five Points', contextualising them within a body of architectural works rather than treating them as a sudden theoretical epiphany. By re-examining what appears to be a rigid doctrine, this study explores the architectural and aesthetic potential of reinforced concrete as a cohesive structuring system.

Materials and Methods: The study employs a comparative methodology, juxtaposing written histories with built artefacts. Archival research at the Foundation Le Corbusier and historical analyses of various editions of the *Œuvre* Complète were combined with detailed case studies of four pivotal villas: Villa Besnus (1922), Villa Stein-de Monzie (1927), the Weissenhofsiedlung Houses (1927), and Villa Savoye (1929). The analysis involves comparing as-drawn and as-built drawings

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*. Corresponding Author Email Address: mzh11@psu.edu

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Research Questions:

1. How did Le Corbusier's 'Five Points of a New Architecture' evolve practically through his built works during the 1920s, rather than emerging as a sudden theoretical epiphany?

2. What are the key incongruities between Le Corbusier's theoretical proclamations (and published drawings) and the actual constructive realities in pivotal case studies such as Villa Besnus, Villa Stein-de Monzie, and the Weissenhofsiedlung Houses?

3. In what ways did the architectural and aesthetic potential of the reinforced concrete frame drive the codification and materialisation of the 'Five Points'?

4.How do Le Corbusier's built works from this period reflect the tension between systematic geometric organisation and the singularity of spatial experience (or plastic form)?

to identify incongruities between theoretical proclamations and constructive realities. The analysis reveals that the 'Five Points' were not formulated instantaneously but evolved through successive construction trials. In the 1922 Villa Besnus, while the 'free plan' was nascent, the other points remained uncodified, with columns concealed within perimeter walls. By 1927, Villa Stein-de Monzie demonstrated an advanced exploration of reinforced concrete, yet exhibited a 'mis-alignment' between technical necessity and aesthetic ideal; notably, Le Corbusier eliminated two structural columns from the published plans to preserve the appearance of geometric order. Full alignment was achieved in the Weissenhof houses, where the technical requirements of the reinforced concrete frame finally mirrored the aesthetic expression predicted by the 'Five Points'.

Results and Conclusion: The study concludes that the 'Five Points' emerged from a constant tension between systematic geometric organisation and the singularity of spatial experience. Rather than mere stylistic dogmas, these principles served to concretise the architectural possibilities afforded by the reinforced concrete frame. The findings suggest that Le Corbusier's architecture was a persistent struggle to materialise plastic form within rationalised building systems.

1.Introduction

Le Corbusier is recognised for a distinctive style of writing—emphatic, declarative, and bordering on dogmatic. In a book-length study,[1] I have argued that behind the mask of dogma, constructed by Le Corbusier himself and perpetuated by architects and historians, the buildings convey a different message. When examined through close reading, his built work reveals the architect's persistent struggle to materialise singular formal and spatial experiences within the framework of rationalised building systems. He sought to create plastic experiences that could not be conceived within the strict geometry of technical building systems. Le Corbusier manipulated the components of these two architectural conditions, technical systems and plastic forms

1. Mehrdad Hadighi, *Le Corbusier's Ahmedabad Millowners' Association Building: Between the Beautiful and The Sublime* (Basel, Switzerland: Birkhäuser, 2025).

The five Points of a New Architecture

1. The Columns: Assiduous and stubborn research has resulted in partial realizations which can be considered as having been acquired in a laboratory. These results open new prospects for architecture; they present themselves to an urbanisme which can find the means therein to arrive at the solution of the great sickness of our present-day cities.
The house on columns! The house used to be sunk in the ground: dark and often humid rooms. Reinforced concrete offers us the columns. The house is in the air, above the ground; the garden passes under the house, the garden is also on the house, on the roof.

2. The roof-gardens: For centuries the traditional rooftop has usually supported the winter with its layer of snow, while the house has been heated by stoves.
From the moment central heating is installed, the traditional rooftop is no longer convenient. The roof should no longer be convex, but should be concave. It must cause the rainwater to flow towards the interior and not to the exterior.
A truth allowing of no exceptions: cold climates demand the suppression of the sloping rooftop and require the construction of concave roof-terraces with water draining towards the interior of the house.
Reinforced concrete is the new means for realizing a homogeneous roof. Reinforced concrete experiences a great deal of expansion and contraction. An intense movement of this sort can cause cracks in the structure. Instead of trying to rapidly drain away the rain-water, one should maintain a constant humidity for the concrete of the roof-terrace and thereby assure a regulated temperature for the concrete. An especially good protection: sand covered by thick cement slabs laid with staggered joints; the joints being seeded with grass. The sand and roots permit a slow filtration of the water. The garden terraces become opulent: flowers, shrubbery and trees, grass.
Thus we are led to choose the roof-terrace for technical reasons, economic reasons, reasons of comfort and sentimental reasons.

3. The free plan: Until now: load-bearing walls; rising up from the basement they are always superimposed, forming the ground and upper floors, right up to the roof. The plan is a slave of the bearing walls. Reinforced concrete in the house brings about the free plan! The floors no longer superimpose rooms of the same size. They are free. A great economy of constructed volume, a rigorous use of each centimeter. A great financial economy. The easy rationalism of the new plan!

4. The long window: The window is one of the essential goals of the house. Progress has brought about a liberation. Reinforced concrete has brought about a revolution in the history of the window. Windows can now run from one edge of the façade to the other. The window is the repetitive mechanical element of the house; for all our town-houses, all our villas, all our workers' housing, all our apartment houses.

5. The free façade: The columns are now set back from the façades, towards the interior of the house. The floor extends outward in a cantilever. The façades are now only light membranes composed of insulating or window elements.
The façade is free; the windows, without being interrupted, can run from one edge of the façade to the other.

and spaces, to simultaneously address systemic technical requirements and intensify plastic spatial and formal qualities. While deeply committed to the ideal of rationality and geometric order inherent in building systems, his work pursued a more complex agenda: to craft singular plastic experiences of space and form through the deliberate engagement of an architecture conceived within systemic and geometric terms. Ultimately, his architecture emerged from a constant tension between these two realms: the systematic and geometric organisation of building systems (structural, plumbing, sun-shading, circulation) and the singularity of spatial experience realised through movement in space. The 'Five Points' exemplify this proposition, as they stem from the strict geometry and principles of reinforced concrete construction, yet they formulate an aesthetic experience of form and space that has been freed from the regimens of the building systems. In this light, I will analyse four villas designed by Le Corbusier and Jeanneret during the 1920s that coincide with the timing of the texts that have been associated with the 'Five Points'. The villas will be examined in the context of the relationship between structure and form in reinforced concrete.

As regimens the abstract, Le Corbusier's 'Five Points' have been associated with multiple sources ranging from the essays of the early 1920s to the formally published version of 1929. The first of these sources are the essays Le Corbusier published in *L'Esprit Nouveau*, the journal he founded in 1920 with painter Amédée Ozenfant, and poet Paul Dermée. Twenty-eight *L'Esprit Nouveau* issues were published between 1920 and 1925, including regular con-

Figure 1. Le Corbusier and Pierre Jeanneret, 'The Five Points of a New Architecture,' as translated in the single-volume *Œuvre* Complète, Le Corbusier 1910-1965 (Zurich, Switzerland: Les Editions d'Architecture Zurich, 1967), 44.

tributions on architecture by Le Corbusier. Many of the essays were collected into the book *Towards a New Architecture*,[2] with the French title, *Vers Une Architecture*, published in 1923 by Éditions Crès.[3] Had the 'Five Points' been outlined in these essays, it would suggest that many of the early villas, Besnus in Vaucresson of 1922, Ozenfant in Paris of 1922, the L'Esprit Nouveau pavilion of 1922, and the La Roche-Jeanneret house in Paris of 1923 would have been developed along with the 'Five Points'. The analysis of the Villa Besnus will show whether the 'Five Points' were outlined succinctly enough to be theoretically and constructively clear for this early villa. Werner Oechslin published an original typed text with handwritten corrections by Le Corbusier and Pierre Jeanneret sent to Alfred Roth, dated July 24, 1927, on the occasion of the two residential buildings designed for Weissenhofsiedlung in Stuttgart. A modified version of this text was then published in the 1929 printing of the first edition of the *Œuvre Complète de 1910-1929*.[4] Oechslin points to a revision in the 1927 text: from 'fréquentes,' (frequent) to 'successives' (successive). The opening remarks of Le Corbusier and Pierre Jeanneret's typed text read: 'These are the theoretical conclusions drawn from frequent (→successive) observations made on construction sites over several years. The theoretical explication leads to the simplicity of the formula.'[5] The revision from frequent to successive highlights the decisive nature of the trials on the construction site. These were not just frequent observations, rather successive, repeated and consecutive construction trials. Thus, tying the five points to construction practices, and not simply theoretical observations. In this light, we recognise that the five points did not and could not emerge suddenly from a burst of genius. They were, rather, the result of many years of construction practice, observations, analyses, and conclusions. They could only have emerged after the many trials that were conducted in the 1920s by Le Corbusier and Pierre Jeanneret. The following analysis will point more specifically to the ideas that were tested in each villa toward their development as the 'Five Points'.

2. Methods

First and foremost, this is a comparative study, comparing written histories with built artifacts. For the written histories, I combine archival research at the Foundation Le Corbusier with historical research of different editions of the *Œuvre Complète*, and other texts on the villas. For the built artifacts, I utilise a set of case studies and analyse them to understand the role of material, construction technique, and structure in their formulation. I also compare as-drawn, and as-built drawings with images of the physical conditions. The earliest of these free-standing villas is the 1922 Villa Besnus at Vaucresson. Its timing aligns perfectly with *Vers Une Architecture*, one of the commonly assumed sources of the 'Five Points'. The next Villa is the 1927 Villa Stein-de Monzie, aligning with the publication of the essay in *L'Architecture Vivante* on 'The Theory of the Roof Garden.' Next in my analysis is the double-house, Houses 14 and 15, designed for the Weissenhofsiedlung exhibition of 1927, noted by the architects as the pretext for the announcement of the 'Five Points'. In addition, the opening of the building exhibition aligns perfectly with the typed text of the 'Five Points' sent by Le Corbusier and Jeanneret to Al-

2. Charles-Éduard Jeanneret (Le Corbusier). *Towards a New Architecture*. Translated by Frederick Etchells. (New York, Toronto, London, Sydney: Holt, Reinhart and Winston, 1946).

3. Le Corbusier and Pierre Jeanneret, *Vers Une Architecture* (Paris, France: Éditions Crès, 1923)

4. Le Corbusier and Pierre Jeanneret, *Œuvre Complète de 1910-1929* (Zurich, Switzerland: Les Editions d'Architecture, 1929), 128-129.

5. The original typed text by Le Corbusier and Pierre Jeanneret sent to Alfred Roth, published in: Werner Oechslin, 'Les Cinq Points d'une Architecture Nouvelle.' *Assemblage* (Cambridge, Massachusetts: The MIT Press, Oct 1987, No. 4), 82-93.

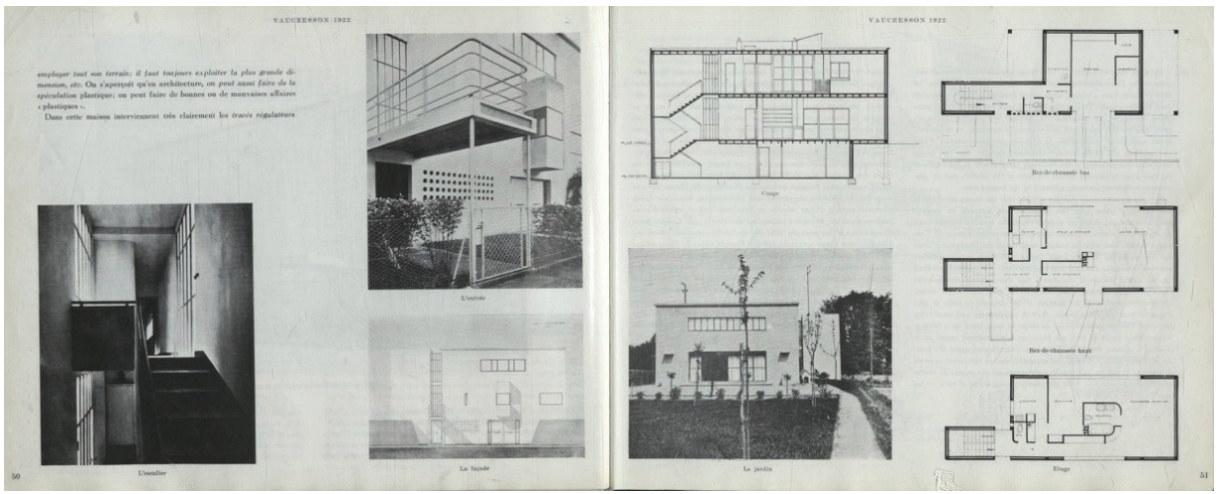
fred Roth. Finally, the 1929 Villa Savoye comes next in my analysis, aligning with the publication of the 'Five Points' in the *Œuvre Complète de 1910-1929*.

1922: Villa Besnus at Vaucresson

In the first edition of the *Œuvre Complète de 1910-1929*, published in 1929, Le Corbusier and Pierre Jeanneret introduce us to Villa Besnus as the first building where solutions to a set of architectural problems had to be sought in construction (Figure 2). These problems, they note, had been theoretically outlined in the essays published in the *L'Esprit Nouveau* journal. Here, they make a distinction between ideas that were defined theoretically in the essays and their practical architectural resolutions, which they argue were first tested here in Villa Besnus. In the introduction to this villa, they write:

> This design was the direct practical outcome of the Town-Planning Stand at the Paris 'Salon d'Automne' of 1922. It dates from a period when every kind of difficulty presented itself simultaneously. Though theories had been put forward and principles developed for clearing the ground in 'L'Esprit Nouveau', everything in this house had, architecturally speaking, to be created anew: methods of construction, an efficient structural solution of the roof problem and of the window frames, parapet, etc. The design reveals its free plan - the bathroom being placed in the centre of the floor area. It likewise defines the form of the window and its proportions, which are correctly adjusted to the human scale.[6]

In addition to the architectural solutions to the construction problems that had been newly outlined by Le Corbusier and Jeanneret in *L'Esprit Nouveau*, the house presents us with a free plan, 'the bathroom being placed in the centre of the floor area' organises the entire floor plan, without being a part of the perimeter wall or the structural grid. The bathroom (on the second floor) and the fireplace/library (on the first floor) in the centre of the house also gives us the first glimpse of the 'promenade architecturale.' In combination with the staircase–



6. Le Corbusier and Pierre Jeanneret, *Œuvre Complète de 1910-1929* (Zurich, Switzerland: Les Editions d'Architecture, 1929), 48.

Figure 2. Le Corbusier and Pierre Jeanneret, Villa Besnus at Vaucresson as published in *Œuvre Complète de 1910-1929*, pages 50-51.

turned 90 degrees from its initial location–the movement into and around the house is defined by a series of continuous left-hand turns. Starting from the main entrance on the ground floor, one is invited left onto the stairs, continues left up the stairs and, entering either first or second floors, continues along the Vaucresson road façade, with views front and back, turning left around the sculptural wall of the library/ fireplace or the bathroom into the main space of each floor. The 'promenade architecturale' comes to fruition in villas La Roche-Jeanneret and culminates in the Villa Savoye, but one sees its inception here.

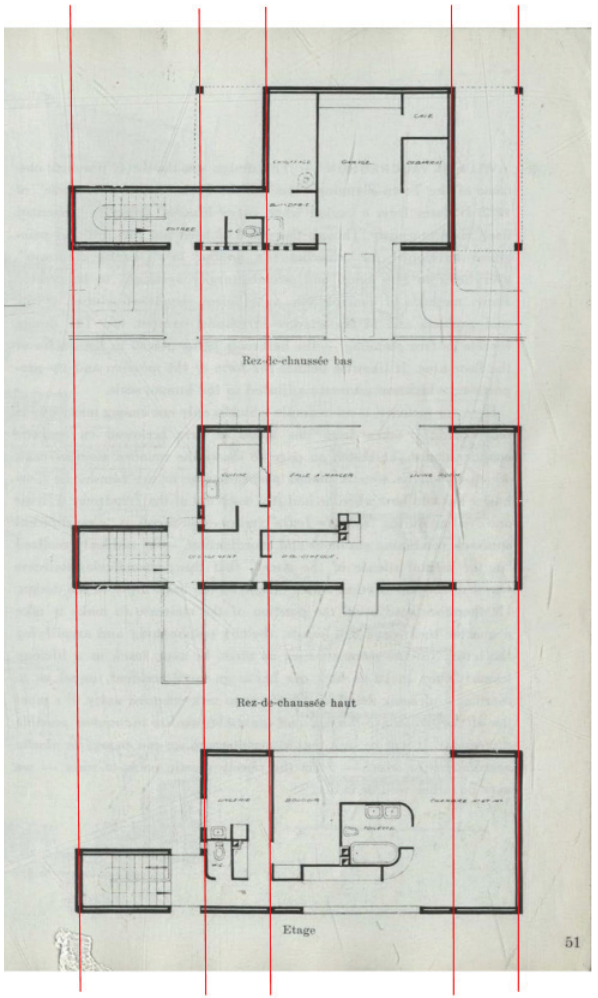


Figure 3. Le Corbusier and Pierre Jeanneret, Villa Besnus at Vaucresson, Floor plans as published in *Œuvre Complète de 1910-1929*, page 51. Red highlights by the author marking the structural column lines, with the columns embedded in the perimeter walls.

The house is executed using a reinforced concrete frame concealed in the perimeter walls of the house. As such, the columns are not visible anywhere in the house, nor do they elevate the house above the ground to permit the garden to pass through. In fact, the house negotiates a grade change between the front and the back of the house. It remains grounded and embedded in the earth. The columns do not play a formal or spatial role in the villa, only structural. They determine the locations of most of the windows. This is especially important on the garden side as the largest structural bay provides the largest window with views of and access to the garden (Figure 3). Given that the structure is embedded and concealed in the perimeter walls, 'free façade' and 'long window' are not possible. The house does not have a roof terrace either. We note that of the five points, the house explores the free plan, but not the remaining four. It is therefore fair to conclude that at this point in Le Corbusier's career, the 'Five Points' had not yet been codified. They existed as ideas, but remained untested, and were not yet cohesively theorised. Although the structure of the villa is reinforced concrete, the house does not yet explore the formal and aesthetic possibilities afforded by the construction method. We can certainly conclude that at the time villa Besnus was designed, the 'Five Points' were not yet defined and codified.

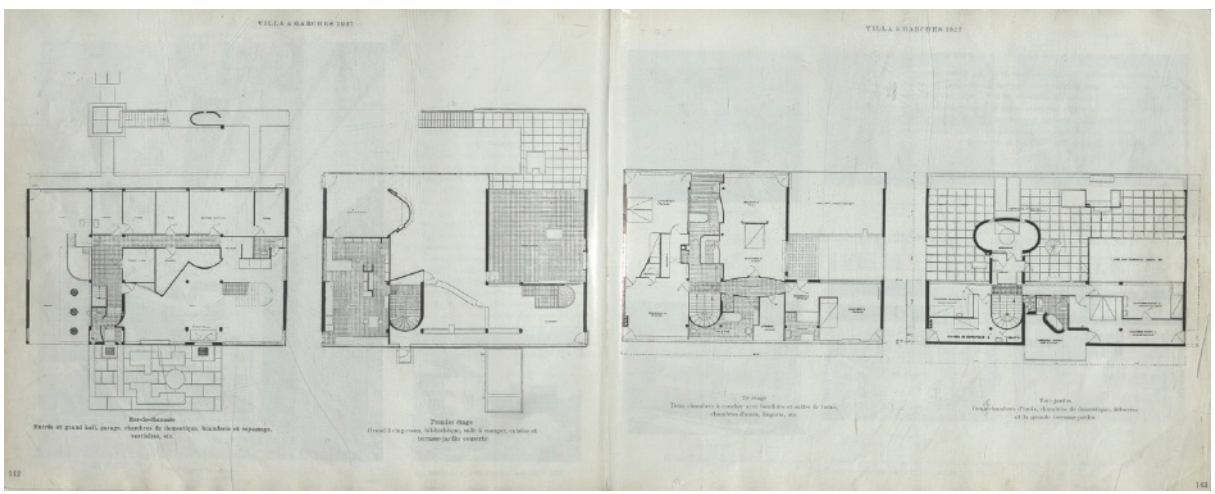
1927: Villa Stein-de Monzie at Garches

In the first edition of the *Œuvre Complète de 1910-1929*, published in 1929, Le Corbusier and Pierre Jeanneret included all four floor plans, ground, first, second and roof, of the Villa Stein-de Monzie at Garches (Figure 4). The plans were specifically redrawn for this publication in September of 1928.[7]

The villa is constructed in a manner anticipated by the Maison Dom-Ino sketch of 1914, a grid of reinforced concrete columns supporting concrete floor slabs with stairs connecting different floors. The villa follows an ABABA column grid in the east-west direction. On the first-floor plan, the main floor of the villa, two columns are missing from the plan, while all others on all plans are shown exactly where they belong, at the intersection of the north-south and east-west grids. These columns are the ones in front of the figural wall separating living and dining areas (Figure 5).

In all subsequent editions of the *Œuvre Complète* the same plan with the two eliminated columns is shown. Of course, at first glance, one imagines that the columns were not built, and transfer beams transferred the loads to the neighbouring columns in the figural wall. However, in the same 1929 first edition, there is a photograph of the area showing exactly the two columns in front of the figural dining room wall (Figure 6). The columns are also shown on the floor plan studies drawn in Le Corbusier's studio at 35 rue de Sèvres. The mystery is why did Le Corbusier decide to eliminate the two columns from the drawing in the book, while he knew full well, they needed to be there and were constructed as such. This mystery prompted the investigation of the parallels between Le Corbusier's stated doctrines and their practice in built form.

1927, the year Villa Stein-de Monzie was completed is also the year attributed to the 'Theory of the Roof Garden,' and the codification of the 'Five Points' published in Roth's book. It appears logical to imagine that while Le



7. Tim Benton, *The Villas of Le Corbusier 1920-1930* (New Haven and London: Yale University Press, 1987), 176.

Figure 4. Le Corbusier and Pierre Jeanneret: Floor plans of the Villa Stein-de Monzie at Garches, as they appeared on pages 142 and 143 of the *Œuvre Complète de 1910-1929*.

Corbusier was working on the villa, he was also testing and refining some if not all of the five points. It may be useful to include the translation of the explanatory text that Le Corbusier and Jeanneret used to head the section on Villa Stein-de Monzie in the *Œuvre Complète*.

This house represents an important milestone in which the problems of comfort, luxury and architectural aesthetics are combined. The house is entirely supported by columns disposed along a grid of 5m by 2.5m without regard for the interior plan. If these columns were to be assembled together in a tight bundle, the total cross-section of this bundle would be 110 x 80 cm. Thus, this large house is entire supported by a concrete cross-section 110 x 80 cm. The independent disposition of the columns diffuses a constant scale, a rhythm, a restful cadence through-out the house. The façades are considered as carriers of light. Not one of them touches the ground. On the contrary, they are suspended from the cantilevered floors. Therefore, the façade carries neither floors nor the roof; it is nothing more than a veil of glass or masonry enclosing the house.

On the interior, the plan is free, each floor having a disposition totally independent from that of another, rigorously proportioned to its particular function: the partitions are nothing more than membranes. The impression of richness is not conveyed by luxurious materials, but simply by the interior disposition and propor-

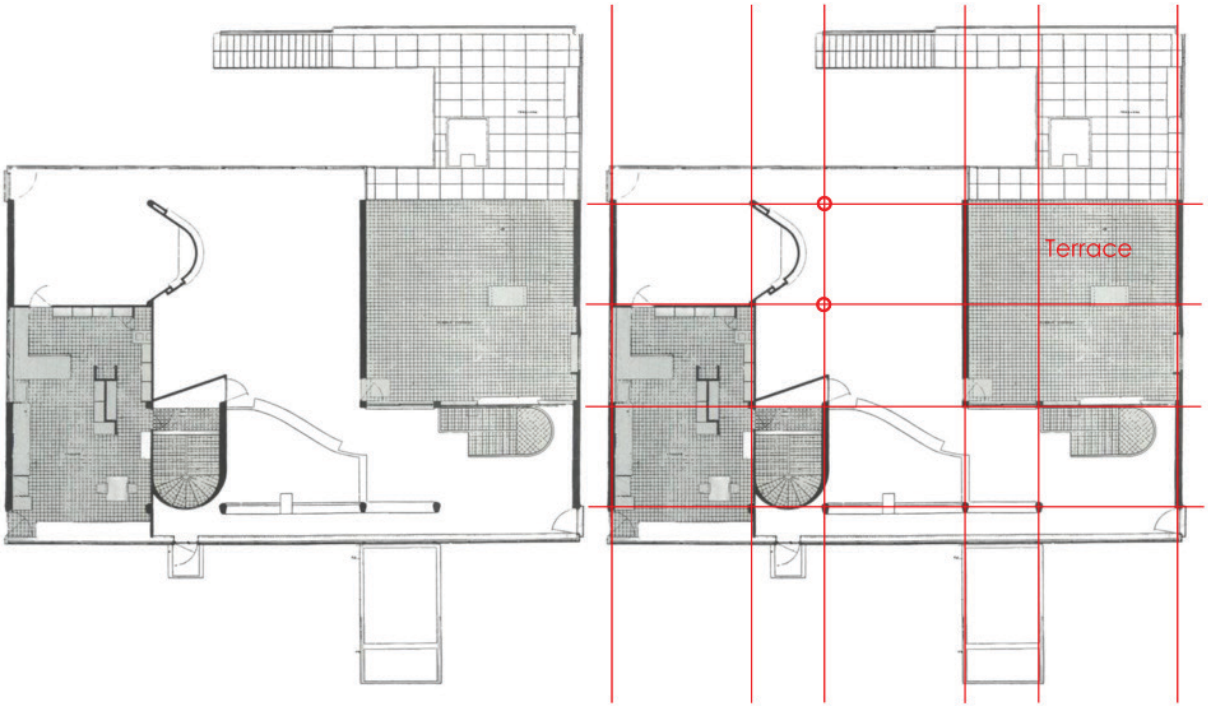


Figure 5. Le Corbusier and Pierre Jeanneret. L: First floor plan of the Villa Stein-de Monzie at Garches, as it appeared on page 142 of the *Œuvre Complète de 1910-1929*. R: Same plan with column grid and two missing columns highlighted by author.

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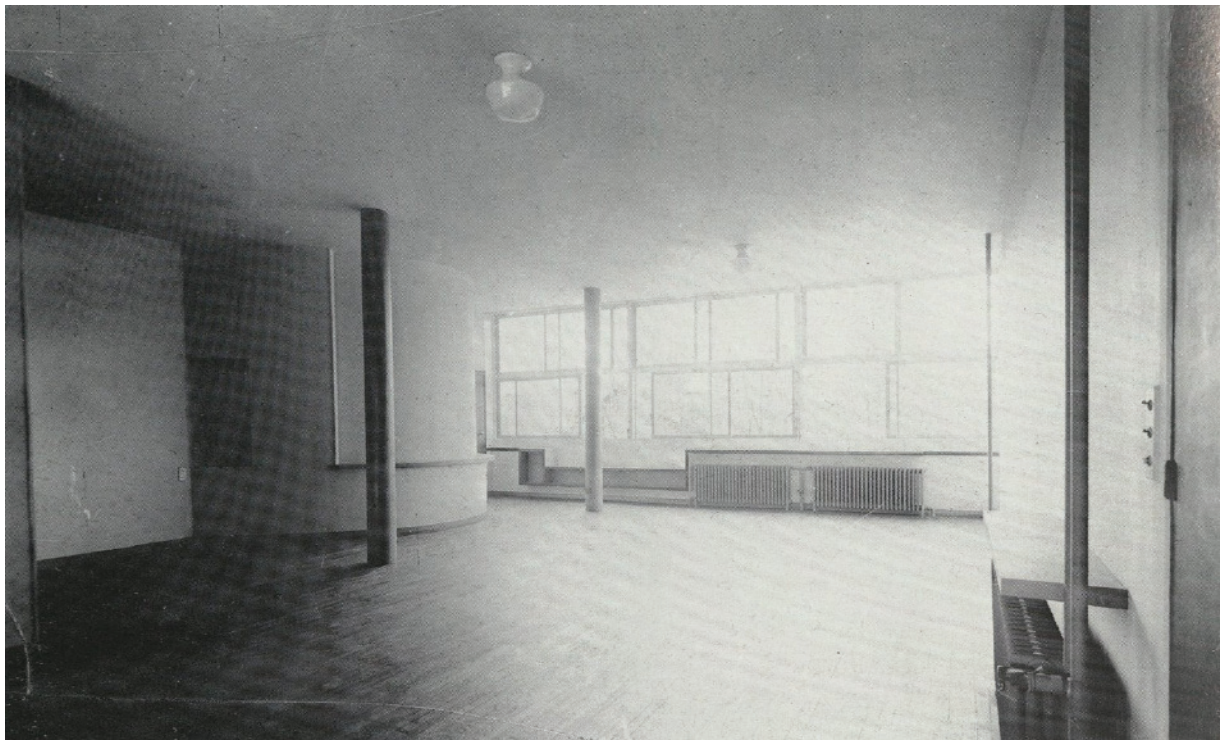
tioning. This entire house adheres to strict regulating principles that led to adjustments, down to the centimetre, in the dimensions of the different sections. Mathematics provides reassuring truths here: one leaves the project with the certainty of having arrived at the exact result.[8]

Le Corbusier and Pierre Jeanneret start the explanatory note with addressing problems of comfort, luxury and aesthetics, responding to two of the three principles of the Vitruvian triad, commodity and delight. They immediately move to the third principle, firmness, expressing the structural grid, its efficiency and its independence from all else. The columns (les pilotis) are there, but they do not lift the building from the ground, from the 'great sickness of our present-day cities,'[9] and to permit the garden to continue below the volume of the house, as the 'Five Points' suggest. Nor do they yet have a clear and consistent expression. Some assimilate into walls, invisible, others become figurative, shaped beyond their round section, others remain round, yet act as figures in spaces, and others become dividers in a glazed surface. Le Corbusier and Jeanneret then move to the façade, declaring it free from bearing any building load and expressing it as a veil (the free façade,) unencumbered by structure. Next comes the free plan, with partitions being described as nothing more than membranes. And finally they end with the exactitude and precision of a



8. Le Corbusier and Pierre Jeanneret, *Œuvre Complète de 1910-1929* (Zurich, Switzerland: Les Editions d'Architecture, 1929), 140-144.

9. Charles-Éduard Jeanneret (Le Corbusier), *Œuvre Complète, Le Corbusier 1910-1965* (Zurich, Switzerland: Les Editions d'Architecture Zurich, 1967), 44.

Figure 6. Photograph showing the view from the living room toward the dining room on the first floor of the Villa Stein-de Monzie at Garches, as it appeared on page 149 of the *Œuvre Complète de 1910-1929*. Photographer not known. The two columns which were eliminated from the plan are documented here as built.

scientific laboratory, mathematics as truth. Importantly, the roof terraces, though abundant, and connecting the garden to the highest roof terrace in a stepped fashion, are not mentioned in the introductory text. Nor are the long windows brought up, though present in the building. We note that the five points were exercised in the Villa Stein-de Monzie, but the pilotis do not yet take full expression on the interior. Nor do they elevate the volume of the building above the ground, allowing the garden to pass through, as suggested in 'The Five Points of a New Architecture.' 'Promenade architecturale,' however, reaches new heights here, as human ambulation and circulation involves a much more complex spatial/visual sequence than villa Besnus. Double-height spaces introduce vertical glimpses, as do encounters with multilayered exterior spaces and volumes. We note that Villa Stein-de Monzie at Garches presents an advanced exploration of the aesthetic and constructional consequences of the reinforced concrete frame.

As noted above, the structural columns in Villa Stein-de Monzie follow the model posed by the 1914 Dom-Ino diagram, reinforced concrete columns on a grid supporting reinforced concrete slabs. The 'Five Points' do not outline a particular role for the columns beyond structure, however, if the columns were to permit the organisation of a free plan, their structural role must be identified from the role of partitions. There are 22 columns on a 4x6 grid, with two columns falling in the terrace, and therefore unnecessary. Of these, only five are visible as individual structural elements, including the two not shown in the plan published in *Œuvre Complète*. The remainder are assimilated into the two exterior and many interior partition walls, hence blending structural and partitioning wall systems. If a partition is free to be placed as dictated by 'comfort, luxury, and architectural aesthetics,' then it cannot be dictated by the location of the structure. Although the 'Five Points' do not explicitly state the independence of the columns from other systems, they do implicitly, through their pairing with the free plan. Thus, Le Corbusier's solution to the two independent columns in front of the figural dining room wall, the decision to not draw them, suggests an incongruity between the systematicity of the structural grid and the aesthetic and formal ambitions of the architects.

The 'Five Points,' in their inception, in the *L'Architecture Vivante* version, 'The Theory of the Roof Garden' provide a congruity, an absolute alignment of technical matters with formal matters. In fact, the essay proposes that aesthetic possibilities are only afforded by technical solutions. The essay opens with a very detailed explanation of the drainage problems of sloped and tiled roofs in the cold northern climate. Le Corbusier argues that what worked when the heat source was in the chimney and the corresponding flue in the wall, no longer works with central heating that heats the entire volume of air in the house, including the part that is in contact with the roof. Thus, the roof garden solution is born out of a technical drainage/icing resolution. He continues and provides even more detail on the construction of the roof, again, based on a technical resolution: how to keep a roof humid, so that the concrete would retain humidity and not crack due to drying.

He then returns to reinforced concrete as the construction solution that supports pilotis, free façade, and the free plan. He writes:

Here we see the fundamental forms dictated by climate and materials, followed by the aspirations of an ideal confronted with constructive realities. Reinforced concrete, by giving us the flat roof, brings liberation from age-old constraints.[10]

We note how the technical necessities of architecture and their aesthetic possibilities go hand in hand, they are one. One brings about the other, at least, that is the argument. In the elimination of the two columns from the plan of the Villa Stein-de Monzie published in the *Œuvre Complète de 1910-1929* Le Corbusier confirms this mis-alignment. The technical necessities, the two structural columns, did not correspond with his aesthetic sensibilities, hence their elimination in plan. His idealised formal proposal, once faced with constructive realities, forced the elimination of the two columns from the drawing.

1927: Weissenhofsiedlung Houses 14 and 15, Stuttgart

On the pages immediately following the Villa Stein-de Monzie in the first edition of the *Œuvre Complète de 1910*-1929 appear the two residential buildings designed by Le Corbusier and Jeanneret for the Weissenhof housing exhibition, built for the Deutscher Werkbund in Stuttgart.[11] The introductory text opens with: 'Since the inauguration of the Weissenhof Colony, these houses have served as a pretext for the announcement of "the five points of a New Architecture".'[12] We know that Le Corbusier and Jeanneret wrote to Alfred Roth supplying him with the codified five points, which Roth later published in his book on the two houses. Thus, the connection between the Weissenhof houses and the 'Five Points' in definitive, at least as far as Le Corbusier was concerned. In addition, the houses were completed for the opening of the Weissenhof building exhibition on July 23, 1927, and the note to Roth was dated July 24, 1927, the day after the opening. If nothing else, the Weissenhof buildings and the codified five points were brewing at the same time. We can thus assume a distinct correlation between the buildings and the 'Five Points' in the most succinct manner.

Le Corbusier and Jeanneret designed two buildings for the housing estate, one was a single-family house, a development of maison Citrohan, a type originally proposed in 1920. The other was a double house, Houses 14 and 15, which were based on the organisation of a train sleeping car (Figure 7). Given that over the last century, the double house has become recognised as more of an icon of the 'Five Points,' we will examine it for this study. Weissenhof houses 14 and 15 appear as one from the outside, a long, elevated, stretched house. The only sign of the existence of the two houses on the outside is a dividing fin that breaks the linearity of the long window. On the interior, the two houses are completely independent, each with its own entrance and circulation stair. The double house is nine structural bays long, house 14 to the South is five bays and house 15 to the North is four bays. The main living spaces are on the first floor which is elevated above

10. *L'Architecture Vivante* 5, no. 18 (Autumn 1927), 18.

11. This order was reversed in the one-volume version of the *Œuvre Complète* published in 1967 by Verlag Für Architekture, Zurich.

12. Le Corbusier and Pierre Jeanneret, *Œuvre Complète de 1910-1929* (Zurich, Switzerland: Les Editions d'Architecture, 1929), 150.

the ground floor, itself almost a floor above the street due to the contours of the land. The recessed ground floor is for the utilities and the entire floor above the living quarters is the roof garden.

Houses 14 and 15 are made of a reinforced concrete frame with masonry infill. They literally embody the free plan, as the plan of the houses changes at least twice daily with movable partitions. Expansive living areas during the day transform into individual sleeping quarters at night by sliding partitions into place and rolling out beds from the built-in storage units. Free plan is here conceptually, but also literally. There are twenty columns in two rows of ten, not accounting for the four in the stairways. The east row, facing the street, is expressed as columns (pilotis) and figural. It elevates the main building volume above the ground, permitting the landscape to pass below the building. The west column row is embedded in the rear (west) perimeter wall. The north and south end-walls and the division wall between the two houses also assimilate the columns. Even with the embedded columns, their expression in the building form is undeniable. All of the interior partitions are simply that, non-structural partitions. Although their location is defined by the location of the structural grid, the partitions do not assimilate the columns, except in two minor bathroom walls. Here we see a much more precise handling of the legibility of the structure and the relationship between the structure and non-structural components of the house (Figure 8).

As mentioned, the entire second floor is occupied with the roof terrace, expressed on the main façade. This façade exemplifies the free façade and the long windows of the 'Five Points'. The structural columns are pushed back from the perimeter wall, making the building skin free from all structure. It is literally a veil. The long window encompasses the entire length of the two houses, stopping only short of the end

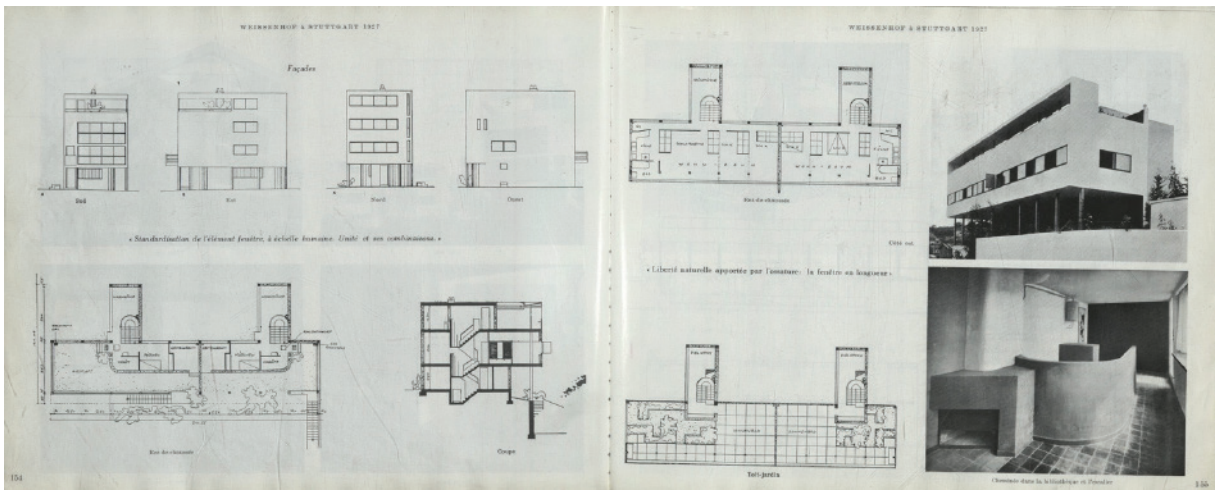


Figure 7. Le Corbusier and Pierre Jeanneret, Weissenhofsiedlung houses 14 and 15. Building plans, sections, and photographs as published in *Œuvre Complète de 1910-1929*, pages 154-155.

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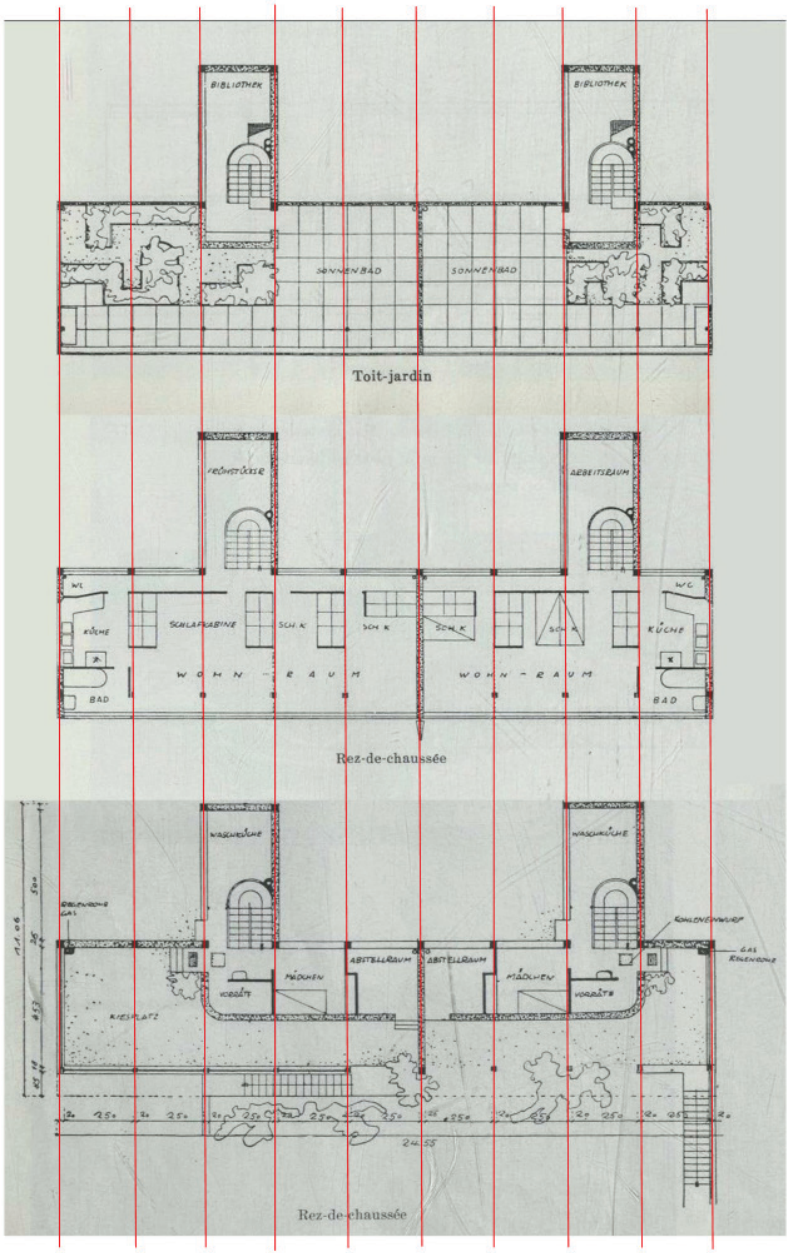
wall to accommodate its thickness. The west wall, on the contrary, houses the columns and expresses them in the masonry breaks between the windows. Houses 14 and 15 indeed embody the 'Five Points'. Even where they break with it, such as the west façade containing the columns, they do so with full legibility of what is structural and what not. Here we see a complete alignment of the technical necessities of architecture and their aesthetic possibilities. The reinforced concrete frame not only structures the building with its regular geometry, but it also provides it aesthetic expression in the way that the 'Five Points' predicted.

1929: Villa Savoye at Poissy

Villa Savoye has come to be considered as the example in which the 'Five Points' are best displayed. Its visible and iconic roof garden, the pilotis surrounding the building and lifting the main volume above the ground with the landscape passing underneath, the long windows declaring the free façade, only leaves the free plan to be determined from the interior. The building shouts the 'Five Points' from its exterior formal organisation. It has served as the icon for the 'Five Points'. In the first edition of the *Œuvre Complète de 1910-1929*, this villa appears toward the end of the book, as its date places it at the end of the period covered in the first volume. It occupies a brief 4-page spread. At the time of the publication of the first volume of the *Œuvre Complète*, the villa was still being debated with the client and had not been finalised. As such, the plans that appear in this volume were not the final plans (Figure 9). They are similar, but not the same as the as-built plans. In the later editions of the *Œuvre*

Figure 8. Le Corbusier and Pierre Jeanneret, Weissenhof houses 14 and 15. Floor plans as published in *Œuvre Complète de 1910-1929*, pages 154-155.



Complète, the final plans were published. In the introduction to this villa, Le Corbusier and Jeanneret do not mention the 'Five Points,' its principles, the construction of the villa, nor its reinforced concrete frame. They discuss the site being at the crown of a hill, beautiful views, and the 'promenade architecturale' from the ground through the ramp to the roof.

The structural concrete columns, the pilotis, encircle almost the entire perimeter of the building on the ground floor. On the north and south sides, the columns are inset from the main volume of the house, and on the east and west they are in-line with it, almost exactly as described in the Dom-Ino diagram of 1914. The shape of the floor plans is a square, slightly stretched to accommodate the north and south overhangs. The building declaratively pronounces four equal bays on each of its four sides, marked by the columns: a square plan with a square structural grid, the perfect geometric matrix. Tim Benton, in his *The Villas of Le Corbusier and Pierre Jeanneret 1920-1930,* has documented multiple building arrangement studies leading to the final configuration.[13] The original plans from October 1928 and the final plans hold much similarity. In between, from November and December 1928, there were four other formal studies. In all of them, the regularity and precision of the structural grid is maintained. In the final iteration, two matters of circulation come to the fore, one for the car, the other for people, both of which diminish the relationship between the regular geometry of the structural grid and the building form. The two matters of circulation were the 'promenade architecturale' via the ramp, and the enclosed car circulation/parking within the volume of the house. These two circulatory items introduced anomalies in the regularity of the square structural grid in the square plan. A smaller bay was introduced in the interior of the house for the ramp, and the columns in the parking area were removed (Figure 10).

As noted in the previous sections, Le Corbusier and Jeanneret had developed a struc-

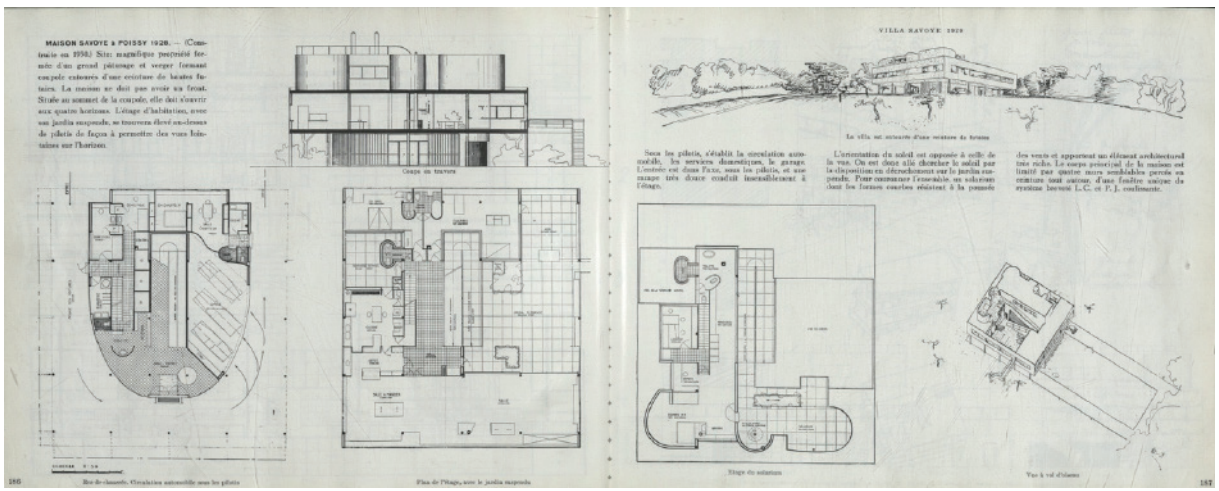


Figure 9. Le Corbusier and Pierre Jeanneret, Villa Savoye at Poissy. Floor plans as published in *Œuvre Complète de 1910-1929*, pages 186-187.

13. Tim Benton, *The Villas of Le Corbusier and Pierre Jeanneret 1920-1930* (Basel, Boston, Berlin: Birkhäuser, 2007), 190.

tural grid for the Stein-de Monzie house that had unequal bays, ABABA. A similar approach could have been taken in the north-south direction to address the ramp. The car parking would have needed a more complex solution. Nonetheless, the architects decided to privilege the appearance of order and geometric precision on the four façades and address the structural issues locally. Thus, an interior north-south bay was introduced to accommodate the ramp, yet maintain the square grid at the north and south faces. To accommodate the interior car parking, Le Corbusier and Jeanneret showed one column removed in the published plans, exactly where a car would need to park (Figure 10). In the later iteration of the plan which was used for construction, the column is shown relocated off-grid to accommodate the pattern of the car parking (Figure 11). In the published version of the plan, we note the ramp splitting the centre column line into two, in essence creating three smaller structural bays in the interior of the villa. In the same plans, the architects removed, at least in drawing, a column from the car-park. Unlike the published plans of 1929, in the revised, as-built plans, the structural grid is manipulated much more aggressively, adding many new column lines, and making small local adjustments off-grid (Figure 12). Given all these adjustments, the perimeter columns always maintain a distinct figural role, exactly on the square grid, lifting the volume of the house and allowing the landscape to pass underneath. On the interior of the villa, not unlike Villa Stein-de Monzie, the columns take on many roles. Some assimilate into walls, invisible, while others remain free-standing, figural elements in the plan.

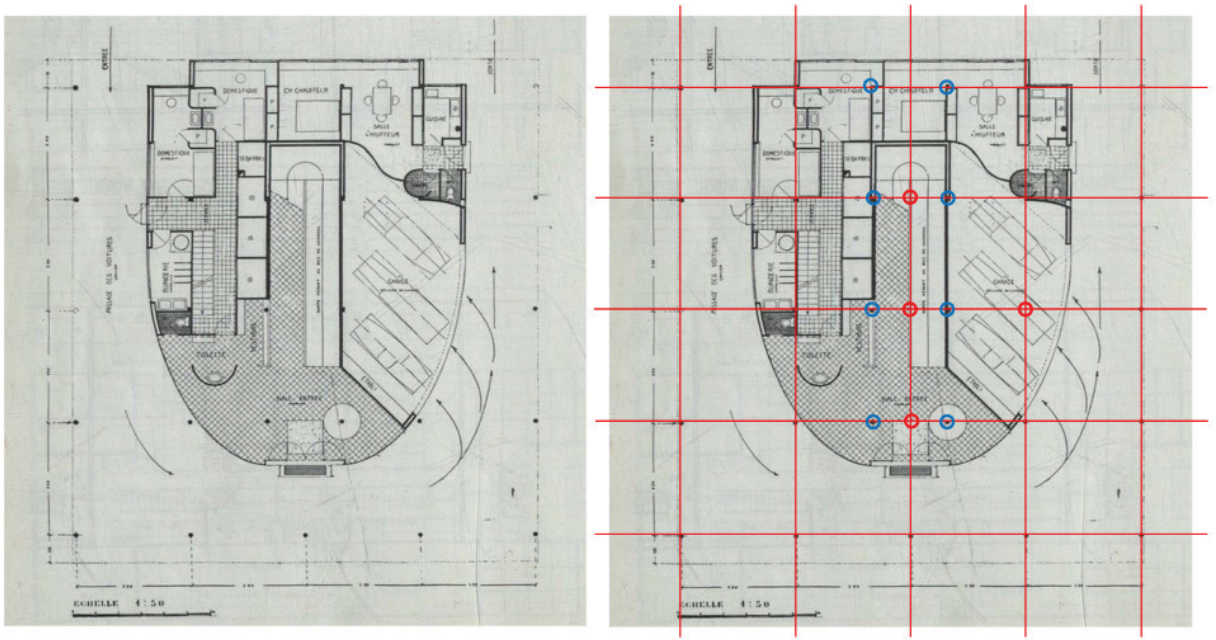


Figure 10. Le Corbusier and Pierre Jeanneret, Villa Savoye at Poissy. L: Ground floor plan as published in *Œuvre Complète de 1910-1929*, page 186. R: Same plan with highlights by author: red circles note on-grid columns that were removed. Blue circles note off-grid columns that were added.

In Villa Savoye, Le Corbusier and Jeanneret heavily favoured the idealised, almost fetishised, form of the house over its structure. Clearly, the building was built and has been standing for nearly a century. This analysis is not to say that its structure did not work, of course it did. The analysis only suggests that despite its iconic relationship with the 'Five Points,' Villa Savoye does not present a coherent alignment of Le Corbusier's aesthetic and formal ambitions with his structural and constructive promises. In a sense, the theoretical framework that tied the building form to structural and constructive practices is weakened in this villa. Le Corbusier saw the absolute geometry inherent in buildings' technical systems, such as its structure, as the imprint of universal laws of nature. In distinction, the building's forms and spaces, its profiles and contours abided by a different order, that of affecting our senses acutely. In his 1923 *Towards a New Architecture*, Le Corbusier spoke of the roles of the engineer and the architect. To this end, he wrote: 'Profile and contour are the touchstone of the Architect. Here he reveals himself as artist or mere engineer.…Profile and contour are a pure creation of the mind; they call for the plastic artist.'[14]

'The Architect, by his arrangement of forms, realises an order, which is a pure creation of his spirit; by forms and shapes he affects our senses to an acute degree and provokes plastic emotions; by the relationships which he creates he wakes profound echoes in us, he gives us the measure of an order which we feel to be in accordance with that of our world, he determines the various movements of our heart and of our understanding; it is then that we experience the sense of beauty.'[15]

Conclusion

The four Le Corbusier/Pierre Jeanneret 1920s

14. Jeanneret, Charles-Éduard (Le Corbusier). *Towards a New Architecture*. Translated by Frederick Etchells (New York, Toronto, London, Sydney: Holt, Reinhart and Winston, 1946), 186.

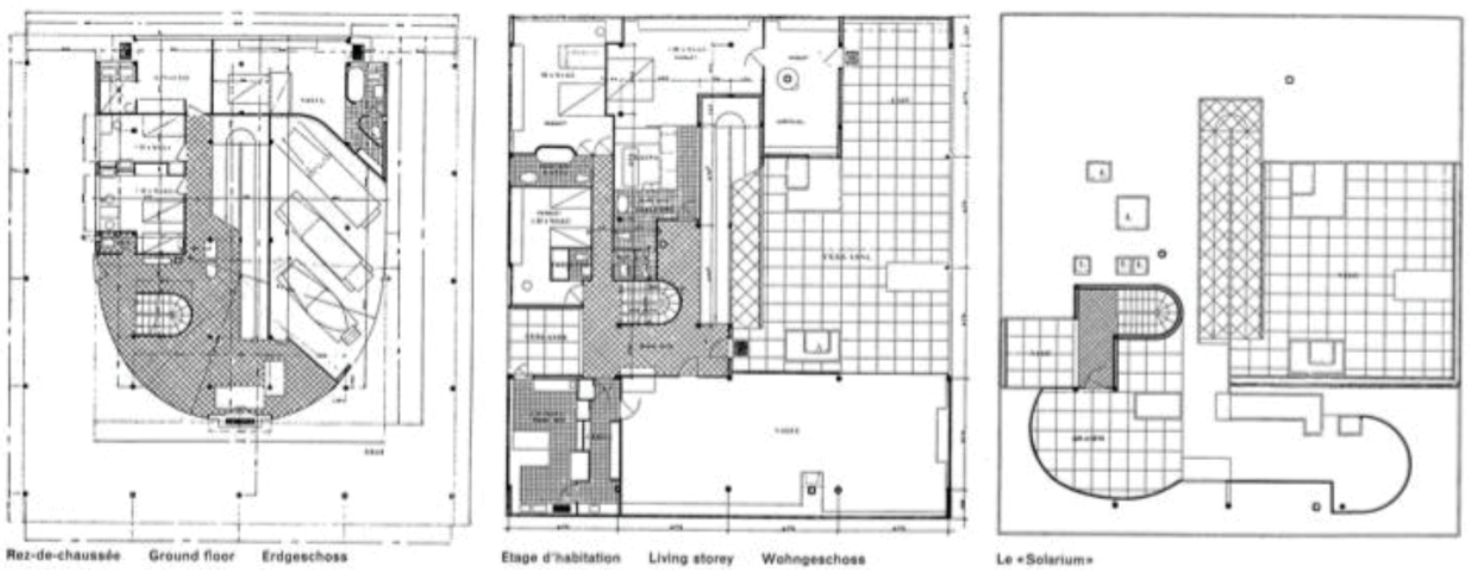
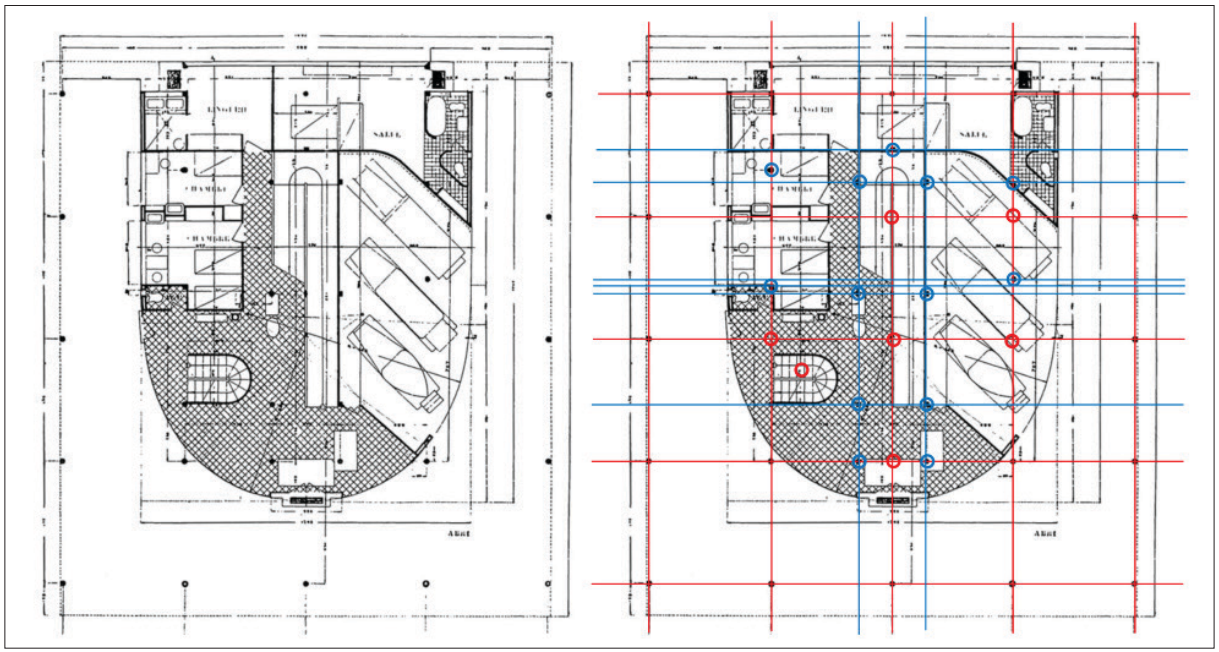


Figure 11. Le Corbusier, Villa Savoye at Poissy. Floor plans as published in the single volume *Œuvre Complète* 1910-1965, page 59.

villas analysed above confirm that the 'Five Points' were in development during this period. Despite their attribution to many sources from the early 1920s to 1929, in fact, they developed gradually over time, and over many constructive trials. Although all four villas were built using reinforced concrete, they do not take advantage of the aesthetic possibilities outlined in the 'Five Points' to the same degree. In the 1922 Villa Besnus, only the free plan was implemented. The reinforced concrete structure was embedded in the perimeter walls, undermining the independence of the frame from the walls and thus making legibility of the pilotis unlikely and the free façade impossible. There was also no roof garden, as the 'Theory of the Roof Garden' did not appear till 1927. The 1927 Villa Stein-de Monzie, which was being designed in Le Corbusier's studio at 35 rue de Sèvres in 1926, incorporated multiple terraces and roof gardens, made the structure independent from the skin, thus added the free façade, and incorporated the long windows. For the first time, in the 1927 Houses 14 and 15 of the Weissenhofsiedlung all five points were incorporated and supported a singular theoretical, constructive, and formal proposal. In Houses 14 and 15, the building's structural system and 'profile and contour' are one and the same. They are congruent. The opening of the Weissenhof Estate and the houses coincided with the date on the note from Le Corbusier and Pierre Jeanneret to Alfred Roth that outlined the five points. It is thus clear that the 'Five Points' were in development throughout the 1920s, both theoretically and constructively. Their first formal appearance in writing as a codified set of points that outline the aesthetic and formal possibilities of



15. Jeanneret, Charles-Éduard (Le Corbusier). *Towards a New Architecture.* Translated by Frederick Etchells (New York, Toronto, London, Sydney: Holt, Reinhart and Winston, 1946), 7.

Figure 12. Le Corbusier, Villa Savoye at Poissy. L: Ground floor plan as published in the single volume *Œuvre Complète 1910-1965*, page 59. R: Same plan with highlights by author: red circles note on-grid columns that were removed. Blue circles note off-grid columns that were added, and blue lines the added column lines.

the reinforced concrete structural system is in this note to Roth, as documented by Werner Oechslin. Houses 14 and 15 serve as the built confirmation of the synthesised and codified 'Five Points'.

The Villa Savoye, though attributed to 1929 in the *Œuvre Complète de 1910-1929*, was designed in the studio starting in 1928 and continued till the completion of its construction in 1931. This iconic villa accentuated formal priorities over a congruence of technical and formal attributes. This may be why it became a formal icon. At first glance and from the exterior viewpoint, it totally adhered to the 'Five Points'. However, a close reading proved a discord between the technical/structural concerns and the formal ones. This building moved away from the coherence of structural geometry with profile and contour, undermining the unified and cohesive proposal put forth by the 'Five Points'. The Villa Savoye is a breathtaking building. Its spaces and circulatory promenade leave one speechless. It truly affects our senses to an acute degree. We can agree that Le Corbusier achieved his formal and spatial ambitions in this building. This monumental achievement, however, is at the expense of the discord between the absolute geometry of its plan, its structure as visible on the perimeter and the re-structuring of its interior necessitated by the circulation promenades. We can assess that once the 'Five Points' were conclusively achieved in the Weissenhof Houses 14 and 15, both theoretically and constructively, Le Corbusier and Jeanneret prioritised other architectural matters, while still remaining wedded to the reinforced concrete construction system.

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