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Master's Thesis of Science in Architecture

Le Corbusier's post-1929 architectural design strategy tendency and characteristics through 'Les 4 Compositions' categorization

- Focused on Le Corbusier's post 'Les 4 Composition' (1929) architectural projects published in *Œuvres Complètes* Volume 1-8 -

'4구성' 분류 방식을 통해 본 르 꼬르뷔지에 1929년 이후 설계구성방식의 변화와 특성에 관한 연구

-*Œuvres Complètes* Le Corbusier 작품집 1-8권에 게재된 '4구성'(1929)후 설계 작품을 중심으로-

August 2016

Graduate School of Engineering
Seoul National University
Architecture Major
BILLY TAN CHOO KHEE

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Submitting a Master's thesis of Science in Architecture

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Abstract

Le Corbusier's post-1929 architectural design strategy tendency and characteristics through 'Les 4 Compositions' categorization

- Focused on Le Corbusier's post 'Les 4 Composition' (1929) architectural projects published in *Œuvres Complètes* Volume 1-8 –

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This study aims at the analysis of architectural design strategy applied in Le Corbusier's projects and how they change in time throughout his later 37 years of architectural career.

'Les 4 Compositions', which comprises of different methods in approaching the relationship between interior space and exterior form was first introduced by the Swiss-French architect Charles Édouard Jeanneret, or better known by his pseudonym, Le Corbusier in 1929 through the publication of *Œuvre Complète* Volume I, where 4 of his private dwelling projects, namely Villa La Roche (1923), Villa Stein (1927), Villa à Carthage (1928) and Villa Savoye (1929) were used in proposing 4 different compositions or design methodologies, with additional comments on the strengths and weaknesses of each respective

compositions proposed in the form of sketches and hand-written notes. Although remained less known compared to the other architectural theory proposed by the architect, such as Dom-Ino, Le Modulor, 5 Points of Modern Architecture and etc., 'Les 4 Compositions' remains a perfect example of the architect's attempt in approaching relationship between internal spaces and external form.

With the purpose of examining if Le Corbusier designed his subsequent projects with the application of 'Les 4 Compositions' after the year 1929, architectural projects published in the similar 8 volume work collections, *Œuvres Complétes* are analyzed and classified according to 'Les 4 Compositions' into 4 different categories.

Quantitative and qualitative analyses are then carried out in order to have a better understanding of Le Corbusier's tendency and pattern of selection for each composition with reference to project type, scale, temperate climate of context and proportion factors. Through these analyses, comprehension of the architect's preference as well as changes in application throughout his later stage of architecture career based on the perspective of 'Les 4 Compositions' and verification on whether other new design strategy besides 'Les 4 Compositions' was attempted was made possible. Measures taken by the architect in adapting each composition to specific conditions and limitations of each project are also a focus of the thesis.

Finally, with the findings of this study, it is hoped that the awareness towards the practicality of 'Les 4 Compositions' can be increased, as well as implementation the design strategy in contemporary architectural projects can be

encouraged.

Keyword: Le Corbusier, ‘Les 4 Compositions’, post-1929 design strategy, architectural, interior space, exterior form

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CHAPTER 1

Introduction and Background

1.1 Research Background

1.2 Research Objective

1.3 Subjects and scope of study

"Architecture is an act of conscious willpower.

To create architecture is to put in order.

Put what in order? Functions and objects."

- *Le Corbusier, Precisions*

1.1 Research Background

For Charles-Édouard Jenneret, or better known by his pseudonym of Le Corbusier, 1920 was a period of extraordinary creativity of this Swiss-French architect. In the first volume of *Œuvre Complète*, a page of manuscript simply titled as 'Les 4 Compositions' was included. Describe by Werner Seligmann[1] as "a somewhat mysterious page of diagrams", the architect left limited clues in his writings about 'Les 4 Compositions', whereby aside from the annotations and

[1] Werner Seligmann,, '*Le Corbusier: The Four Compositions*' in *Form, Modernism, and History* (Massachusetts: Harvard University Graduate School of Design, 1996)

similar brief comments that he made in his 1929 lecture in Buenos Aires and later published in *Précisions sur un état present de l'architecture et de l'urbanisme* (Precision on the present state of Architecture and City Planning), the architect gives no further explanation about these drawings.

'Les 4 Compositions' is Le Corbusier's 4 different methods in approaching the relationship between interior space and exterior form, introduced through the utilization of the architect's 4 private dwelling projects, namely Villa La Roche (1923), Villa Stein (1927), Villa à Carthage (1928) and Villa Savoye (1929).

1.2 Research Objectives

"We, Pierre Jeanneret and I, have built quite a lot of houses. Studying our own production, I manage to discern the general intention that determined the tendency of our work (...) up to now we have worked on four distinct types of plans, each expressing characteristic intellectual preoccupations." (Le Corbusier, Precision)[2]

During his 11th October 1929 lecture in Buenos Aires, titled 'The Plan of the Modern House', Le Corbusier described 'Les 4 Compositions' as a conclusion or result from the self-judgment of his works before 1929. This implies the significance of 'Les 4 Composition' as a milestone in the architect's career.

This is further verified by H.C. Kim through his 1995 article, which emphasized the importance of 'Les 4 Compositions' and how it differs

[2] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991), pg 134

fundamentally from the other theories proposed by Le Corbusier and it being the key towards understanding the architect's works.[3]

Hence the main purpose of this thesis is to understand the work of Le Corbusier through the perspective of 'Les 4 Compositions' theory, introduced by the architect himself. Whereby through the categorization and analysis of his works after the proposal of 'Les 4 Compositions' in 1929 (hereby known as post-1929 or post-Les 4 Compositions), it is hope to examine whether the theory remained as a vital design strategy or approach by the architect in his subsequent projects, or whether other new design strategies were attempted, as well as how the trend of application changes from 1929 to 1963.

Besides that, based on the 5 actions of *classification*, *dimensioning*, *circulation*, *compositions* and *proportioning*, which 'Les 4 Compositions' was based on[4], 4 factors of project type, scale, proportion and site temperate climate of each project are analysed in understanding the consideration and reasoning behind selection of the best-suited composition for each project. Modification of design strategy in adapting 'Les 4 Compositions' to limitations and constraints of each particular project was also analyzed through this thesis.

[3] 김현철, 르 꼬르뷔지에의 '4구성'에 담긴 창조적 진술구조 연구 (대한건축학회, 2000)
[4] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991), pg 134

1.3 Subjects and scope of study

From 1887 to 1965, during his 78 years of lifetime, Le Corbusier has produced countless architectural designs, artworks, furniture designs, books, articles and etc. Hence the selection of case study for this thesis is based on the architectural works published in Le Corbusier's *Œuvres Complétes*[5], the similar work collections series in which 'Les 4 Compositions' was officially introduced in 1929. Published between 1929 and 1970 and reprinted in numerous editions since, the 8 volume publication is a comprehensive record of architecture and planning projects, sketches, drawings, texts, manifestos and other works of Le Corbusier.

As the main objective of this thesis is to examine the architectural design strategy tendency and characteristics of Le Corbusier based on 'Les 4 Compositions', a total of 104 architectural projects designed after the proposal of 'Les 4 Compositions' (during and after 1929) are selected as case studies for the thesis.

	PROJECT	YEAR	LOCATION	AREA (m^2)
1	Villa La Roche	1923	Paris, France	660.39
2	Villa Stein	1927	Garches, France	746.31
3	Villa à Carthage	1928	Carthage, Tunisia	889.72
4	Maison Canneel	1929	Brussels, Belgium	611.68
5	Maisons Loucheur	1929	-	143.41
6	Villa à Carthage II	1929	Carthage, Tunisia	474.78
7	Villa Savoye	1929	Poissy, France	465.92

[5] Le Corbusier, *Œuvres completes Vol 1 – 8* (Zurich: Les editions d'architecture, 1929)

	PROJECT	YEAR	LOCATION	AREA (m²)
8	Appartement de M. Charles de Beistegui	1930	Paris, France	239.34
9	Immeuble Clarté	1930	Geneva, Switzerland	6283.07
10	Maison de M. Errazuriz	1930	Chile	242.27
11	Pavillon Suisse	1930	Paris, France	1734.60
12	Villa de Madame H. de Mandrot	1930	Le Pradet, France	160.19
13	Musée d'Art Contemporain	1931	Paris, France	1427.61
14	Palais des Soviets	1931	Moscow, Russia	62710.97
15	Cité de Refuge	1932	Paris, France	7331.13
16	Immeuble locatif Rue Fabert	1932	Paris, France	6706.68
17	Immeuble locatif Zurich	1932	Zurich, Switzerland	12550.04
18	Immeuble pour ouvrier	1932	Zurich, Switzerland	27340.20
19	Immeuble locatif Porte Molitor	1933	Paris, France	3285.90
20	Immeuble Rentenanstalt	1933	Zurich, Switzerland	19566.45
21	Lotissement Barcelone	1933	Barcelona, Spain	115.92
22	Lotissement Durand I	1933	Algiers, Algeria	125229.17
23	Lotissement Durand II	1933	Algiers, Algeria	211.28
24	Lotissement Durand III	1933	Algiers, Algeria	171.48
25	Maison locatif Alger	1933	Algiers, Algeria	3478.35
26	Petit Maison à Alger	1933	Algiers, Algeria	205.88
27	Reorganisation Agraire	1934	-	121.63
28	Maison aux Mathes	1935	Les Mathes, France	213.76
29	Maison de week-end	1935	La Celle-St-Cloud, France	88.34
30	Musée de la ville et de l'etat	1935	Paris, France	7984.25
31	Boutique Bat'a	1936	-	1372.32
32	Ministère de l'Education Nationale et de la Santé	1936	Rio de Janeiro, Brazil	18608.24
33	Un centre d'esthétique contemporaine	1936	Paris, France	3214.23
34	Gratte-ciel Cartésien	1937	Paris, France	87486.62
35	Maison de week-end Jaoul	1937	-	304.89
36	Pavillon Bat'a	1937	Paris. France	121.40
37	Pavillon des Temps Nouveaux	1937	Paris, France	4058.88
38	Quartier de la Marine	1938	Algiers, Algeria	181272.48

	PROJECT	YEAR	LOCATION	AREA (m²)
39	Maison Clarke Arundell	1939	-	841.68
40	Maisons montées à sec (M.A.S.)	1939	-	119.88
41	Musée à Croissance ilimitée	1939	-	2010.42
42	Pavillon Français, Exposition de l'Eau	1939	Liege, Belgium	18349.10
43	Station biologique	1939	Roscoff, France	5291.14
44	Ecole Volantes	1940	-	296.02
45	Maison 'Murondins'	1940	-	38.68
46	Maison pour contremaître	1940	S.P.A. Lannemezan, France	168.96
47	Maison pour ingéniuer	1940	S.P.A. Lannemezan, France	201.70
48	Résidence Peyrissac	1942	Cherchell, Algeria	437.75
49	Unité d'habitation transitoire (avec rue exéterieure)	1944	-	184.82
50	Unité d'habitation transitoire (avec rue intérieure)	1944	-	292.60
51	Manufacture de St-Dié	1946	Saint-Dié, France	7085.75
52	Palais des Nations Unies	1947	New York, USA	153742.09
53	Unité d'habitation Marseille	1947	Marseille, France	68337.36
54	6 maisons familiales	1948	La Sainte-Baume, France	1129.21
55	Cité Permanente (Type 1)	1948	La Sainte-Baume, France	315.74
56	Cité Permanente (Type 2)	1948	La Sainte-Baume, France	225.56
57	Hôtels Sainte-Baume	1948	La Sainte-Baume, France	506.37
58	Maison du Docteur Currutchet	1949	La Plata, Argentina	756.96
59	Roq et Rob à Cap Martin	1949	Cap Martin, France	200.42
60	Chapelle de Ronchamp	1950	Ronchamp, France	1883.10
61	Maison Fueter	1950	Constance Lake, Switzerland	133.06
62	Maison rurales	1950	Lagny, France	120.45
63	Projet Porte Maillot 50	1950	Paris, France	1018.26
64	Concours des Strasbourg	1951	Strassburg, France	32821.55
65	Maison des Péons	1951	Chandigarh, India	112.28
66	Palais de Justice, Chandigarh	1951	Chandigarh, India	14727.30
67	Palais de l'Assemblée, Chandigarh	1951	Chandigarh, India	41436.92
68	Palais du Gouverneur, Chandigarh	1951	Chandigarh, India	4052.48

	PROJECT	YEAR	LOCATION	AREA (m²)
69	Secrétariate, Chandigarh	1951	Chandigarh, India	57629.79
70	Villa Shodhan	1951	Ahmedabad, India	2106.69
71	Cabanon à Cap Martin	1952	Cap Martin, France	15.26
72	Maison des Mill-Owners	1952	Ahmedabad, India	2143.77
73	Maison pour Mr. Chimanbhai	1952	Ahmedabad, India	1807.36
74	Maison pour Mr. Huthseeing	1952	Ahmedabad, India	2570.48
75	Musée, Chandigarh	1952	Chandigarh, India	4891.53
76	Unité d'habitation Nantes-Rezé	1952	Rezé, France	53307.88
77	Centre Culturel : la Musée	1953	Ahmedabad, India	5641.99
78	Maisons Jaoul	1954	Neuilly-sur-seine, France	502.44
79	Palais des Filateurs	1954	Ahmedabad, India	3876.84
80	Maison pour Madame Sarabhai	1955	Ahmedabad, India	942.62
81	Unité d'habitation Berlin	1956	Berlin, Germany	80041.68
82	Convent Sainte-Marie de la Tourette	1957	Eveux-sur-l'Arbresle, France	8778.72
83	Maison du Brésil , Cité Internationale Universitaire	1957	Paris, France	4947.06
84	Musée National d'Art Occidental	1957	Tokyo, Japan	3172.49
85	Unité d'habitation Briey-en-Forêt	1957	Briey-en-Forêt, France	29316.60
86	Le centre de la ville	1958	Chandigarh, India	3745.44
87	Pavillon Philips (exposition internationaleBrussels)	1958	Brussels, Belgium	814.80
88	Bâtiments de l'écluse I	1960	Kembs-Niffer, France	90.64
89	Bâtiments de l'écluse II	1960	Kembs-Niffer, France	31.36
90	Eglise Saint Pierre	1960	Firminy, France	1875.00
91	La Tour d'Ombres	1960	Chandigarh, India	2016.00
92	Maison de la Culture	1960	Firminy, France	8595.48
93	Musée de la Connaissance	1960	Chandigarh, India	11188.50
94	Unité d'habitation Firminy	1960	Firminy, France	44311.91
95	Carpenter Centre for Visual Arts	1961	Cambridge, USA	6679.89
96	Hôtel et palais des congrés (Gare d'Orsay)	1961	Paris, France	94572.39
97	Palais Ahrenberg	1962	Stockholm, Sweden	1077.54
98	Centre d'art international Erlenbach	1963	Erlenbach, Germany	9843.92
99	Club Lac Sukhna	1963	Chandigarh, India	717.73

	PROJECT	YEAR	LOCATION	AREA (m^2)
100	Pavillon d'exposition ZHLC (Maison de l'Homme)	1963	Zurich, Switzerland	420.36
101	Ecole d'Art et d'Architecture	1964	Chandigarh, India	3025.90
102	La Chancellerie (Ambassade de France du Brasilia)	1964	Brasilia, Brazil	6706.24
103	L'Ambassadeur (Ambassade de France du Brasilia)	1964	Brasilia, Brazil	3850.08
104	Palais des congrés, Strasbourg	1964	Strassburg, France	9149.40

Table 1-1 List of Le Corbusier's post-1929 projects selected as case studies

CHAPTER 2

Comprehending ‘Les 4 Compositions’ (1929)

2.1 Analyzing importance of ‘Les 4 Compositions’ in Le Corbusier’s works

2.2 Interpreting existing research on ‘Les 4 Compositions’

2.3 Interpreting ‘Les 4 Compositions’ as a design strategy

2.4 Summary

This chapter is an understanding and literature review on ‘Les 4 Compositions’ as well as its interrelation with Le Corbusier’s actual design works. It started with an overview on the importance of ‘Les 4 Compositions’ in Le Corbusier’s architectural career and its influence on the architect’s work after its proposal in 1929. This strengthens the intention of this study and provides solid reasons to the pre-determined period of analysis (the year 1929-1965). The chapter then proceeds to detail analysis of ‘Les 4 Compositions’ as a design strategy for the 4 Corbusien house projects.

2.1 Analyzing importance of 'Les 4 Compositions' in Le Corbusier's works

Proposed through Le Corbusier's 2 publications, titled 'Precisions on the Present state of Architecture and City Planning' and '*Œuvre Compléte* Vol I', 'Les 4 Compositions' played an important role in the architect's lifelong career.

In the earliest years, Charles Eduouard Jeanneret (later known by the pseudonym 'Le Corbusier') was enrolled in Ecole d'Art, where he first studied architecture (initially watch making) under Charles L'Eplatteneir.[6] Influenced by his mentor's teaching, Le Corbusier was preoccupied with regionalism in his early architectural designs. According to H. Allen Brooks, the first realistic commission of Villa Fallet (1905) with architect René Chapallaz, shows his early influence of regionalism. *Sapin* or fir tree is recognizable in the silhouette (reduced into geometric shape of an equilateral triangle), window mullions that represent denuded

Figure 2-1 Le Corbusier's first actual commission of Villa Fallet (1905) demonstrates his early influence of regionalist style (Source: Fondation Le Corbusier)

[6] Fondation Le Corbusier, '*Biography*', http://www.fondationlecorbusier.fr

tree branches and iron railings of the balcony create a picture of trees silhouetted against cumulus clouds can be observed from the façade design of Villa Fallet as shown in [Figure 2-1].[7]

In 1910, Le Corbusier set off for Germany where he worked for Peter Behren's architectural practice in Berlin. He underwent a radical change in style, breaking off from the medieval art viewpoint and accepted contemporary ideas about chaste classicism. This change can be observed from his later design of Villa Jeanneret-Perret (1912).

Figure 2-2 Villa Jeanneret-Perret (1912) which exhibits Le Corbusier's break from the regionalism influence of 'pine tree style' (The Le Corbusier Archive)

In 1917, Jeanneret who was in his 30s moved to Paris, France, where he soon adopted the pseudonym 'Le Corbusier', marking a break from his regionalism influence. He ventured into the Purist paintings and produced his first painting in oil, *La Cheminée* (1918) [Figure 2-3]. Seligmann (1996) explained that Le Corbusier's Purist activity opened up his possibility in "using three-dimensional format and its enclosing surfaces to produce fascinating spatial experiences in architecture".

[7] H. Allen Brooks, *Le Corbusier's Formative Years* (Chicago: University of Chicago Press, 1999).

Seligmann (1996) in his article explores the influence of Le Corbusier's purist activity and 'Les 4 Compositions' which was proposed in 1929, further claimed that "…the introduction of *prism pur* was a decisive moment in the evolution of modern architectural space…" [8]

Figure 2-3 Le Corbusier's first Purist painting, *La Cheminée* which has lead him the idea of *prism pur*(Source: Fondation Le Corbusier)

H.C. Kim (2000) claimed that 'Les 4 Compositions' is significant in 2 ways. Firstly, 'Les 4 Compositions' played an important role in the expansion of Le Corbusier's genre of design, whereby after 1929 (the year 'Les 4 Compositions' was published), Le Corbusier's works proceeded from merely private housings into vast variations of building typologies. Secondly, 'Les 4 Compositions' is the key to understanding the works and Le Corbusier himself.[9]

Colquhoun (1982) as well, admitted to the importance of 'Les 4

[8] Werner Seligmann,, '*Le Corbusier: The Four Compositions*' in *Form, Modernism, and History* (Massachusetts: Harvard University Graduate School of Design, 1996). pg 80.
[9]김현철, 르 꼬르뷔지에의 '4구성'에 담긴 창조적 진술구조 연구 (대한건축학회, 2000)

Compositions', stating that "…in his houses of the 1920s, Le Corbusier may be said to have laid the foundations of his architectural aesthetic…" Le Corbusier's later venture into public buildings post-1929 showed a single predominant characteristic in his works, which is the logical articulation and elementarization. This is claimed to be departed from the paradigm of cube (*prism pur*) established in Le Corbusier's 'Les 4 Compositions'.[10]

Le Corbusier's design later shows a significant change in direction, specifically post-World War II period. Crystalline forms and precise detailing with the use of smoothly rendered surfaces, steel and glass curtain walls strikingly changed into the use of massive sculptural forms, tactile surfaces and the crude detailing combined with the material use of raw concrete, brick and wood in the architect's post-war works. According to Colquhoun (1982), though the main fac tor of this drastic change was mainly the shortage of steel in the post-war period in Europe, it was also a result of Le Corbusier's attitude change manifested in his works during the 1930s. This is particularly obvious in Le Corbusier's public building designs in Chandigarh and Ahmedabad, India, where he opted for local material options for the projects.

2.2 Interpreting existing research on 'Les 4 Compositions'

'Les 4 Compositions' is still less known compared to Le Corbusier's other theories such as *5 points d'une architecture nouvelle* (5 points of architecture),

[10] Alan Colquhoun, '*The Significance of Le Corbusier'* in The Le Corbusier Archive (Connecticut: Garland Publishing. Inc, 1982) pg *xxxv*

Dom-Ino, Modulor and etc. The lack of explanation and reference after its proposal by the author himself[11] limited the attention as well as research activities dedicated to this topic.

Seligmann (1996) explored the influence Le Corbusier's Purist activity on the architect's proposal of 'Les 4 Compositions'. He further concluded that the Purist movement-influenced *prism pur* introduction was a decisive moment in the evolution of modern architecture.[12]

Besides that, H.C. Kim (2000) conducted detailed analysis of the drawings and writings of 'Les 4 Compositions' manuscript, whereby the meaning, format and interrelation between the 4 compositions were studied. Kim claimed that the numbering 1, 2, 3 and 4 of each composition indicates a chronological progression relationship. In other words, problems and difficulties of each composition are resolved by the subsequent composition, which ended with Fourth Composition as the outcome of Le Corbusier's exploration.[13] This claim correlates with Seligmann (1996)'s thought that diagram 4 (4th Composition) is equal to diagrams 1+2+3 (1st, 2nd and 3rd Compositions).

Also, H.C. Kim (2015) in his study of design strategy for Musée National d'Art Occidental (National Museum of Western Art) in Tokyo through Le Corbusier's theory of 'Les 4 Compositions', *promenade architecturale,* Mundameum and Modulor, claimed that the project exhibits characteristics of a

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[11] 'Les 4 Compositions' was introduced through publication of manuscript in Œuvre Compléte Vol I and brief explanation during 'The Plan of the Modern House' lecture in Buenos Aires by Le Corbusier

[12] Werner Seligmann,, '*Le Corbusier: The Four Compositions*' in *Form, Modernism, and History* (Massachusetts: Harvard University Graduate School of Design, 1996).

[13]김현철, 르 꼬르뷔지에의 '4구성'에 담긴 창조적 진술구조 연구 (대한건축학회, 2000)

Fourth Composition variation. S.Y. Choi (2016) also utilized Le Corbusier's 'Les 4 Compositions' in studying Rem Koolhaas's design strategy for his thesis. He categorized works by Rem Koolhaas into the 4 different typologies to study Koolhaas's design methodology from Le Corbusier's perspective of 'Les 4 Compositions'.[14] Both of these mentioned research suggested evidence for application possibilities of 'Les 4 Compositions' into projects other than the initially proposed private housing.

2.3 Interpreting 'Les 4 Compositions' as a design strategy

Initially proposed during a lecture titled 'The Plan of the Modern House' in Buenos Aires on 11th October 1929, 'Les 4 Compositions' was described as 4 distinct types of plans, generalized through the architect's study of his previous house designs. Le Corbusier then provided a brief explanation on the plans based on actual private dwelling projects by him and his partner, Pierre Jenanneret.[15]

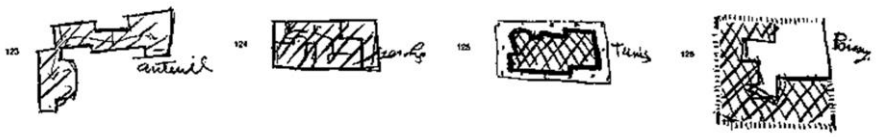


Figure 2-4 Le Corbusier's sketch of the 4 distinct type of plans during 'The Plan of Modern House' lecture (Source: Precision)

[14]최성열, Le Corbusier의 '4구성' 분류를 통해 본 Rem Koolhaas 설계구성방식의 특성에 관한 연구 (서울대학교, 2016)

[15] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991), pg 134.

This was followed by the architect's inclusion of a full page 'Les 4 Compositions' manuscript in work collection of Le Corbusier and Pierre Jeanneret titled *Œuvre Complète* Vol I in 1929, edited by W. Boesiger and O. Stonorov. The manuscript included diagrammatic representation of the same 4 private housing projects, each with handwritten notes and comments by the architect himself.

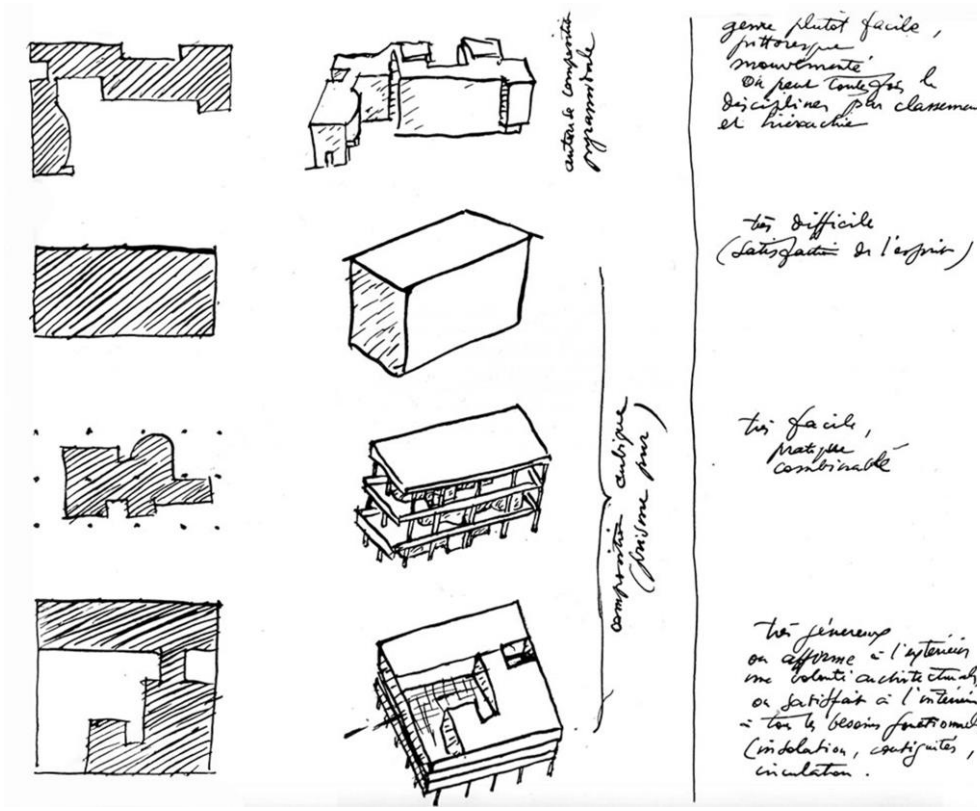


Figure 2-5 Le Corbusier's manuscript of 'Les 4 Compsitions published in *Œuvres Complètes* Vol 1 (Source: *Œuvres Complétes*)

2.3.1 First Composition and Villa La Roche (1923)

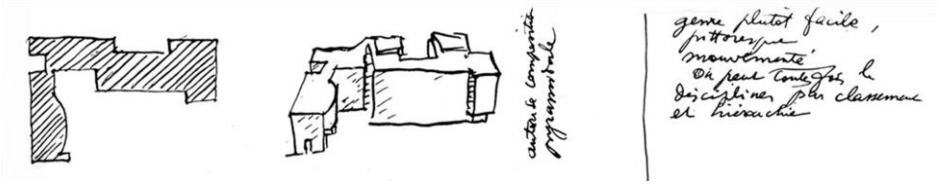


Figure 2-6 Diagrammatic sketch and handwritten comment of First Composition (Source: *Œuvres Complétes*)

First Composition was introduced based on the architect and Pierre Jeanneret's 1923 Villa La Roche project, located in Paris, France. Categorized as *autorise composition pyramidale* or authorize pyramidal composition, First Composition was described as an organic reasoning whereby "the inside takes its ease, and pushes out to form diverse projections"[16] by Le Corbusier. In other words, pyramidal composition of First Composition suggests the formation of building envelope from the growth of interior volumes. This was further interpreted by H.C. Kim (2000), which explained that First Composition refers to the strategy of developing of building exterior form through annexation of volumes based on *promenade architectural*[17], which can be seen represented by fine the arrow in [Figure 2-7] of LE Corbusier's sketch.

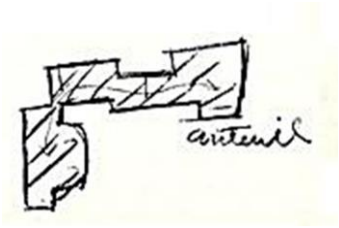


Figure 2-7 Sketch of Villa La Roche's plan showing pyramidal composition of First Composition

(Source: Precisions, 1991)

First Composition is commented as *genre plutôt facile* (a rather easy genre)

[16] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991), pg 134.
[17]김현철, 르 꼬르뷔지에의 '4구성'에 담긴 창조적 진술구조 연구 (대한건축학회, 2000)

by Le Corbusier himself due to its volume annexation strategy nature, which forms *picturesque* (picturesque) and *movement* (dynamic) interior spaces.

First Composition though may be deemed a comparatively easy design strategy, it should be applied with cautious as it might "become busy if one doesn't watch out", as warned by the architect himself. Hence the suggestion of '*On peut toutefois le discipliner par classement et hiérarchie*' (can be subdue by applying order and hierarchy) was written in the 'Les 4 Composition' manuscript, which refers to *traces regulateurs* or regulating lines introduced by Le Corbusier in his book, 'Towards a new Architecture'[18]. *Traces regulateurs* are the series diagonal lines of identical gradients, extracted from the facades' general mass, used to correct and regulate secondary elements such as doors, windows and etc.

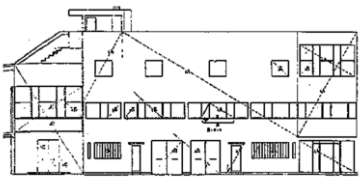


Figure 2-8 *Traces regulateurs* of 6 different gradients used in regulating the proportion of Villa La Roche's elevation (Source: Towards a New Architecture)

Figure 2-9 Pyramidal composition based on movement sequence in Villa La Roche (1923) (Source: *left* Fondation Le Corbusier website, *right* Author)

[18] Le Corbusier, *Towards a new Architecture* (New York: Dover Publications Inc, 1927) pg 75.

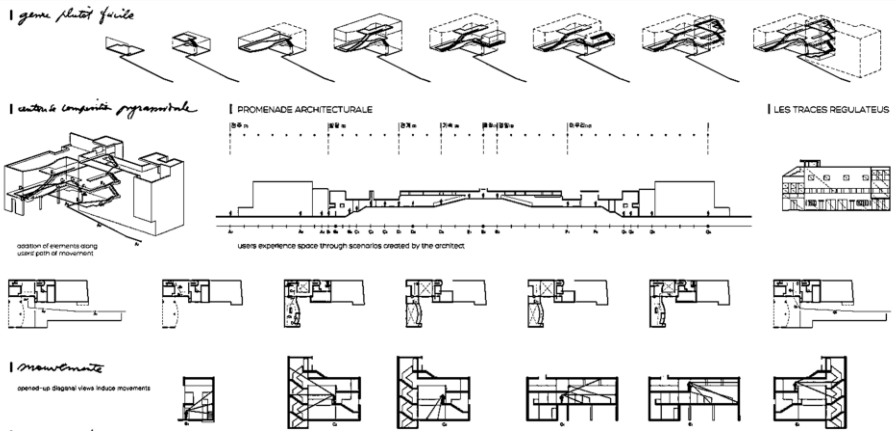


Figure 2-10 Analysis of First Composition as design strategy for Villa La Roche (1923) (Source: Author)

Study on the project of Villa La Roche (1923) revealed that along the architect's intended *promenade architecturale*, planes and surfaces are allocated, inducing visitors' sequence of movement along the organically grown interior volumes, which directly translated into the building's exterior form. The resulted diverse and lively interior space however, requires regulation of the 'busy' exterior with *traces regulateurs*.

2.3.2 Second Composition and Villa Stein (1927)

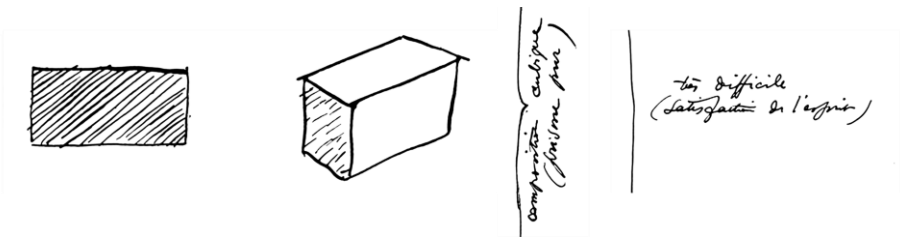


Figure 2-11 Diagrammatic sketch and handwritten comment of Second Composition (Source: *Œuvre Compléte*)

Fundamentally different from First Composition's pyramidal composition, the Second, Third and Fourth Composition were categorized as *composition cubique* (or cubic composition). Unlike the organic growth of pyramidal composition, cubic composition refers to the 'compression of organs within a rigid envelope, absolutely pure' by Le Corbusier.[19] As shown in the axonometric sketch of [Figure 2-11], the pure form acts as a self-imposed limitation, whereby interior spaces are organized within. The interior spaces that are deemed as 'organs', vital for the functionality of a building, are contained within the hollow-out proportionally ideal exterior pure form.

Despite having a predetermined proportionally ideal pure form, eliminating the possible lack of order as shown in First Composition, the pure form, on the other hand, restrained architectural and spatial need of the design. Hence, Second Composition was thought to be '*trés difficile'* (very difficult) by the architect himself.

Villa Stein (1927) which was designed based on the Second Composition, consist of a cubic pure exterior form which limits and regulates the design.

Figure 2-12 Self-imposed pure form limitation which acts as the proportionally ideal exterior form. (Source: Fondation Le Corbusier)

Promenade architecturale was bent to be contained and enfolded by the pure form, where space objects are placed within to induce the sequence of movement.

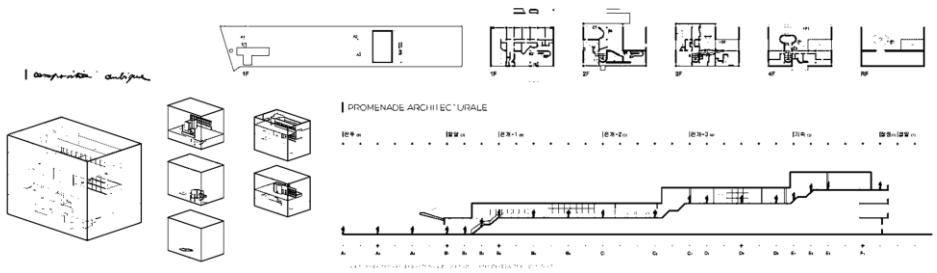


Figure 2-13 Analysis of Second Composition as design strategy for Villa Stein (1927) (Source: Author)

Although being considered as the most difficult strategy among 'Les 4 Compositions', the challenging limitation imposed by Second Composition itself brings '*statisfaction de l'esprit*' (spiritual satisfaction) if a good space design is achieved.

2.3.3 Third Composition and Villa à Carthage (1928)

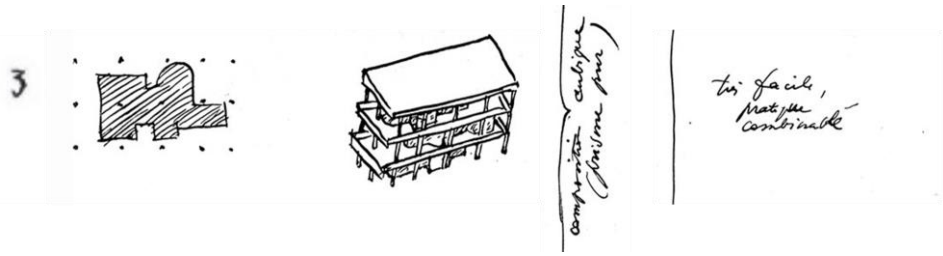


Figure 2-14 Diagrammatic sketch and handwritten comment of Third Composition (Source: *Œuvre Compléte*)

A similar cubic composition variation, Third Composition, on the other hand, has a simpler, clear and transparent self-imposed limitation. Axonometric sketch [Figure 2-14] of the composition shows the application of Dom-Ino structure

instead of load-bearing structure, which forms a porous and transparent pure form.

Besides forming the exterior envelope, use of Dom-Ino structure also "allows the creation of useful volumes of rooms different on each floor in form and quantity".[20] Hence, with floor plans independent from structural considerations, Third Composition is regarded as '*trés facile*' (very much easy) by Le Corbusier. Moreover, while being regulated by the proportionally ideal transparent pure form, the freedom of structure independent omits the difficult problem introduced by Second Composition, hence is the easiest strategy to handle among the 4 compositions.

The Villa Carthage (1927) project shows 5 levels of distinct floor plans made possible by Dom-Ino structure. The column gallery and longitudinal running surfaces slither visitors along, forming repetitive parallel running *promenade architecturale*. Third Composition was considered *practique* (practical) and *combinable* (combinable) by Le Corbusier himself, due to curtain wall envelope and free plan features which were the trends of contemporary architecture back then.

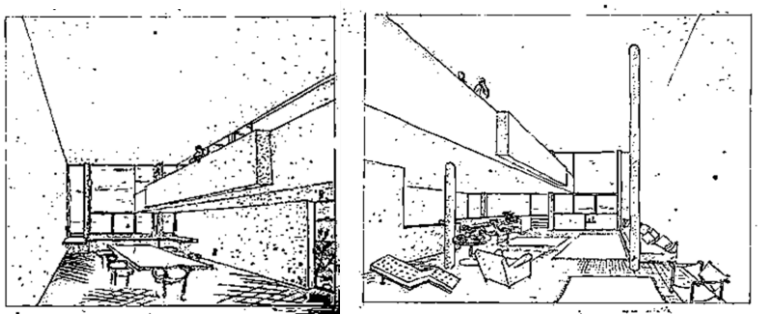


Figure 2-15 Slithering effect of column gallery and longitudinal running surfaces (Source: Fondation Le Corbusier)

[20] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 134.

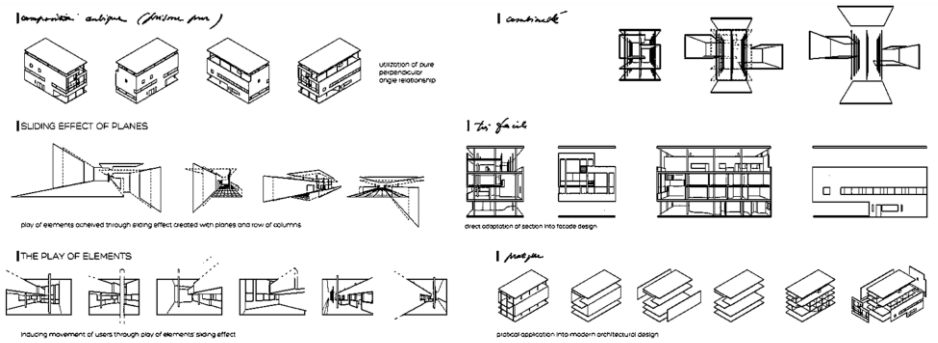


Figure 2-16 Analysis of Third Composition as design strategy for Villa à Carthage (1928) (Source: Author)

2.3.4 Fourth Composition and Villa Savoye (1929)

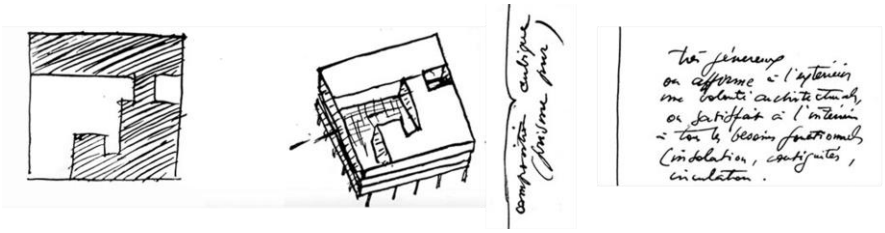


Figure 2-17 Diagrammatic sketch and handwritten comment of Fourth Composition (Source: *Œuvre Compléte*)

Likewise, the last variation of cubic composition, Fourth Composition is of pure form design strategy. Yet, characteristically different from cubic Second, Third Composition, as well as pyramidal First Composition, the Fourth Composition is a result of a combination between the previous 3 compositions. Reference to Le Corbusier's manuscript [Figure 2-17] shows that Fourth Composition on the outside, attains the pure form of Second Composition, which regulates overall order and hierarchy of the project; inside, the advantage of Third

Composition's transparent envelope and free plan, as well as First Composition's dynamic and picturesque interior spaces are acquired. [21] This hence resulted in a vertical combination of compositions in the order of Third Composition, Second Composition and First Composition from the bottom up. [Figure 2-18]

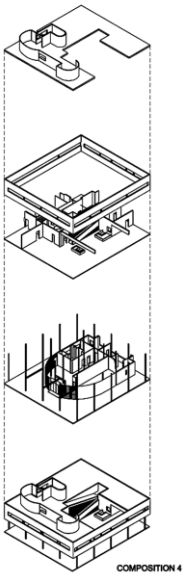


Figure 2-18 Vertical combination of Fourth Composition (Source: Author)

A design strategy which attains all the advantage of First, Second and Third Composition, the Fourth Composition is used in the design of Villa Savoye (1929). The exterior architectural will was affirmed through the pure form of Second Composition (*on affirme à l'éxterieur une volanté architecturale*); while First and Third Composition satisfied all the interior functional requirements such as light penetration, connectivity and circulation (*on satisfait à l'intérieur à tous les*

Figure 2-19 Free plan of Third Composition and dynamism of First Composition affirmed in Villa Savoye (1929) (Source: Author)

[21] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 134.

besoins fonctionnels). As a result, the project is pure, ample and full of possibilities, hence receiving '*trés généreux*' (very general) comment from the architect himself.

In fact, the Fourth Composition can be considered as the answer to 'Les 4 Composition', the solution to all problems and disadvantages of previous compositions according to Seligmann (1996) and H.C. Kim (2000). The numbering of 1, 2, 3 and 4 of each composition indicates a chronological progression relationship. In other words, problems and difficulties of each composition are resolved by the subsequent composition, which ended with Fourth Composition as the outcome of Le Corbusier's exploration. [22]

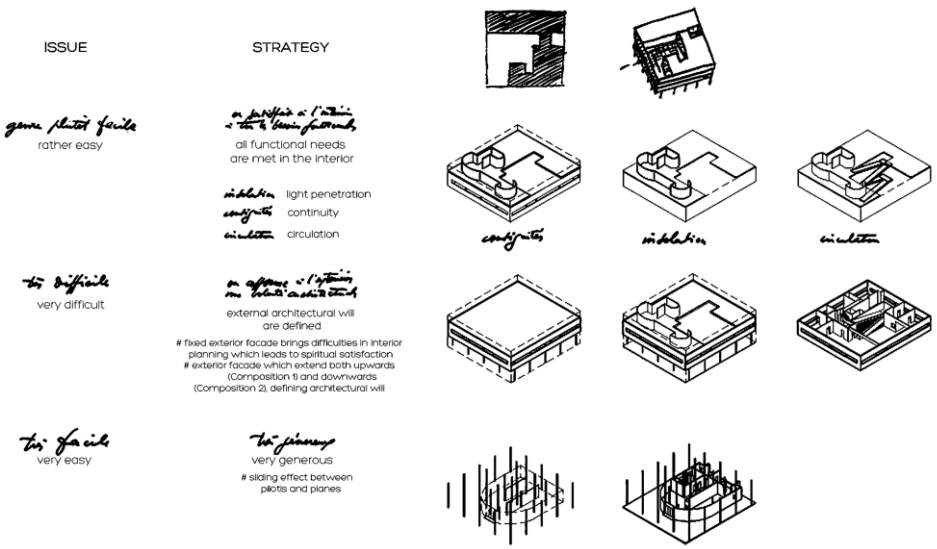


Figure 2-20 Analysis of Fourth Composition as design strategy for Villa Savoye (1929) (Source: Author)

[22]김현철, 르 꼬르뷔지에의 '4구성'에 담긴 창조적 진술구조 연구 (대한건축학회, 2000) pg 9

2.4 Summary

‘Les 4 Compositions’, being an important milestone in Le Corbusier’s architecture career, was a crucial influencing factor to the architect’s design post-1929. Preoccupied initially by symbolical regional style based on natural forms, Le Corbusier’s activity in Purist movement set the foundation to the architect’s *prism pur* idea, in which researchers claimed ‘a decisive moment in the evolution of modern architectural space’.

The 1920s was the era of extraordinary creativity or Le Corbusier, where his genre of design expanded from Corbusien houses into mass housings, urbanism planning, public buildings and etc. Analysis into existing research suggested that most of these projects, both private and non-private housing projects post-1929 exhibits common traits of logical articulation and elementarization, as well as function-form relationship characteristics departed from *prism pur* established in Le Corbusier’s ‘Les 4 Compositions’, proposed in 1929.

Detailed study and analysis was then carried out into Le Corbusier’s ‘The Plan of the Modern House’ titled Buenos Aires lecture and the manuscript of ‘Les 4 Compositions’ published in *Œuvre Compléte* Vol I as design strategy, with reference to Villa La Roche (1923), Villa Stein (1927), Villa Carthage (1928) and Villa Savoye (1929). Characteristics and strategies proposed by Le Corbusier for each composition were concluded and shown in [Table 2-1].

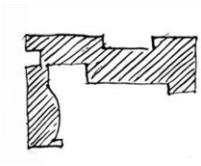
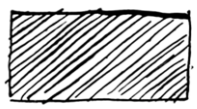
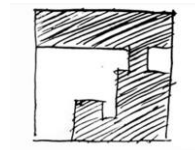
Composition	Exemplar	Characteristics		*promenade architecturale*
		Exterior	**Interior**	
	Villa La Roche (1923)	Organically grown exterior form based on interior space, use of *tracile regulatuer* for order and proportion of form		Form determining liberal and free *promenade architecturale*
	Villa Stein (1927)	Pure form	Placement of spatial elements within the predetermined limitation	*promonade architecturale* within rigid proportionally ideal form
	Villa Carthage (1928)	Permeable exterior form	Free plan through Dom-Ino structure	Sliding effect on the basis of free plan
	Villa Savoye (1929)	Regulated periphery by Second Composition	Interior characteristic of First and Third Compositions	Characteristics of all 3 other compositions

Table 2-1 Characteristics and design strategies of each composition proposed by Le Corbusier through 'Les 4 Compositions'

CHAPTER 3

Categorizing Le Corbusier's works 'post-Les 4 Compositions' (1929-1965)

3.1 Deriving categorization criteria of 'Les 4 Compositions'

3.2 Categorizing Le Corbusier's works with 'Les 4 Compositions'

3.3 Qualitative analysis of variations for each compositions

3.4 Analysis of works not categorizable with 'Les 4 Compositions'

3.5 Summary

This chapter attempted to categorize Le Corbusier's architectural works from the year 1929 to 1965 with 'Les 4 Compositions' as the standard for classification. Each study project was analyzed and categorized based on the derived criteria of each composition into 4 different groups. The result was then tested and investigates for its corresponding characteristics and variations that were developed post-1929.

3.1 Deriving categorization criteria of 'Les 4 Compositions'

Based on the study of 'Les 4 Composition' conducted in Chapter 2, a categorization standard was derived for each composition. Le Corbusier explained

that ‘Les 4 Compositions’ is the study result of his previous private dwelling designs, with the method of classification, dimensioning, circulation, composition and proportioning.[23] With comparison to what Le Corbusier regarded as, the 5 acts of architectural revolution, alongside with his comments and notes on ‘Les 4 Compositions’, 3 classification criteria of *promenade architectural*, *exterior form*, and *interior space* were acquired.

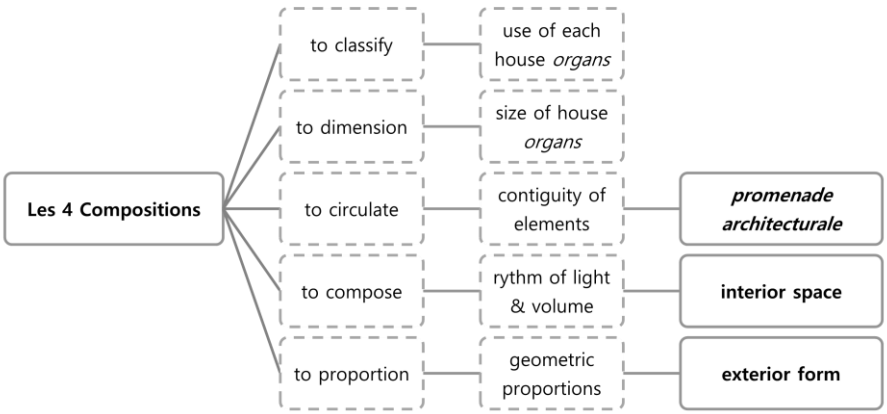


Figure 3-1 Classification criteria derivation based on Le Corbusier’s lecture titled ‘The Plan of Modern House’

3.1.1 Classification criteria of First Composition

Firstly, a project of First Composition should have a *promenade architectural*-based exterior form. In other words, free and unrestricted *promenade architecturale* is first planned out, which is then directly adopted into the exterior form of the project. The form undergoes regulation with *traces regulateur* for order and ideal proportion of the project.

[23] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 124-134.

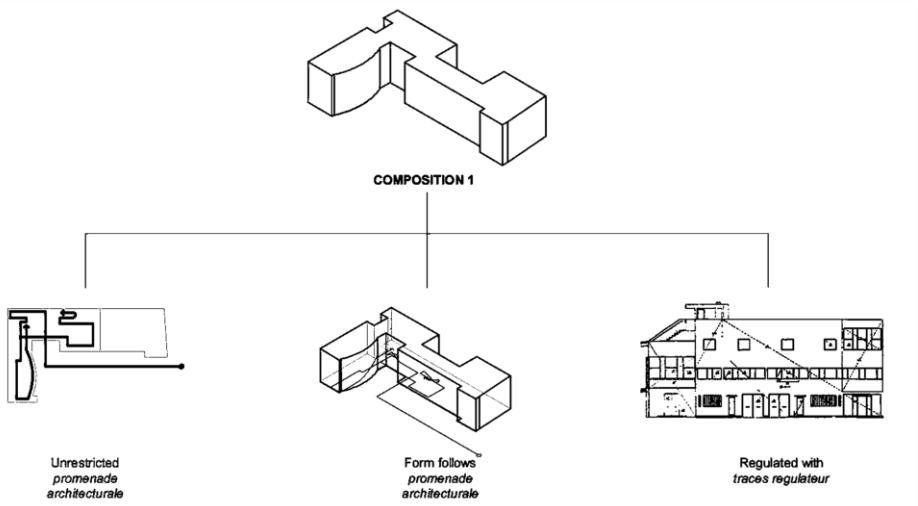


Figure 3-2 Categorization criteria of First Composition (Source: Author)

3.1.2 Classification criteria of Second Composition

Contrary to the organic growth of First Composition's pyramidal composition, a project of Second Composition has a predetermined limitation of proportionally ideal pure form. This self-imposed pure form acts both as the exterior form and rigid shell or envelope that restrains *promenade architectural* in within. Space elements such as columns, surfaces, planes, light and etc are then allocated within the limitation, creating a challenging but spiritually satisfying play of space between form, elements, and *promenade architectural*.

That is to say, Second Composition is a design strategy of form → *promenade architectural* design sequence.

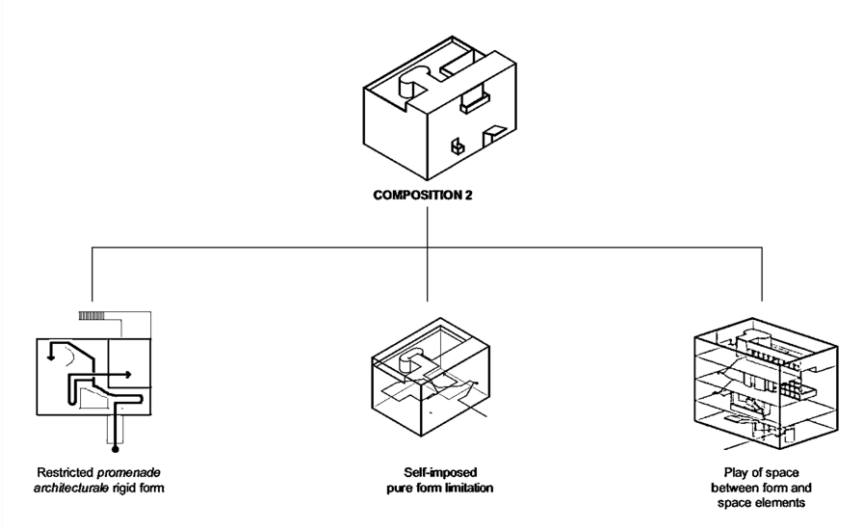


Figure 3-3 Categorizing criteria of Second Composition (Source: Author)

3.1.3 Classification criteria of Third Composition

Being of a cubic composition, similar to that of Second Composition, a project of Third Composition is designed following the form → *promenade architectural* sequence. However, instead of rigid form, a porous and transparent envelope is imposed as the pure form envelope, made possible through a plan which is liberal from structural restriction, or widely known as *plan libre* (free plan). The free plan proposed by Le Corbusier in Third Composition is achieved through the application of Dom-Ino structure. The transparent envelope which turned into the exterior form of the project can be translated into glazed curtain wall, *brise soleil* façade, umbrella roof structure and etc.

Induced by Dom-Ino structure's column gallery, repetitive parallel *promenade architectural* is developed within a project of Third Composition.

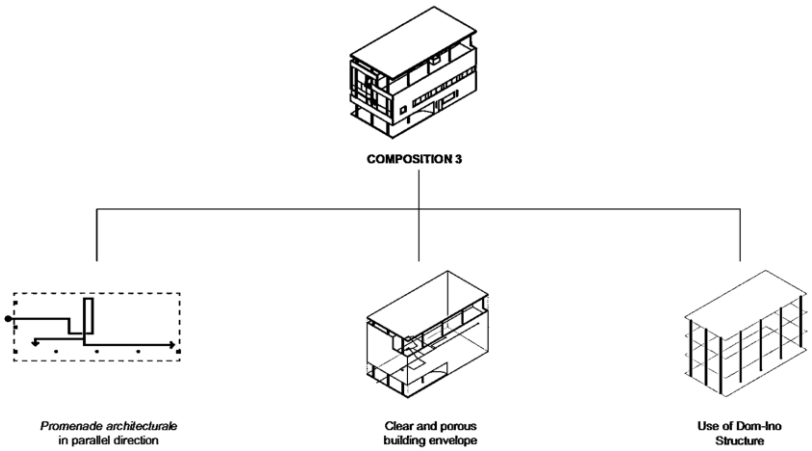


Figure 3-4 Categorization criteria of Third Composition (Source: Author)

3.1.4 Classification criteria of Fourth Composition

As discussed previously in Chapter 2, Fourth Composition is a combinative composition of the other 3 compositions, acquiring all the advantages of each composition into a single project.

Hence, a project of Fourth Composition should have the characteristics of all First, Second and Third Composition, vertically stacked in $\begin{matrix} C1 \\ C2 \\ C3 \end{matrix}$ sequence. The rigid pure form of Second Composition regulates the order and hierarchy while providing the peripheral limitation to the overall design. The rganically grown form of First Composition (roof garden in the case of Villa Savoye) and free plan of Third Composition (pilotis in the case of Villa Savoye) are then designed within the peripheral boundary.

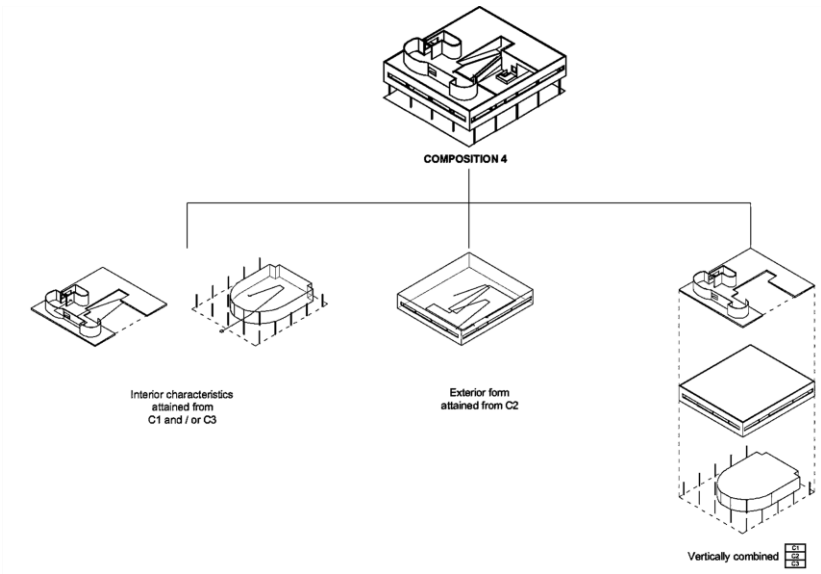


Figure 3-5 Categorization criteria of Fourth Composition (Source: Author)

3.2 Categorizing Le Corbusier's works with 'Les 4 Compositions'

A total of 104 architectural projects proposed during and after the year 1929, when 'Les 4 Compositions' was proposed, were selected as the case study for this thesis. These projects which were published in the 8 volumes of Le Corbusier's work collection, *Œuvres Complètes*, are then diagrammed into hatched plans and axonometric representations, similar to that of Le Corbusier's original 'Les 4 Compositions' manuscript. [24]

[24] Le Corbusier, *Œuvres completes Vol 1 – 8* (Zurich: Les editions d'architecture, 1995)

PROJECT YEAR		1923	1927	1928	1929	1929	1929	1929	1930	1930	1930
PROJECT NAME		Villa La Roche	Villa Stein	Villa Carthage	Villa Savoye	Maison Caneel	Maison Loucheur	Villa à Carthage II	Appartment de M. Charles de Beistegui	Immeuble Clarté	Maison de M. Errazuriz
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●			●						●
	Form follows *promenade architecturale*	●			●						●
	Use of *traces regulateur*	●			●						●
COMPOSITION 2	Restricted *promenade architecturale* within rigid form		●		●	●	●		●		
	Self-imposed pure form limitation		●		●	●	●		●		
	Space play between form and space elements		●		●	●	●		●		
COMPOSITION 3	*Promenade architecturale* in parallel direction			●	●	●				●	
	Clear and porous building envelope			●	●	●	●	●		●	
	Dom-Ino Structure			●	●	●		●		●	
COMPOSITION 4	Exterior form attained from C2				●	●					
	Interior characteristics attained from C1 and / or C3				●	●					
	Combination method between compositions				C1 C2 C3	C2 C3					
COMPOSITION CATEGORIZATION		COMPOSITION 1	COMPOSITION 2	COMPOSITION 3	COMPOSITION 4	COMPOSITION 4	COMPOSITION 2	COMPOSITION 3	COMPOSITION 2	COMPOSITION 3	COMPOSITION 1

PROJECT YEAR		1930	1930	1930	1931	1932	1932	1932	1932	1933	1933
PROJECT NAME		Pavillon Suisse	Villa de Madame H. de Mandrot	Musée d'Art Contemporain	Palais des Soviets	Cité de Refuge	Immeuble locatif Rue Fabert	Immeuble locatif Zurich	Immeuble pour ouvrier	Immeuble locatif Porte Molitor	Immeuble Rentenanstalt
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●	●	●	●	●					
	Form follows *promenade architecturale*	●	●	●	●	●			●		
	Use of *traces regulateur*	●	●	●	●	●					
COMPOSITION 2	Restricted *promenade architecturale* within rigid form			●	●	●					
	Self-imposed pure form limitation	●		●	●	●					
	Space play between form and space elements	●		●	●	●					
COMPOSITION 3	*Promenade architecturale* in parallel direction	●		●	●	●	●	●	●	●	●
	Clear and porous building envelope	●		●	●	●	●	●	●	●	●
	Dom-Ino Structure	●		●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2	●		●		●					
	Interior characteristics attained from C1 and / or C3	●		●		●					
	Combination method between compositions	C2 / C1 C3		C1 / C2 / C3	C2 C3 C1 C2	C1 / C2 / C3 C2					
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 1	COMPOSITION 4	OTHERS	COMPOSITION 4	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3

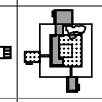
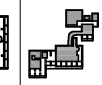
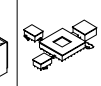
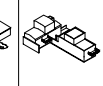
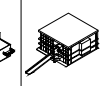
PROJECT YEAR		1933	1933	1933	1933	1933	1933	1934	1935	1935	1935
PROJECT NAME		Lotissement Barcelone	Lotissement Durand I	Lotissement Durand II	Lotissement Durand III	Maison Locatif Alger	Petit Maison à Alger	Reorganisation Agraire	Maison aux Mathes	Maison de week-end	Musée de la ville et de l'etat
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale			●	●	●	●			●	
	Form follows *promenade architecturale*			●	●	●	●			●	
	Use of *traces regulateur*			●	●	●	●			●	
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●						●			
	Self-imposed pure form limitation	●				●		●			●
	Space play between form and space elements	●				●		●			●
COMPOSITION 3	*Promenade architecturale* in parallel direction		●			●			●		●
	Clear and porous building envelope		●			●		●	●		●
	Dom-Ino Structure		●			●		●	●		●
COMPOSITION 4	Exterior form attained from C2					●		●			●
	Interior characteristics attained from C1 and / or C3					●		●			●
	Combination method between compositions					C1 C2 C3 C2		C2 C3			C3 | C2
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 3	COMPOSITION 1	COMPOSITION 1	COMPOSITION 4	COMPOSITION 1	COMPOSITION 4	COMPOSITION 3	COMPOSITION 1	COMPOSITION 4

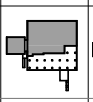
PROJECT YEAR		1936	1936	1936	1937	1937	1937	1937	1938	1939	1939
PROJECT NAME		Boutique Bat'a	Ministère de l'Education Nationale	Un centre d'esthétique contemporaine	Gratte-ciel Cartésien	Maison de week-end Jaoul	Pavillon Bat'a	Pavillon des Temps Nouveaux	Quartier de la Marine	Maison Clarke Arundell	Maisons montées à sec (M.A.S.)
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale		●						●		
	Form follows *promenade architecturale*		●						●		
	Use of *traces regulateur*		●						●		
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●		●			●	●		●	●
	Self-imposed pure form limitation	●	●	●			●	●		●	●
	Space play between form and space elements	●	●	●			●	●		●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction		●	●	●	●			●		
	Clear and porous building envelope		●	●	●	●			●		
	Dom-Ino Structure		●	●	●	●			●		
COMPOSITION 4	Exterior form attained from C2		●	●							
	Interior characteristics attained from C1 and / or C3		●	●					●		
	Combination method between compositions		C1 C2 C3	C2 C3					C1 C3		
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 4	COMPOSITION 4	COMPOSITION 3	COMPOSITION 3	COMPOSITION 2	COMPOSITION 2	COMPOSITION 4	COMPOSITION 2	COMPOSITION 2

PROJECT YEAR		1939	1939	1939	1940	1940	1940	1940	1942	1944	1944
PROJECT NAME		Musée à Croissance ilimitée	Pavillon Français, Exposition de l'Eau	Station biologique	Ecole Volantes	Maison 'Murondins'	Maison pour contremaître	Maison pour ingéniuer	Résidence Peyrissac	Unité d'habitation transitoire (avec rue exétérieure)	Unité d'habitation transitoire (avec rue intérieure)
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●		●					●		
	Form follows *promenade architecturale*	●		●					●		
	Use of *traces regulateur*	●		●					●		
COMPOSITION 2	Restricted promenade architecturale within rigid form	●				●	●	●		●	●
	Self-imposed pure form limitation	●		●	●	●	●	●		●	●
	Space play between form and space elements	●		●	●	●	●	●		●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction	●		●	●						
	Clear and porous building envelope	●	●	●							
	Dom-Ino Structure	●	●	●	●						
COMPOSITION 4	Exterior form attained from C2	●		●							
	Interior characteristics attained from C1 and / or C3	●		●							
	Combination method between compositions	C1 C2 C3		C2 C1 C3							
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 3	COMPOSITION 4	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 1	COMPOSITION 2	COMPOSITION 2

PROJECT YEAR		1946	1947	1947	1948	1948	1948	1948	1949	1949	1950
PROJECT NAME		Manufacture de St-Dié	Palais des Nations Unies	Unité d'habitation Marseille	6 maisons familiales	Cité Permanente (Type 1)	Cité Permanente (Type 2)	Hôtels Sainte-Baume	Maison du Docteur Currutchet	Roq et Rob à Cap Martin	Chapelle de Ronchamp
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale		●	●							
	Form follows *promenade architecturale*		●	●							
	Use of *traces regulateur*		●	●							
COMPOSITION 2	Restricted *promenade architecturale* within rigid form				●	●	●	●		●	●
	Self-imposed pure form limitation	●		●	●	●	●	●		●	●
	Space play between form and space elements	●		●	●	●	●	●		●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●					●		
	Clear and porous building envelope	●	●	●					●		
	Dom-Ino Structure	●	●	●					●		
COMPOSITION 4	Exterior form attained from C2	●		●							
	Interior characteristics attained from C1 and / or C3	●		●							
	Combination method between compositions	C2 / C3	C1 | C3	C1 / C2 / C3							
COMPOSITION CATEGORIZATION		COMPOSITION 4	OTHERS	COMPOSITION 4	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 3	COMPOSITION 2	COMPOSITION 2

PROJECT YEAR		1950	1950	1950	1951	1951	1951	1951	1951	1951	1951
PROJECT NAME		Maison Fueter	Maison rurales	Projet Porte Maillot 50	Concours des Strasbourg	Maison des Péons	Palais de Justice	Palais de l'Assemblée	Palais du Gouverneur	Secrétariate	Villa Shodhan
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●			●			●		●	
	Form follows *promenade architecturale*	●			●			●		●	
	Use of *traces regulateur*	●			●			●		●	
COMPOSITION 2	Restricted *promenade architecturale* within rigid form		●			●		●	●		
	Self-imposed pure form limitation		●		●	●		●	●	●	
	Space play between form and space elements		●		●	●		●	●	●	
COMPOSITION 3	*Promenade architecturale* in parallel direction				●		●	●		●	
	Clear and porous building envelope		●	●	●		●	●	●	●	●
	Dom-Ino Structure		●	●	●		●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2		●		●			●	●	●	
	Interior characteristics attained from C1 and / or C3		●		●			●	●	●	
	Combination method between compositions		C2 C3		C1 C2 C3			C1 C2 C3	C2 C3 C2 C3	C1 C2 C3	
COMPOSITION CATEGORIZATION		COMPOSITION 1	COMPOSITION 4	COMPOSITION 3	COMPOSITION 4	COMPOSITION 2	COMPOSITION 3	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 3

PROJECT YEAR		1951	1952	1952	1952	1952	1952	1953	1954	1954	1955
PROJECT NAME		Cabanon à Cap Martin	Maison des Mill-Owners	Maison pour Mr. Chimanbhai	Maison pour Mr. Huthseeing	Musée, Chandigarh	Unité d'habitation Nantes-Rezé	Centre Culturel : la Musée	Maisons Jaoul	Palais des Filateurs	Maison pour Madame Sarabhai
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale						●	●	●		●
	Form follows *promenade architecturale*						●		●		●
	Use of *traces regulateur*						●		●		●
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●	●			●		●			
	Self-imposed pure form limitation	●	●			●	●	●			
	Space play between form and space elements	●	●			●	●	●			
COMPOSITION 3	*Promenade architecturale* in parallel direction					●	●	●		●	
	Clear and porous building envelope			●	●	●	●	●		●	●
	Dom-Ino Structure		●	●	●	●	●	●		●	
COMPOSITION 4	Exterior form attained from C2					●	●	●			
	Interior characteristics attained from C1 and / or C3					●	●	●			
	Combination method between compositions					C2 C3	C1 C2 C3	C2 C3			
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 2	COMPOSITION 3	COMPOSITION 3	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 1	COMPOSITION 3	COMPOSITION 1

PROJECT YEAR		1956	1957	1957	1957	1957	1958	1958	1960	1960	1960
PROJECT NAME		Unité d'habitation Berlin	Convent Sainte-Marie de la Tourette	Maison du Brésil	Musée National d'Art Occidental	Unité d'habitation Briey-en-Forêt	Le centre de la ville	Pavillon Philips	Bâtiments de l'écluse I	Bâtiments de l'écluse II	Eglise Saint Pierre
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●	●	●		●		●			
	Form follows *promenade architecturale*	●	●	●	●	●		●			
	Use of *traces regulateur*	●	●	●	●	●		●		●	
COMPOSITION 2	Restricted *promenade architecturale* within rigid form		●		●				●		●
	Self-imposed pure form limitation	●	●	●	●	●			●		●
	Space play between form and space elements	●	●	●	●	●			●		●
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●	●	●	●				
	Clear and porous building envelope	●	●	●	●	●	●			●	
	Dom-Ino Structure	●	●	●	●	●	●				
COMPOSITION 4	Exterior form attained from C2	●		●	●	●					
	Interior characteristics attained from C1 and / or C3	●	●	●	●	●					
	Combination method between compositions	C1 C2 C3	C1 C2 C3	C2 C1 C3 C1	C1 C2 C3	C1 C2 C3					
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	OTHERS	COMPOSITION 4	COMPOSITION 3	COMPOSITION 1	COMPOSITION 2	OTHERS	COMPOSITION 2

PROJECT YEAR		1960	1960	1960	1960	1961	1961	1962	1963	1963	1963
PROJECT NAME		La Tour d'Ombres	Maison de Culture	Musée de la Connaissance	Unité d'habitation Firminy	Carpenter Cent er for Visual Arts	Hôtel et palais des congrés (Gare d'Orsay)	Palais Ahrenberg	Centre d'art international Erlenbach	Club Lac Sukhna	Pavillon d'exposition ZHLC
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale				●	●			●		
	Form follows *promenade architecturale*				●	●			●		
	Use of *traces regulateur*				●	●			●		
COMPOSITION 2	Restricted *promenade architecturale* within rigid form		●				●	●			
	Self-imposed pure form limitation		●		●		●	●	●		
	Space play between form and space elements		●		●		●	●	●		
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●	●	●	●		●		
	Clear and porous building envelope	●	●		●	●	●		●	●	●
	Dom-Ino Structure	●	●	●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2		●		●		●		●		
	Interior characteristics attained from C1 and / or C3		●		●	●	●		●		
	Combination method between compositions		C2 C3		C1 C2 C3	C1 C3	C2 C3		C2 C3 C1		
COMPOSITION CATEGORIZATION		COMPOSITION 3	COMPOSITION 4	COMPOSITION 3	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 2	COMPOSITION 4	COMPOSITION 3	COMPOSITION 3

PROJECT YEAR		1964	1964	1964	1964						
PROJECT NAME		Ecole d'Art et d'Architecture	La Chancellerie (Ambassade de France du Brasilia)	L' Ambassadeur (Ambassade de France du Brasilia)	Palais des congrés, Strasbourg						
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale				●						
	Form follows *promenade architecturale*				●						
	Use of *traces regulateur*				●						
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●			●						
	Self-imposed pure form limitation	●			●						
	Space play between form and space elements	●			●						
COMPOSITION 3	*Promenade architecturale* in parallel direction		●	●	●						
	Clear and porous building envelope		●	●	●						
	Dom-Ino Structure	●	●	●	●						
COMPOSITION 4	Exterior form attained from C2				●						
	Interior characteristics attained from C1 and / or C3				●						
	Combination method between compositions				C1 C2 C3						
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 3	COMPOSITION 3	COMPOSITION 4						

Table 3-1 Categorization of Le Corbusier's post-1929 projects based on the derived categorization criteria

3.3 Qualitative Analysis of Le Corbusier's works with 'Les 4 Compositions'

Investigation into the result of categorization based on the derived criteria of each composition as shown previously in [Table 3-1], suggested the development of variations for each composition throughout Le Corbusier's last 37 years of career, after the introduction of 'Les 4 Compositions' in 1929.

In this sub-chapter, the attempt of quantitative analysis is carried out, with the purpose of discovering the variations developed for each composition as shown in [Table 3-2], and the speculation of reasons behind it.

VARIATION OF EACH COMPOSITION

COMPOSITION 1

VARIATIONS	PROJECTS
Prototypal Composition 1	Villa La Roche; Maison de M. Errazuriz; Villa de Madame H. de Mandrot; Maison de week-end; Résidence Peyrissac; Maison Fueter; Maisons Jaoul; Pavillon Philips
Composition 1 with pilotis	Lotissement Durand II; Lotissement Durand III; Petit Maison à Alger
Composition 1 with porous building envelope	Maison Madame Sarabhai

1930 1940 1950 1960

COMPOSITION 2

VARIATIONS	PROJECTS
Prototypal Composition 2	Villa Stein; Appartment de Beistegui; Lotissement Barcelone; Boutique Bat'a; Pavillon Bat'a; Pavillon des Temps Nouveaux; Maison Clarke Arundell; Maison 'Murondins'; Maison pour contremaître; Maison pour ingénieur; Unité d'habitation transitoire (avec rue en élevation); Unité d'habitation transitoire (avec rue intérieure); 6 maisons familiales; Cité Permanente (Type 1); Cité Permanente (Type 2); Chapelle de Ronchamp; Maison des Péons; Cabanon à Cap Martin; Bâtiments de l'écluse I; Eglise Saint Pierre
Composition 2 with pilotis	Maison Loucheur; Maisons montées à sec; Hôtels Sainte-Baume; Roq et Rob à Cap Martin
Parallel *traces regulateur* within predetermined rigid envelope	Ecole Volantes
Composition 2 with Dom-Ino structure	Maison des Mill Owners; Palais Ahrenberg; Ecole d'Art et d'Architecture

1930 1940 1950 1960

COMPOSITION 3

VARIATIONS	PROJECTS
Prototypal Composition 3	Villa Carthage; Immeuble Clarté; Immeuble locatif Zurich; Immeuble pour ouvrier; Immeuble locatif Rue Fabert; Immeuble locatif Porte Molitor; Immeuble Rentenanstalt; Lotissement Durand I; Maison aux Mathes; Gratte-ciel Cartésien; Maison de week-end Jaoul; Maison Docteur Currutchet; Palais de Justice; Le centre de la ville; La Tour d'Ombres; Musée de la Connaissance; La Chancellerie; L' Ambassadeur
Composition 3 without parallel *promenade architecturale*	Villa à Carthage II; Exposition de l'Eau; Projet Porte Maillot 50; Villa Shodhan; Maison Mr. Chimanbhai; Maison Mr. Huthseeing; Palais des Filateurs; Club Lac Sukhna; Pavillon d'exposition ZHLC

1930 1940 1950 1960

COMPOSITION 4

VARIATIONS	PROJECTS
Prototypal Composition 4	Villa Savoye; Musée d'Art Contemporain; Ministère de l'Education Nationale; Musée à Croissance illimitée; Unité d'habitation Marseille; Concours des Strasbourg; Palais de l'Assemblée; Secrétariate; Unité d'habitation Nantes-Rezé; Unité d'habitation Berlin; Convent Sainte-Marie de la Tourette; Unité d'habitation Briey-en-Forêt; Unité d'habitation Firminy
Vertically combined C2 and C3	Maison Caneel; Reorganisation Agraire; Un centre d'e esthétique contemporaine; Manufacture de St-Dié; Maison rurales; Chandigarh Musée; Centre Culturel : la Musée; Maison de Culture; Gare d'Orsay
Other variations of vertical combination	Maison Locatif Alger; Quartier de la Marine; Palais du Gouverneur; Carpenter Center for Visual Arts; Palais des congrès
Horizontal addition on Composition 4	Pavillon Suisse; Cité de Refuge; Station biologique; Maison du Brésil; Centre d'art international Erlenbach
Horizontally combined C2 and C3	Musée de la ville et de l'etat

1930 1940 1950 1960

OTHERS

VARIATIONS	PROJECTS
-	Palais des Soviets; Palais des Nations Unies; Musée National d'Art Occidental; Bâtiments de l'écluse II

1930 1940 1950 1960

3.3.1 Analysis of works under First Composition and its variations

PROJECT YEAR		1923	1930	1930	1933	1933	1933	1935	1942	1950	1954
PROJECT NAME		Villa La Roche	Maison Errazuriz	Villa Mandrot	Lotissement Durand II	Lotissement Durand III	Petit Maison à Alger	Maison de week-end	Résidence Peyrissac	Maison Fueter	Maisons Jaoul
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●	●	●	●	●	●	●	●	●	●
	Form follows *promenade architecturale*	●	●	●	●	●	●	●	●	●	●
	Use of *traces regulateur*	●	●	●	●	●	●	●	●	●	●
COMPOSITION 2	Restricted *promenade architecturale* within rigid form										
	Self-imposed pure form limitation										
	Space play between form and space elements										
COMPOSITION 3	*Promenade architecturale* in parallel direction										
	Clear and porous building envelope										
	Dom-Ino Structure										
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1	COMPOSITION 1

PROJECT YEAR		1955	1958								
PROJECT NAME		Maison pour Madame Sarabhai	Pavillon Philips								
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●	●								
	Form follows *promenade architecturale*	●	●								
	Use of *traces regulateur*	●	●								
COMPOSITION 2	Restricted *promenade architecturale* within rigid form										
	Self-imposed pure form limitation										
	Space play between form and space elements										
COMPOSITION 3	*Promenade architecturale* in parallel direction										
	Clear and porous building envelope	●									
	Dom-Ino Structure										
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 1	COMPOSITION 1								

Table 3-3 Projects categorized as First Composition

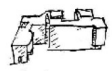
	VARIATIONS	PROJECTS	NO. OF PROJECTS
 COMPOSITION 1	Prototypical Composition 1	Villa La Roche Maison Errazuriz Villa Mandrot Maison week-end Résidence Peyrissac Maison Fueter Maisons Jaoul Pavillon Philips	**8** /12 (66.67%)
	Composition 1 with *pilotis*	Lotissement Durand II Lotissement Durand III Petit Maison à Alger	**3** /12 (25.00%)
	Composition 1 with porous building envelope	Maison Sarabhai	**1** /12 (8.33%)

Table 3-4 Variations of First Composition

Apart from the prototypal First Composition, initially proposed by Le Corbusier through Villa La Roche (1923) project, 2 other variations were developed during the 37 years from 1929-1965. As a matter of fact, both variations exhibits characteristic of Third Composition, each of *pilotis* and porous building envelope application respectively.

(1) Prototypical Composition 1

Following the use of First Composition for the design of Villa La Roche in 1923, the pyramidal composition design strategy was continuously applied by Le Corbusier in his following private dwelling projects. Namely Maison de M. Errazuriz (1930), Villa de Madame H. de Mandrot (1930), Maison de week-end (1935), Résidence Peyrissac (1942), Maison Feuter (1950) and Maison Jaoul(1954), these Corbusien houses show organically grown forms which hinted *promenade*

architecturale of the interior, as shown in [Figure 3-6] through the example of Maison de week-end (1935).

Most of the above mentioned projects are private dwellings. Differing from other project types (such as multi-unit housings or public buildings), private housing projects require more non-repetitive spaces, should to be designed specifically in accordance to the need of the client. As a result the design strategy with an organic reasoning, such as First Composition was deemed to be more appropriate.

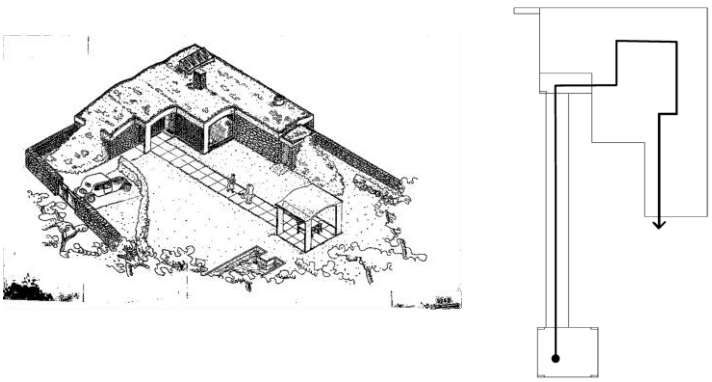


Figure 3-6 Sketch of Maison de week-end (1935) by Le Corbusier and *promenade architecturale* that grown into exterior form

(Source: *left* Fondation Le Corbusier, *right* Author)

The only non-residential project among all the works categorized under First Composition is Pavillon Philips designed for Brussels World Expo 1958. With the intention to filtered visitors through a curved passageway while experiencing color, imagery, music, words and rhythm exhibits along the way, the pavilion's form was designed using a basic mathematical algorithm, along the intended curved

promenade architecturale.[25]

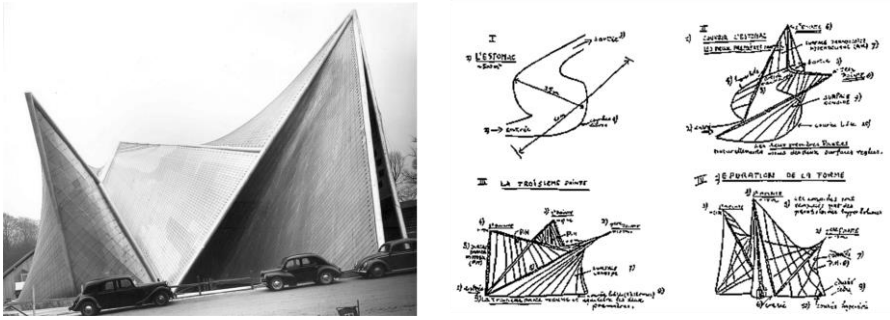


Figure 3-7 Mathematical algorithm based form design of Pavillon Philips (1958)

(Source: Œuvre Complète)

(2) Variation of C1: Composition 1 with *pilotis*

This variation of First Composition exhibits characteristic of Third Composition, with the usage of *pilotis* that allow free plan, in addition to the existing First Composition properties. Namely, Lotissement Durand II (1933), Lotissmement Durand III (1933) and Petit Maison à Alger (1933), all projects of

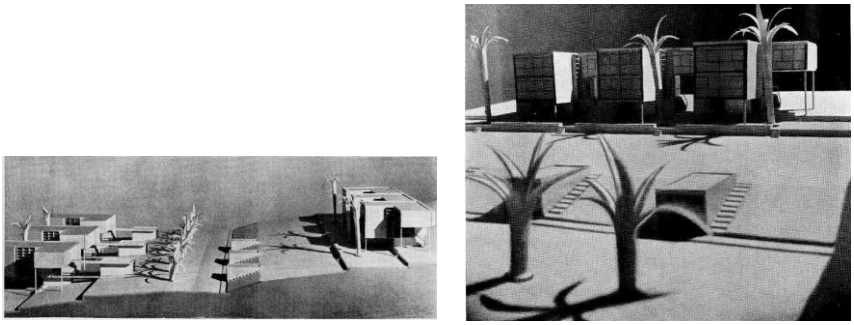


Figure 3-8 The use of pilotis on Lotissement Durand II and II, First Composition projects with sloping site context. (Source: *Œuvre Complète*)

[25] Oscar Lopez, *AD Classics: Expo 58' + Philips Pavilion/ Le Corbusier and Iannis Xenakis*. http:// www.archidaily.com (August 25, 2011).

this First Composition variation are found to be located in Algeria.

According to Le Corbusier, utilization of *pilotis* allows the building mass to be raised above ground, which is vital for projects on a sloping site.[26] In this case, all three Algeria located projects have a sloping site context, which explains why this variation of First Composition was developed by Le Corbusier.

(3) Variation of C1: Composition 1 with porous building envelope

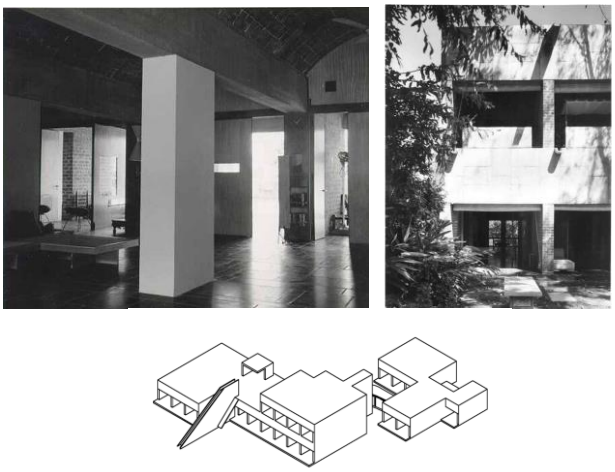


Figure 3-9 Large openings and on the façade of Maison pour Madame Sarabhai (1955) creating a porous building envelope for the hot India climate (Source: *left, centre* Fondation Le Corbusier. *riaht* Author)

Also exhibiting characteristic of Third Composition, this particular First Composition variation shows the utilization of porous building envelope on the organically grown exterior form. To illustrate, Maison pour Madame Sarabhai (1955) exhibits an unrestricted *promenade architecturale*-grown exterior form of First

[26] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 50

Composition. However, instead of an enclosed building form, the use of Catalonian vaults (half-cylinders carried to the walls by the intermediary of rough concrete lintel) create large openings that frees up the interior spaces for better natural air ventilation, which forms a porous building envelope in adapting to the hot climate of Chandigarh, India.

Besides that, the porous building envelope extends interior spaces into the plants and greeneries of garden surrounding the building. This hence prevents the interior from turning into dark and hidden indoor spaces.

3.3.2 Analysis of works under Second Composition and its variations

PROJECT YEAR		1927	1929	1930	1933	1936	1937	1937	1939	1939	1940
PROJECT NAME		Villa Stein	Maison Loucheur	Appartment Beistegui	Lotissement Barcelone	Boutique Bat'a	Pavillon des Temps Nouveaux	Pavillon Bat'a	Maison Clarke Arundell	Maisons montées à sec (M.A.S.)	Ecole Volantes
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale										
	Form follows *promenade architecturale*										
	Use of *traces regulateur*										
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●	●	●	●	●	●	●	●	●	
	Self-imposed pure form limitation	●	●	●	●	●	●	●	●	●	●
	Space play between form and space elements	●	●	●	●	●	●	●	●	●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction										●
	Clear and porous building envelope		●								
	Dom-Ino Structure										●
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2

PROJECT YEAR		1940	1940	1940	1944	1944	1948	1948	1948	1948	1949
PROJECT NAME		Maison 'Murondins'	Maison pour contremaître	Maison pour ingéniuer	Unité d'habitation transitoire I	Unité d'habitation transitoire II	6 maisons familiales	Cité Permanente (Type 1)	Cité Permanente (Type 2)	Hôtels Sainte-Baume	Roq et Rob à Cap Martin
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale										
	Form follows *promenade architecturale*										
	Use of *traces regulateur*										
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●	●	●	●	●	●	●	●	●	●
	Self-imposed pure form limitation	●	●	●	●	●	●	●	●	●	●
	Space play between form and space elements	●	●	●	●	●	●	●	●	●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction										
	Clear and porous building envelope										
	Dom-Ino Structure										
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2

PROJECT YEAR		1950	1951	1951	1952	1960	1960	1962	1964		
PROJECT NAME		Chapelle de Ronchamp	Maison des Péons	Cabanon à Cap Martin	Maison des Mill-Owners	Bâtiments de l'écluse I	Eglise Saint Pierre	Palais Ahrenberg	Ecole d'Art et d'Architecture		
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale										
	Form follows *promenade architecturale*										
	Use of *traces regulateur*										
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●	●	●	●	●	●	●	●		
	Self-imposed pure form limitation	●	●	●	●	●	●	●	●		
	Space play between form and space elements	●	●	●	●	●	●	●			
COMPOSITION 3	*Promenade architecturale* in parallel direction								●		
	Clear and porous building envelope										
	Dom-Ino Structure				●			●	●		
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2	COMPOSITION 2		

Table 3-5 Projects categorized as Second Composition

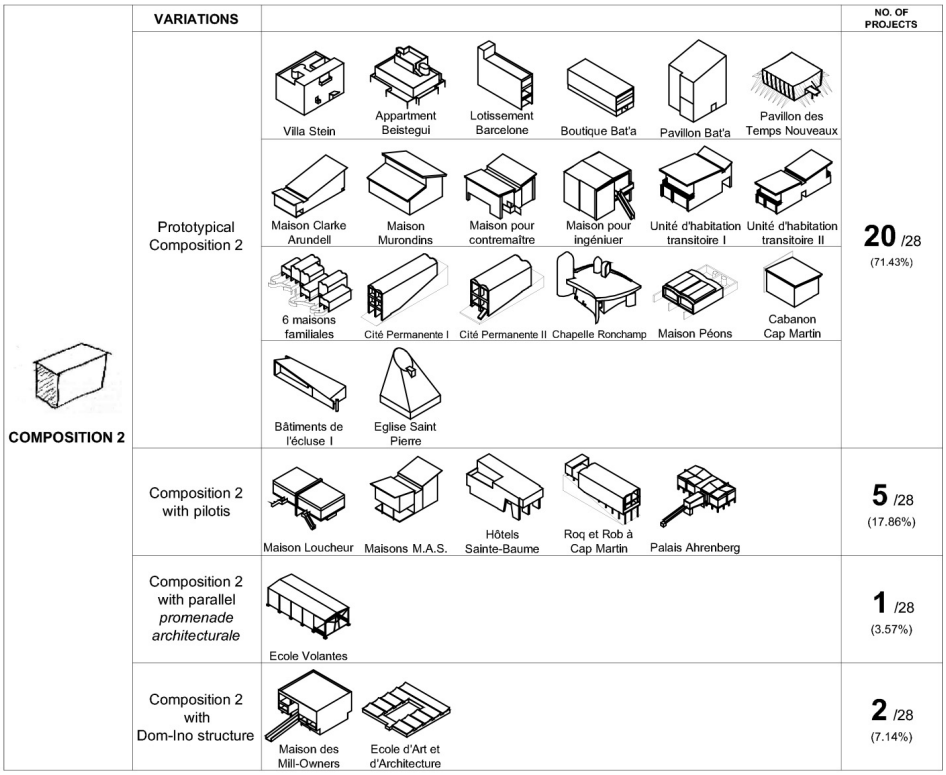


Table 3-6 Variations of Second Composition

Categorization result shows that 3 variations of Second Composition were developed after the year 1929, apart from the prototypical Second Composition, initially proposed by Le Corbusier through the exemplar of Villa Stein (1927). Similar to First Composition, all 3 variations found in Second Composition exhibits addition or replacement of characteristics with that of Third Composition.

(1) Prototypical Composition 2

Proposed as a design strategy of form → *promenade architecturale* progression, the 20 out of 28 projects categorized as Second Composition show identical features to that of Villa Stein (1927). In other words, 71.43% of Second

Composition-identified projects possess rigid predetermined form, which acted as a limitation to the *promenade architecturale* designed within.

[Figure 3-10] of Pavillon des Temps Nouveaux (1937) display an example to the regular Second Composition. The simple canvas tent structure acted as an ideally proportional rigid form, which formed self-determined limitation to the design of interior spaces. Exhibits which mainly comprised of photomurals were carefully allocated and placed within the *trés difficile* rigid tent structure limitation. Le Corbusier then used 2 levels of ramps connecting series of platforms in guiding the visitors' *promenade architecturale* within the pavilion.[27]

Figure 3-10 Pavillon des Temps Nouveaux (1937) for 1937 Exposition Internationale in Paris (Source: *top* Fondation Le Corbusier, *bottom* Ivan Shumkov Architects)

Also displaying characteristics of regular Second Composition is Chapelle Ronchamp (1950), a new Catholic church designed to replace the previous church

[27] Romy Golan, *'Paris: A Cardboard Promenade'* in *Le Corbusier: Landscapes for thr Machine Age* (New York: Museum of Modern Art, 2013). pg 282-289

which was destroyed during World War II. Intended to serve some 12,000 pilgrims twice a year, Le Corbusier had designed the form as an answer to a psychophysiology of feelings, instead of fulfilling the requirements of religion.[28] This hence resulted in an irregular sculptural form, placed atop a hill. Le Corbusier's focus on the exterior form over the interior space planning suggested a form → *promenade architecturale* design sequence, similar to that of Second Composition.

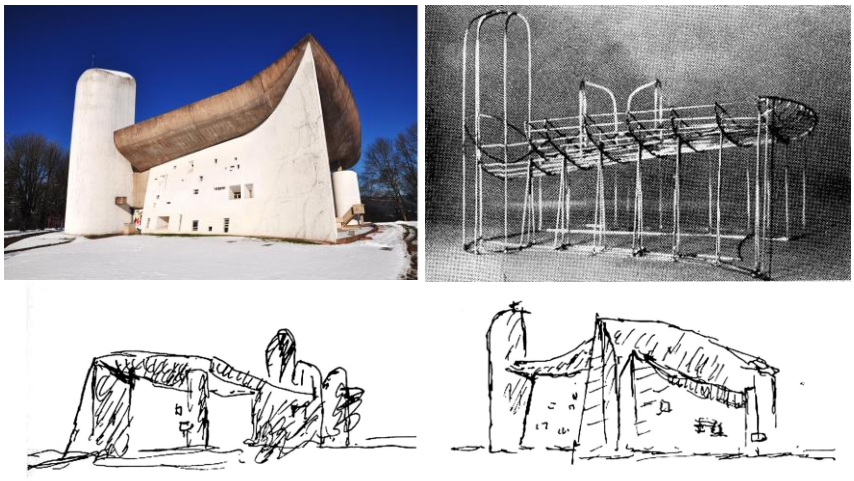


Figure 3-11 Irregular sculptural form of Chapelle Ronchamp (1950) (Source: *top left* Author, *top right and bottom* Œuvre Compléte)

(2) Variation of C2: Composition 2 with *pilotis*

Le Corbusier once claimed that "…*pilotis*, diving down the slopes, would sustain pure forms, create usable spaces down the slopes, allow the planting of trees and lawns…"[29] The categorization result shows 4 projects with the addition of *pilotis* to the pure exterior form of Second Composition.

[28] Le Corbusier, *Œuvre complete Vol 5* (Zurich: Les editions d'architecture, 1995) pg 72
[29] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 50

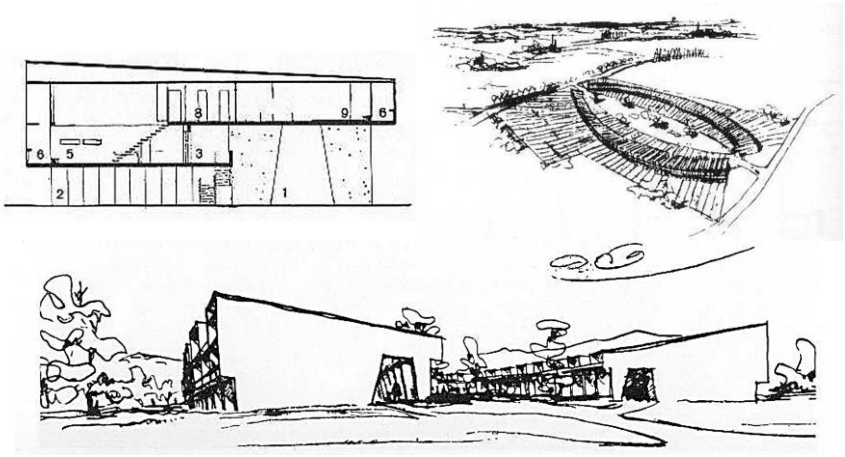


Figure 3-12 Hôtel Sainte-Baume (1948) with *pilotis* that free up ground space for corridor or circulation path (Source: Œuvre Compléte)

To illustrate, Hôtels Sainte-Baume (1948) which is part of Le Corbusier's La Sainte-Baume scheme, was intended to be a modern hotel for people in search of solitude and thought. A study of drawings of the projects [Figure 3-12] shows the use of *pilotis* on the first floor to raise building mass above ground, whereby the reclaimed space might potentially be used as corridors linking all hotel units.

Roq et Rob (1949) located at Roquebrune Cap-Martin on the other hand, shows Le Corbusier's use of *pilotis* to raise the building's pure form above ground due to its sloping site context. Though remained unbuilt, the utilization of *pilotis* retained the pure form despite sloping site and prevented the need for retaining wall, which according to Le Corbusier is uneconomical and 'displace the center of gravity of architectural design'.[30]

[30] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 50

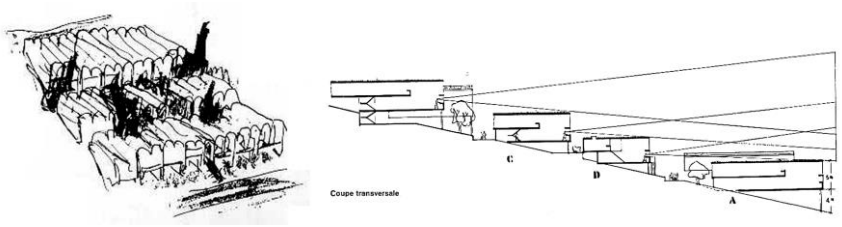


Figure 3-13 Use of *pilotis* for Roq et Rob (1949) preserved the pure form and avoided the use of retaining wall (Source: Œuvre Compléte)

(3) Variation of C2: Composition 2 with parallel *promenade architecturale*

Among projects of Second Composition, portable school Ecole Volantes (1940) is found to possess *promenade architecturale* indifferent from that of the regular Second Composition. In other words, instead of the regular restricted and intertwined *promenade architecturale* within a pure form, repetitive parallel *promenade architecturale* can be observed for the mentioned project. As shown in [Figure 3-14], Ecole Volantes (1940 is a variation of Second Composition, that may have been developed as a result of the repetitive interior spaces and floor plans deemed by the building type of an educational facility.

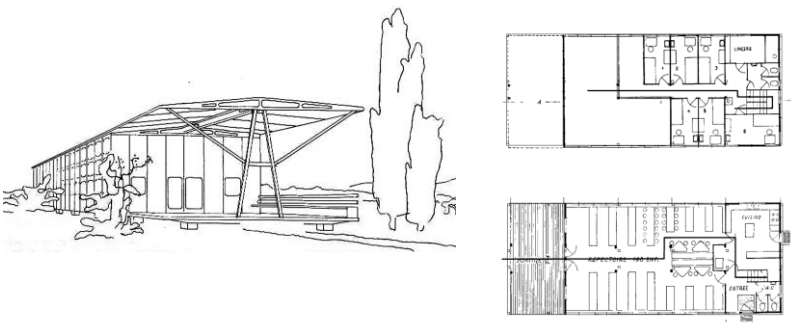


Figure 3-14 Parallel *promenade architecturale* of Ecole Volantes (1940) due to repetitive interior spaces (Source: *left* Œuvre Compléte, *right* Author)

(4) Variation of C2: Composition 2 with Dom-Ino Structure

Maison des Mill-Owners (1952) and Ecole d'Art et d'Architecture (1964) are among the projects of Second Composition with Dom-Ino Structure. These non-housing projects of Second Composition are both located in the hot climatic India, which might be the explanation of why Dom-Ino structure was used within the pure exterior form.

For example, despite being a single-floored project, [Figure 3-15] of Ecole d'Art et d'Architecture shows the use of Dom-Ino structure to free the walls from structural needs. This allowed Le Corbusier to apply *brise soleil* feature only on the north façade, controlling nature light into the building and promoting air ventilation as countermeasures to the hot climatic weather of India.

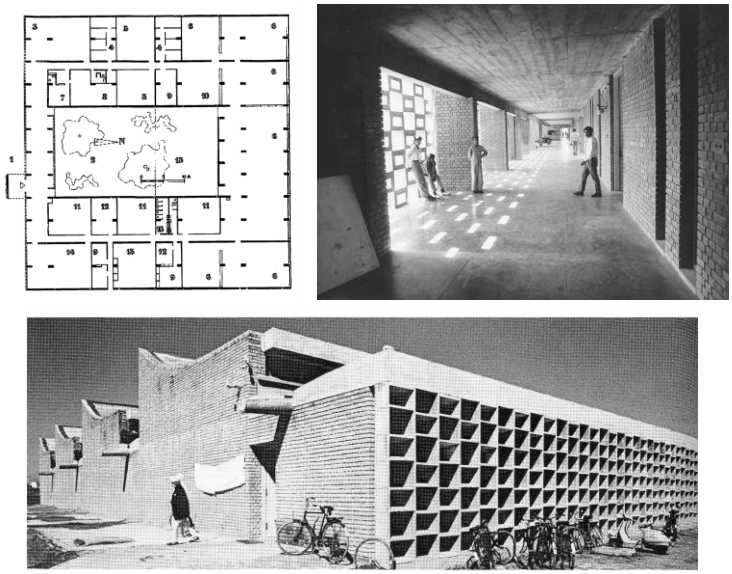


Figure 3-15 Use of Dom-Ino structure in Ecole d'Art et d'Architecture (1960) for structure-free walls as a countermeasure to India's climate (Source: Œuvre Compléte)

3.3.3 Analysis of works under Third Composition and its variations

PROJECT YEAR		1928	1929	1930	1932	1932	1932	1933	1933	1933	1935
PROJECT NAME		Villa Carthage	Villa à Carthage II	Immeuble Clarté	Immeuble locatif Zurich	Immeuble pour ouvrier	Immeuble locatif Rue Fabert	Immeuble locatif Porte Molitor	Immeuble Rentenanstalt	Lotissement Durand I	Maison aux Mathes
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale										
	Form follows *promenade architecturale*					●					
	Use of *traces regulateur*										
COMPOSITION 2	Restricted *promenade architecturale* within rigid form										
	Self-imposed pure form limitation										
	Space play between form and space elements										
COMPOSITION 3	*Promenade architecturale* in parallel direction	●		●	●	●	●	●	●	●	●
	Clear and porous building envelope	●	●	●	●	●	●	●	●	●	●
	Dom-Ino Structure	●	●	●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3

PROJECT YEAR		1937	1937	1939	1949	1950	1951	1951	1952	1952	1954
PROJECT NAME		Gratte-ciel Cartésien	Maison de week-end Jaoul	Pavillon Français	Maison du Docteur Currutchet	Projet Porte Maillot 50	Palais de Justice	Villa Shodhan	Maison pour Mr. Chimanbhai	Maison pour Mr. Huthseeing	Palais des Filateurs
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale										
	Form follows *promenade architecturale*										
	Use of *traces regulateur*										
COMPOSITION 2	Restricted *promenade architecturale* within rigid form										
	Self-imposed pure form limitation										
	Space play between form and space elements										
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●		●		●				●
	Clear and porous building envelope	●	●	●	●	●	●	●	●	●	●
	Dom-Ino Structure	●	●	●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3

PROJECT YEAR		1958	1960	1960	1963	1963	1964	1964			
PROJECT NAME		Le centre de la ville	La Tour d'Ombres	Musée de la Connaissance	Club Lac Sukhna	Pavillon d'exposition ZHLC	La Chancellerie	L' Ambassadeur			
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale										
	Form follows *promenade architecturale*										
	Use of *traces regulateur*										
COMPOSITION 2	Restricted *promenade architecturale* within rigid form										
	Self-imposed pure form limitation										
	Space play between form and space elements										
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●			●	●			
	Clear and porous building envelope	●	●		●	●	●	●			
	Dom-Ino Structure	●	●	●	●	●	●	●			
COMPOSITION 4	Exterior form attained from C2										
	Interior characteristics attained from C1 and / or C3										
	Combination method between compositions										
COMPOSITION CATEGORIZATION		COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3	COMPOSITION 3			

Table 3-7 Projects categorized as Third Composition

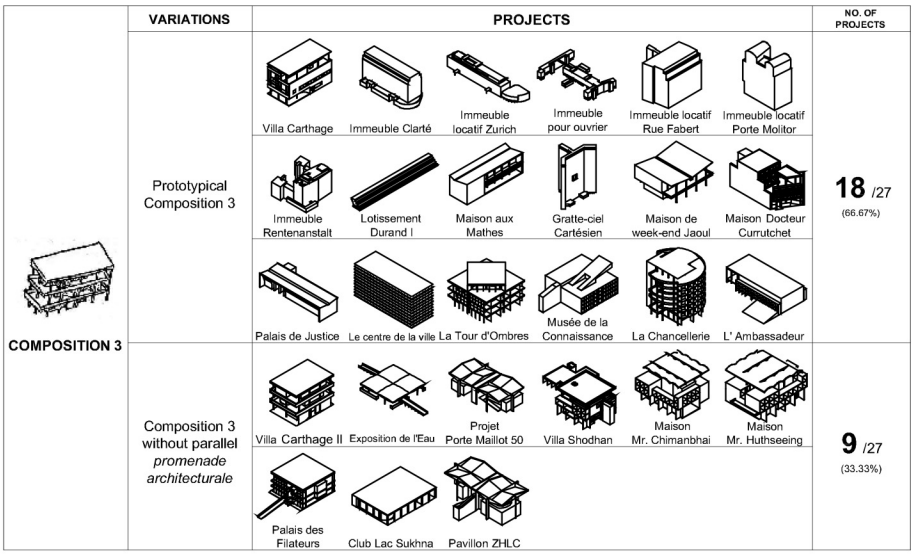


Table 3-8 Variations of Third Composition

Among 104 projects that were studied, 27 projects were identified to be of Third Composition, showing only 1 variation (besides the prototypical Third Composition) that was developed throughout the last 37 years of Le Corbusier's career.

(1) Prototypical Composition 3

Mainly comprises of institutional buildings and multi-unit housing projects, the requirement of repetitive space planning called for the use of Dom-Ino structure. As a result, column gallery and longitudinal running surfaces and planes induced repetitive parallel *promenade architecturale*, as introduced by Le Corbusier through Villa Carthage (1928).

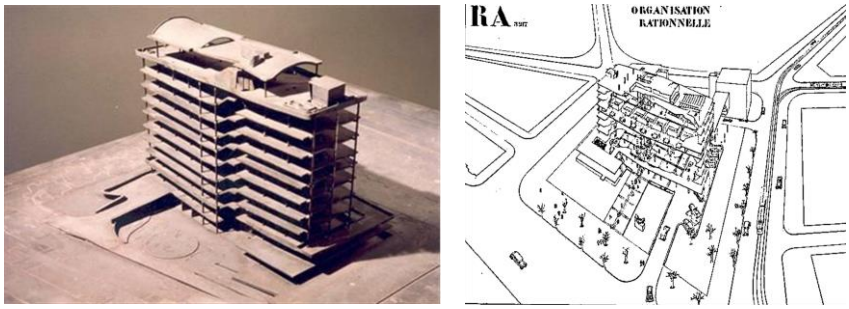


Figure 3-17 Use or Dom-Ino structure for multi-unit housing project, Immeuble Rentenanstalt (1933) induced repetitive parallel *promenade architecturale* (Source: Œuvre Compléte)

[Figure 3-17] shows photograph of the model for Immeuble Rentenanstalt (1933) which was of Dom-Ino structure. Though being a disqualified scheme for the design competition of administrative building in Zurich, Switzerland [31], this project is a perfect example of the prototypical Third Composition, whereby repetitive floor plans of the 20 meters tall building required *plan libre* through the application of Dom-Ino structural system. This hence created non-structural walls and resulted in a transparent and 'completely free façade'.[32]

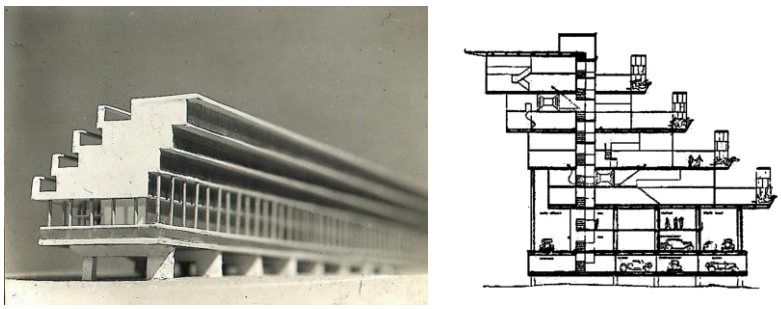


Figure 3-16 Stepped design of Lotissement Durand I (1933) (Source: Œuvre Compléte)

[Figure 3-16] shows another example of regular Third Composition,

[31] Le Corbusier, *Œuvre complete Vol 2* (Zurich: Les editions d'architecture, 1995) pg 178
[32] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 41

Lotissment Durand I (1933). The stepped design of this 300 household's multi-unit housing design called for the need of Dom-Ino structure, whereby together with the repeated floor plans, it induced repetitive parallel *promenade architecturale*. The longitudinal balcony boulevards and application of *brise soleil* façade feature created porous and permeable form of the project, a countermeasure to the Mediterranean climate of Algiers, Algeria.

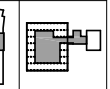
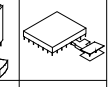
(2) Variation of C3: Composition 3 without parallel *promenade architecturale*

Comprises 4 private houses, 3 pavilions, 1 clubhouse and 1 association building, unlike the regular Third Composition, this variation is made up of projects with non-parallel *promenade architecturale*. Despite having Dom-Ino structural system and non-structural façade which enables porous exterior form, programs of these building types required for non-repetitive interior space planning based on the clients' request. As a result, *promenade architecturale* of this variation is both non-repetitive and non-parallel.

Pavillon d'exposition ZHLC (1963) in Switzerland as shown in [Figure 3-18], is one of the projects with Le Corbusier's infamous umbrella-roof. Initially designed as a private home (Maison de l'Homme), the now pavilion and exhibition gallery comprises of cubical volumes placed underneath the 2 free-standing umbrella-roofs that act as the faint peripheral limitation to the project. The non-repetitive nature of the spaces in the project resulted in intertwined and overlapping *promenade architecturale*, instead of the initially proposed repetitive and parallel characteristics of that.

Figure 3-18 Pavillon d'exposition ZHLC (previously Maison de l'Homme) is a variation of Third Composition without repetitive parallel *promenade architecturale* (Source: Fondation Le Corbusier)

3.3.4 Analysis of works under Fourth Composition and its variations

PROJECT YEAR		1929	1929	1930	1930	1932	1933	1934	1935	1936	1936
PROJECT NAME		Villa Savoye	Maison Caneel	Musée d'Art Contemporain	Pavillon Suisse	Cité de Refuge	Maison Locatif Alger	Reorganisation Agraire	Musée de la ville et de l'etat	Ministère de l'Education	Un centre d'esthétique contemporaine
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●		●	●	●	●			●	
	Form follows *promenade architecturale*	●		●	●	●	●			●	
	Use of *traces regulateur*	●		●	●	●	●			●	
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●	●	●		●		●			●
	Self-imposed pure form limitation	●	●	●	●	●	●	●	●	●	●
	Space play between form and space elements	●	●	●	●	●	●	●	●	●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●	●	●	●		●	●	●
	Clear and porous building envelope	●	●	●	●	●	●	●	●	●	●
	Dom-Ino Structure	●	●	●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2	●	●	●	●	●	●	●	●	●	●
	Interior characteristics attained from C1 and / or C3	●	●	●	●	●	●	●	●	●	●
	Combination method between compositions	C1 C2 C3	C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3 C2	C1 C2 C3 C2	C2 C3	C3 C2	C1 C2 C3	C2 C3
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4

PROJECT YEAR		1938	1939	1939	1946	1947	1950	1951	1951	1951	1951
PROJECT NAME		Quartier de la Marine	Musée à Croissance ilimitée	Station biologique	Manufacture de St-Dié	Unité d'habitation Marseille	Maison rurales	Concours des Strasbourg	Palais de l'Assemblée	Palais du Gouverneur	Secrétariate
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●	●	●		●		●	●		●
	Form follows *promenade architecturale*	●	●	●		●		●	●		●
	Use of *traces regulateur*	●	●	●		●		●	●		●
COMPOSITION 2	Restricted *promenade architecturale* within rigid form		●				●		●	●	
	Self-imposed pure form limitation		●	●	●	●	●	●	●	●	●
	Space play between form and space elements		●	●	●	●	●	●	●	●	●
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●	●	●		●	●		●
	Clear and porous building envelope	●	●	●	●	●	●	●	●	●	●
	Dom-Ino Structure	●	●	●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2		●	●	●	●	●	●	●	●	●
	Interior characteristics attained from C1 and / or C3	●	●	●	●	●	●	●	●	●	●
	Combination method between compositions	C1 C3	C1 C2 C3	C2 C1 C3	C2 C3	C1 C2 C3	C2 C3	C1 C2 C3	C1 C2 C3	C2 C3 C2 C3	C1 C2 C3
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4

PROJECT YEAR		1952	1952	1953	1956	1957	1957	1957	1960	1960	1961
PROJECT NAME		Musée, Chandigarh	Unité d'habitation Nantes-Rezé	Centre Culturel : la Musée	Unité d'habitation Berlin	Convent Sainte-Marie de la Tourette	Maison du Brésil	Unité d'habitation Briey-en-Forêt	Maison de Culture	Unité d'habitation Firminy	Carpenter Cent er for Visual Arts
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale		●	●	●	●	●	●		●	●
	Form follows *promenade architecturale*		●		●	●	●	●		●	●
	Use of *traces regulateur*		●		●	●	●	●		●	●
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●		●		●			●		
	Self-imposed pure form limitation	●	●	●	●	●	●	●	●	●	
	Space play between form and space elements	●	●	●	●	●	●	●	●	●	
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●	●	●	●	●	●	●	●
	Clear and porous building envelope	●	●	●	●	●	●	●	●	●	●
	Dom-Ino Structure	●	●	●	●	●	●	●	●	●	●
COMPOSITION 4	Exterior form attained from C2	●	●	●	●		●	●	●	●	
	Interior characteristics attained from C1 and / or C3	●	●	●	●	●	●	●	●	●	●
	Combination method between compositions	C2 C3	C1 C2 C3	C2 C3	C1 C2 C3	C1 C2 C3	C2 C1 C3 C1	C1 C2 C3	C2 C3	C1 C2 C3	C1 C3
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4	COMPOSITION 4

PROJECT YEAR		1961	1963	1964							
PROJECT NAME		Gare d'Orsay	Centre d'art international Erlenbach	Palais des congrés, Strasbourg							
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale		●	●							
	Form follows *promenade architecturale*		●	●							
	Use of *traces regulateur*		●	●							
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●		●							
	Self-imposed pure form limitation	●	●	●							
	Space play between form and space elements	●	●	●							
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●							
	Clear and porous building envelope	●	●	●							
	Dom-Ino Structure	●	●	●							
COMPOSITION 4	Exterior form attained from C2	●	●	●							
	Interior characteristics attained from C1 and / or C3	●	●	●							
	Combination method between compositions	C2 / C3	C2 / C3 C1	C1 / C2 / C3							
COMPOSITION CATEGORIZATION		COMPOSITION 4	COMPOSITION 4	COMPOSITION 4							

Table 3-9 Projects categorized as Fourth Composition

		PROJECTS	NO. OF PROJECTS
COMPOSITION 4	Prototypical Composition 4	Villa Savoye; Musée d'Art Contemporain; Ministère de l'Education Nationale; Musée à Croissance ilimitée; Unité d'habitation Marseille; Concours des Strasbourg; Palais de l'Assemblée; Secrétariate; Unité d'habitation Nantes-Rezé; Unité d'habitation Berlin; Unité d'habitation Briey-en-Forêt; Unité d'habitation Firminy; Convent Sainte-Marie de la Tourette	13 /33 (39.39%)
	Vertically combined C2 and C3	Maison Caneel; Reorganisation Agraire; Un centre d'esthétique contemporaine; Manufacture de St-Dié; Maison rurales; Chandigarh Musée; Centre Culturel (la Musée); Maison de Culture; Gare d'Orsay	9 /33 (27.27%)
	Other variations of vertical combination	Maison locatif Alger; Quartier de la Marine; Palais du Gouverneur; Carpenter Center; Palais des congrés	5 /33 (15.15%)
	Horizontal addition on Composition 4	Pavillon Suisse; Cité de Refuge; Station biologique; Maison du Brésil; Centre d'art international Erlenbach	5 /33 (15.15%)
	Horizontally combined C2 and C3	Musée de la ville et de l'etat	1 /33 (3.03%)

Table 3-10 Variations of Fourth Composition

Differ from the other 3 compositions, Fourth Composition was found to have a rather scattered distribution of projects among the prototypical form and its variations. (First Composition with 66.67%, Second Composition with 71.43%, and Third Composition with 66.67% has a majority of projects identified as the prototypical form of respective compositions instead of the variations). The different combination possibilities of Fourth Composition allowed flexibility in the adaptation of design strategy according to each project's requirements and intentions of Le Corbusier himself.

(1) Prototypical Composition 4

Projects identified as regular Fourth Composition show characteristics identical to that proposed by Le Corbusier through Villa Savoye in 1929. In other words, these projects have the regular $\begin{matrix} C1 \\ C2 \\ C3 \end{matrix}$ vertical relationship between compositions, with Second Composition regulating the overall order and proportion, while having the interior characteristics of First and/or Third Composition.

Figure 3-19 Unite d'habitation Marseille (1947) with regular $\begin{matrix} C1 \\ C2 \\ C3 \end{matrix}$ combination (Source: *left Author,* right Fondation Le Corbusier)

Unite d'habitation series are some of the projects identified as prototypical Fourth Composition. For example [Figure 3-19] shows Unite d'habitation Marseille (1947), one of Le Corbusier's most famous Brutalism design of all time. Designed as a multi-family residential housing project, this 'manifestation of an environment suited to modern life'[33] was a proposed as a solution towards housing problems post-World War II in Europe by Le Corbusier[34]. The architect's first large-scale

[33] Le Corbusier, *Œuvre complete Vol 4* (Zurich: Les editions d'architecture, 1995) pg 172
[34] Andrew Kroll, *AD Classic: Unite d'Habitation / Le Corbusier*, http:// www.archidaily.com, (Nov 5, 2011).

project post-World War II, this mixed-use residential high rise that accommodated 1600 inhabitants is the perfect example of a regular Fourth Composition design strategy.

The main building volume, divided into 18 floors, is the Second Composition of the project. A proportionally ideal rigid form retains all the main interior programs such as housing units, shopping center, hotel, restaurant, kindergarten and nursery, all connected with longitudinal running 'interior roads'.[35]

Figure 3-20 Unite d'habitation Marseille (1947) which exhibits combination of First, Second and Third Composition (Source: Fondation Le Corbusier)

Restricted peripherally, the main building volume is raised up with *pilotis* structure of Third Composition, reclaiming ground space for pedestrian circulation as well as car and bicycle parking. Meanwhile, First Composition was applied in the design roof terrace for this 'city within city' proposal, which consists of a rooftop garden, swimming pool, gymnasium and solarium that form an unrestricted and liberal

[35] Le Corbusier, *Œuvre complete Vol 5* (Zurich: Les editions d'architecture, 1995) pg 194

(2) Variation of C4: Composition 4 with vertically combined C2 and C3

Different from the regular Fourth Composition, this variation only has vertically combined Second and Third Composition. In other words, this variation of Fourth Composition has a rigid pure form, which functions both as the building main volume as well as the peripheral limitation to vertically combined *pilotis* or Dom-Ino structure with porous façade.

Figure 3-21 Vertical combination of pure form and Dom-Ino structured porous volume shown in Maison de la Culture (1960) (Source: Author)

[Figure 3-21] and [Figure 3-22] shows an example of this variation, whereby the 112 meters pure volume of Maison de la Culture (1960) is raised above ground with the use of *pilotis*, hence regained space of circulation as well as observation deck of the athletics track adjacent to the building.

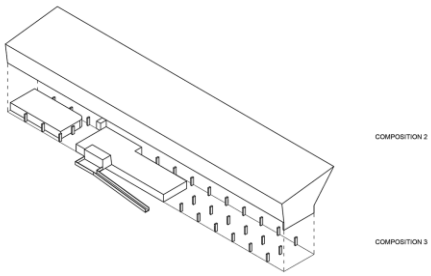
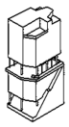
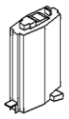
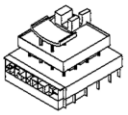


Figure 3-22 Maison de la Culture (1960) with vertical relationship between Second and Third Composition (Source: Author)

(3) Variation of C4: Other vertical combination variations

PROJECTS	COMPOSITION CONFIGURATIONS
Maison locatif Alger 	C1 C2 C3 C2
Quartier de la Marine 	C1 C3
Palais du Gouverneur 	C2 C3 C2 C3

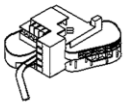
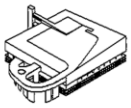
PROJECTS	COMPOSITION CONFIGURATIONS
Carpenter Centre for Visual Arts 	C1 C2 C3
Palais des congrés 	C1 C2 C3

Table 3-11 Composition configuration of Fourth Composition with various vertical combination variations

Among variations of Fourth Composition with vertical relationship between compositions, numerous distinctive configurations were found as shown in [Table 3-11]. These combination configurations may have been developed during the experimentation and design process for projects of higher complexity.

For example, Carpenter Center for Visual Arts (1961) which houses large open studio spaces for students of Harvard University to work and showcase their art, was designed based on Dom-Ino structure which enables flexibility of interior space planning through *plan libre*. Combination configuration of $\begin{matrix} C1 \\ C3 \\ C3 \end{matrix}$ was used for this project by Le Corbusier, whereby instead of a rigid *prism pur* restriction, the transparent pure form of Third Composition was used to regulate the order and proportion of the building. Besides that, the building can also be seen composed of 2 distinct and vertically stacked *prim pur*, with a rooftop garden of First Composition as shown in [Figure 3-23].

With the intention of creating a 'synthesis of the arts' (the union of architecture with paintings and sculpture) which encourages public circulation and provides views into the studio, making the creative process visible through the building design [36], a rigid exterior form was replaced

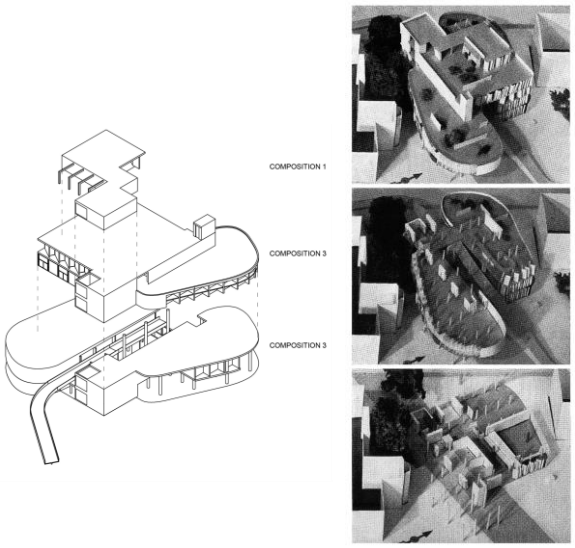


Figure 3-23 $\begin{matrix} C1 \\ C3 \\ C3 \end{matrix}$ configuration of Carpenter Center (1961)
(Source: *left* Author, *right* Œuvre Compléte)

[36] Carpenter Center for Visual Arts (CCVA), "*History: Architecture*"http://www.ccva.fas.harvard.edu

with transparent and porous envelope by Le Corbusier. Moreover, being a university facility dedicated to all students, regardless of their courses of study, the transparent façade (achieved through angled *brile soleil* seen attempted in Chandigarh and *ondulatoires* found in Convent Sainte-Marie de la Tourette) also is intended for students to "look in from the outside, eventually enter and register to work".[37]

Figure 3-24 The transparent façade of Carpenter Center (1961) encourages students to enter and work inside (Source: Fondation Le Corbusier)

(4) Variation of C4: Horizontal attachment to Composition 4

This variation of Fourth Composition comprises of projects with additional attachment (or attachments) to building volumes of Fourth Composition. Namely Pavillon Suisse (1930), Cité de Refuge (1932), Maison du Brésil (1957) and Centre d'Art International Erlenbach (1963), attachments added to main building mass are mostly function as the entrance hall into the main interior spaces, as shown through the shaded volume in [Figure 3-25]. Being of First Composition with non-peripheral relation to the main building mass, these volumes were connected to existing main volume of Fourth Composition feature (either prototypical $\begin{matrix} C1 \\ C2 \\ C3 \end{matrix}$ or variation $\begin{matrix} C2 \\ C3 \end{matrix}$).

[37] Le Corbusier, *Œuvre complete Vol 7* (Zurich: Les editions d'architecture, 1995) pg 54

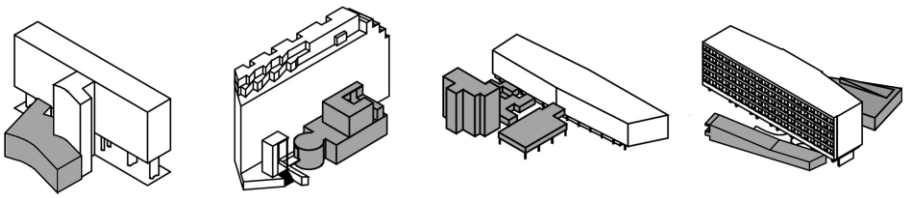


Figure 3-25 Organically grown form added to main building volume of Fourth Composition (Source: Author)

(5) Variation of C4: Horizontally combined C2 and C3

Last but not least, the Fourth Composition's 4th variation is of horizontal combination configuration between different compositions. Different from the prototypical Fourth Composition and its other variations, whereby peripheral-related compositions are stacked vertically, this Fourth Composition variation attaches the compositions in a horizontal manner, with rigid *prism pur* (Second Composition) defining the horizontal peripheral limitation. The only case study among Le Corbusier's works found to be of this variation is Musée de la ville et de l'etat (1935). This project comprises of 2 separate museum buildings, whereby each museum houses different types of exhibits along both left and right gallery wings of each museum.[38] Although functioning separately with different exhibition themes, both museums share common exhibit packing, handling, storage facilities as well as vertical circulations, planned within the *prism pur* form which was sandwiched in between both museums (which acts *prism pur* of Second Composition that regulates the overall order and proportion of both museum wings).

[38] Le Corbusier, *Œuvre complete Vol 3* (Zurich: Les editions d'architecture, 1995) pg 80

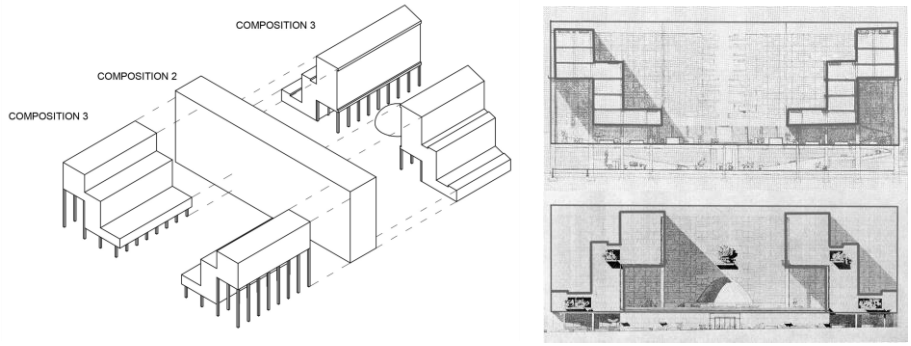


Figure 3-26 Axonometric and elevation of Musée de la ville et de l'etat (1935) showing the horizontal combination configuration. (Source: *left* Author, *right* Œuvre Compléte)

3.4 Analysis of works not categorizable with 'Les 4 Compositions'

PROJECT YEAR		1931	1947	1957	1960						
PROJECT NAME		Palais des Soviets	Palais des Nations Unies	Musée National d'Art Occidental	Bâtiments de l'écluse II						
DIAGRAMMATIC REPRESENTATION	PLAN										
	ISOMETRIC										
COMPOSITION 1	Unrestricted promenade architecturale	●	●								
	Form follows *promenade architecturale*	●	●	●							
	Use of *traces regulateur*	●	●	●	●						
COMPOSITION 2	Restricted *promenade architecturale* within rigid form	●		●							
	Self-imposed pure form limitation	●		●							
	Space play between form and space elements	●		●							
COMPOSITION 3	*Promenade architecturale* in parallel direction	●	●	●							
	Clear and porous building envelope	●	●	●	●						
	Dom-Ino Structure	●	●	●							
COMPOSITION 4	Exterior form attained from C2			●							
	Interior characteristics attained from C1 and / or C3			●							
	Combination method between compositions	C4 C3 ---- C4	C1 C3	C1 C2 C3							
COMPOSITION CATEGORIZATION		OTHERS	OTHERS	OTHERS	OTHERS						

Among the 104 selected case studies of Le Corbusier's works dated between the year 1929 to 1965, 4 projects were not categorizable 'Les 4 Compositions'. These projects either does not fulfill any of the derived categorization of 'Les 4 Compositions', shows improved features of 'Les 4 Compositions', or is unable to be categorized as one specific composition.

(1) Palais des Soviets (1931)

This project was designed as an entry for a competition commissioned by the Government of the Union of Soviet Socialist Republics (USSR) for a new administration center and congress hall in Moscow, as a celebration of the achievements of the First Five-year Plan (1928-1933). This was Le Corbusier's "true demonstration of contemporary architecture based upon the achievements of modern science in Moscow".[39]

This scheme was designed to consist of a Main Auditorium of 15,000 audiences, a perfectly acoustic regulated open air platform for 50,000 people, a small auditorium of 6,500 occupancies and an administrative building. With the extensive use of *pilotis* – the most economical means of construction[40], all the main building volumes were raised above ground, freeing the project from the natural declivities of the ground, above the uneven ground of Moskva River. These *pilotis* let light through under the buildings, hence destroying the notions of 'front and back' as well as providing an unobstructed view towards the surrounding

[39] Stanislaus von Moos, *Le Corbusier: Elements of a Sybnthesis* (Rotterdam: 010Publishers, 2009) pg 236
[40] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 48

landscape.[41]

The project is a breakaway from the body of Le Corbusier's previous works. A study into [Figure 3-28] summarized the step-by-step development of the project, in which to the final, the overall composition was organized in terms of straight axial symmetry. Palais des Soviets (1931) can be seen consist of 2 separate hall volumes of Fourth Composition and a Third Composition lobby with a complex system of ramps connected by an enclosed bridge which also serves as the central axis of the overall project, resembling an hourglass.[42]

The 3 main volumes of auditorium, administrative building and lobby though can be identified individually as one of the compositions of 'Les 4 Compositions', they do not exhibit any peripheral relation between each other. In other words, the project can be seen as a complex consisting of 3 separate individual volumes of distinctive spatial programs, connected through horizontal linkage of ramp system and an enclosed bridge located on the central axis. Hence, 'Les 4 Compositions' was deemed insufficient in categorizing the project of Palais des Soviets (1931).

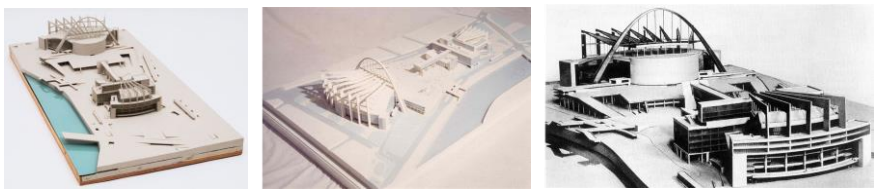


Figure 3-27 Models of Palais des Soviets (1931) showing the overall composition (Source: Fondation Le Corbusier)

[41] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 48
[42] Stanislaus von Moos, *Le Corbusier: Elements of a Sybnthesis* (Rotterdam: 010Publishers, 2009) pg 239

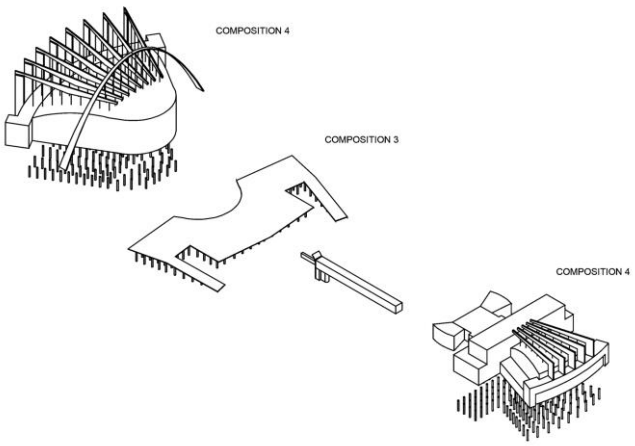


Figure 3-29 Distinctive individual compositions of Palais des Soviets (1931) connected with horizontal circulation (Source: Author)

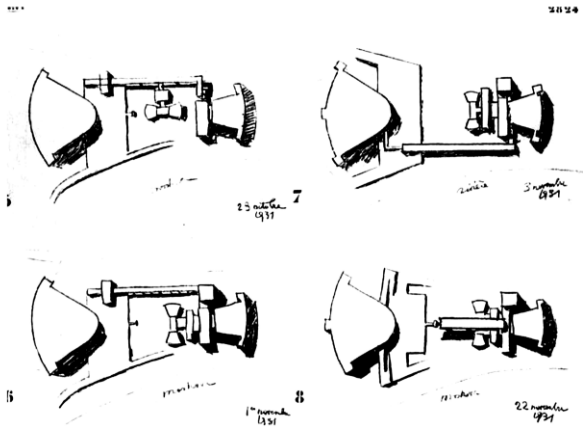


Figure 3-28 Sketches showing the design process of Palais des Soviets (1931) (Source: Œuvre Complete)

(2) Palais des Nations Unies (1947)

In 1947, Le Corbusier was designated as one of the ten experts in charge of the study of the construction of the building. Though he was not invited to take part in the realization of this work, 'Project 23A' which Le Corbusier had developed, was the working basis of the team[43] as well as the final built project.[44]

'Project 23A' proposal consisted of a 'Cartesian Skyscraper' Secretariat Building, with a heavy, concrete General Assembly building acting as the heart of the project. In contrast to the Secretariat tower, the low and dominant volume internalizes both the Assembly Hall and Council Chambers, which according to Kroll (2011) creates a heavy, masked quality, evoking a monolithic and powerful stance within the city and the UN complex.[45]

From the perspective of 'Les 4 Compositions', 'Project 23A' proposal can be seen consist of a First Composition (General Assembly) and Third Composition (Secretariat Building). The Secretariat Building is of a Dom-Ino structured 'Cartesian Skyscraper', perfected from his previous Algiers, Anvers, Barcelona and Buenos Aires schemes, exhibiting characteristics of Third Composition with glass walls and *brise soleil*.[46] Whereas, the heavy concrete General Assembly organically grows from the *promenade architecturale* that hinted the program of both Assembly Hall and Council Chamber, fulfilling the criteria of First Composition. However, as both volumes, individually distinctive and are attached to each other without any

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[43] Stanislaus von Moos, *Le Corbusier: Elements of a Sybnthesis* (Rotterdam: 010Publishers, 2009) pg 244
[44] The current United Nations is a collaboration of Oscar Niemeyer's 39 story International Style tower and Le Corbusier's oblique general assembly building (Andrew Kroll, 2011)
[45] Andrew Kroll, *AD Classics: United Nations / Wallace K. Harrison*, http://www.archidaily.com (March 17, 2011)
[46] Le Corbusier, *Œuvre complete Vol 5* (Zurich: Les editions d'architecture, 1995) pg 38

peripheral relation, ‘Les 4 Compositions’ were deemed insufficient to categorize the project under any of the 4 compositions.

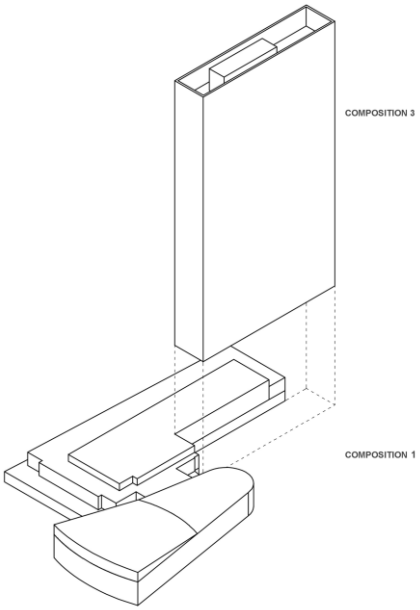


Figure 3-31 Distinctive individual compositions of Palais des Nation Unies (1947) with no peripheral relation (Source: Author)

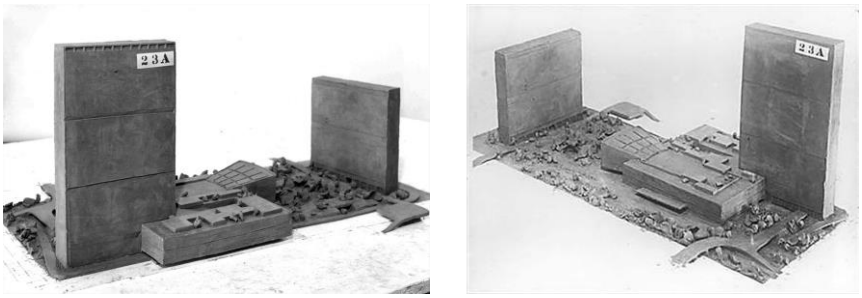


Figure 3-30 Model of “Project 23A” proposed by Le Corbusier for Palais des Nations Unies (1947) (Source: Œuvre Complete)

(3) Musée National d'Art Occidental (1957)

Called upon by the Japanese government to design a museum dedicated to housing the imposing collection of impressionist art of both painting and sculpture by a wealthy Japanese resident in Paris named M. Matsukata. Musée National d'Art Occidental (or National Museum of Western Art) is Le Corbusier's only built project in Japan as well as the Far East.

Musée National d'Art Occidental (1957), designed based on Le Corbusier's theory of Mundaneum (Museums of Unlimited Growth) and Le Modulor, consist of the main Hall accompanied by a Pavilion for Temporary Exhibitions and a building dedicated to the theater and to theatrical experiments. Although well unified among each other, all the three volumes are so fundamentally different, that each building possesses the integrity of its own character.[47]

The main central galleries, formed along the swastika (卐) *promenade architecturale* and enclosed within a rigid volume of precast concrete façade that is raised on *pilotis*, the project may seem to exhibit characteristics of a prototypical Fourth Composition. However, according to H.C. Kim (2015), the 4 branches or wings in the shape of a swastika, as shown in [Figure 3-32] always leads the visitors back to their initial starting point. This affixes geometrical order to the planning of central galleries, resolving the arbitrariness of First Composition. Besides that, Le Corbusier's use of Le Modulor (an architectural measurement and proportions system that combines the traditional golden section and various human body

[47] Le Corbusier, *Œuvre complete Vol 7* (Zurich: Les editions d'architecture, 1995) pg 182

measurements) also regulates and standardizes the overall order and rhythm, hence omitting the need for *traces regulateurs* on central galleries, which are of First Composition.[48]

Though Musée National d'Art Occidental (1957) is not sufficient to be considered as new distinctive composition independent of the 'Les 4 Compositions', the project is undeniably an improved and developed version of 'Les 4 Compositions'. Hence, the project was considered to be uncategorizable with 'Les 4 Compositions'.

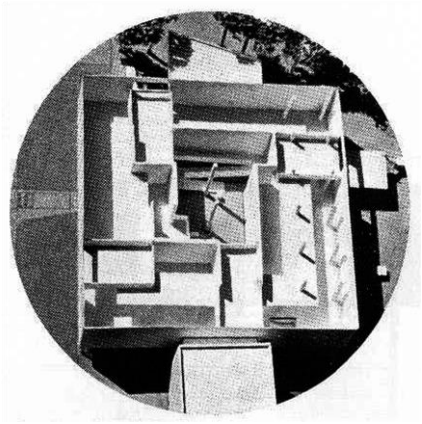


Figure 3-32 Model of Musée National d'Art Occidental (1957) showing the swastika regulated *promenade architecturale* (Source: Œuvre Complete)

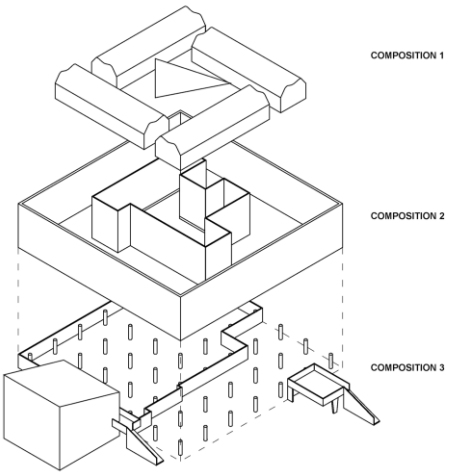


Figure 3-33 Distinctive individual compositions of Musée National d'Art Occidental (1957) with First Composition regulated by swastika and Le Modular (Source: Author)

[48] 김현철, *동경국립서양미술관(1957-1959) 공간 구성 분석을 통해 본 르 꼬르뷔지에의 '생애 건축 설계 전략'에 대한 연구* (한국문화공간건축학회 논문집, 2015)

(4) Bâtiments de l'écluse II (1960)

A gateway of the sluice located between Basel and Mulhouse on the Rhone-Rhine Canal, at the junction between the latter and the Rhine Canal, this project is part of the 2 buildings designed by Le Corbusier, which consist of the tower structure and a customs and navigation offices.

The tower structure was designed to accommodate the lockkeeper's station with the mechanical installations. According to Le Corbusier's statement, "At this juncture, there is no longer any discussion of whether we have to do with architecture or with engineering. This is a constructed work".[49] In other words, the project is neither a pure architecture nor engineering design, but beyond that of both.

A study into [Figure 3-34] shows that the tower consists of 3 distinct forms revolving along a load bearing structural wall, which acts as the central axis. Vertically connected by a staircase, the forms were raised and rotated apart from each other, hence forming 3 fundamentally independent volumes. Although a vertical *promenade architecturale* revolving around the central axis can be inferred, the tower structure was neither grown from the *promenade architecture* nor enclosed within a clear rigid form or transparent envelope. Instead, rather the use of 'Les 4 Compositions' design strategy, the project appears to be a play between planar and solid by Le Corbusier. Hence, Bâtiments de l'écluse II (1960) is deduced to not belong to any of the 4 compositions of 'Les 4 Compositions'.

[49] Le Corbusier, *Œuvre complete Vol 8* (Zurich: Les editions d'architecture, 1995) pg 44

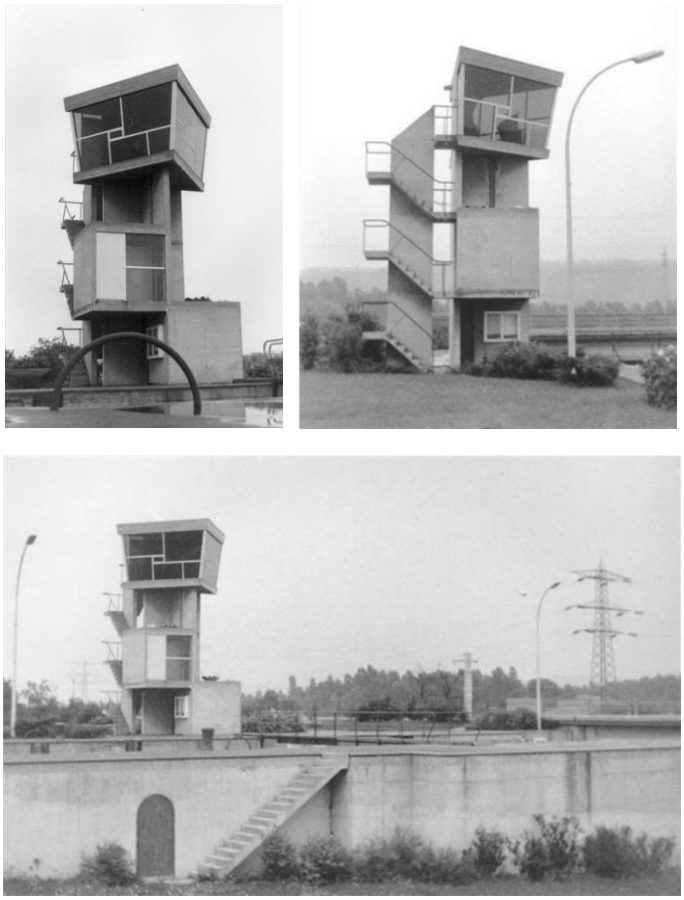


Figure 3-34 Lockkeeper's Tower of Bâtiments de l'écluse (1960) showing play between planar and volumes by Le Corbusier (Source: Fondation Le Corbusier)

3.5 Summary

Based on the study of ‘Les 4 Composition’ conducted in the previous chapter, a categorization standard is derived from each composition based on Le Corbusier’s manuscript and Buenos Aires lecture, shown in [Table 3-12]

Composition	Categorization Standard		
	promenade architecturale	**Interior Space**	**Exterior Form**
First Composition	Unrestricted *promenade architecturale*	*promenade architecturale* grows into form	Regulated with *traces regulateur*
Second Composition	Restricted *promenade architecturale* within rigid form	Play of space between form and space elements	Self-imposed pure form limitation
Third Composition	*Promenade architecturale* in parallel direction	Use of Dom-Ino structure	Clear and porous building envelope
Fourth Composition	-	Interior characteristics attained from C1 and/ or C3	Exterior form attained from C2

Table 3-12 Categorization criteria of all compositions

Categorization of the 104 selected case studies of Le Corbusier’s work post-1929 shows various variations developed from the basic form initially proposed by the architect for each composition throughout the 37 years from the year 1929-1965. These variations were found to be developed as a measure in adopting the design strategies to the limitation and requirement for each project.

Variations	No. of projects	Percentage	Reasons of development
First Composition			
Prototypical C1	**8** /12	66.67%	Unrestricted *promenade architecturale* for design according to specific needs of clients
C1 with *pilotis*	**3** /12	25.00%	A measure towards sloping site context
C1 with porous building envelope	**1** /12	8.33%	Adaptation to the hot site temperate climate
Second Composition			
Prototypical C2	**20** /28	71.43%	Ideal proportion and regulated order with predetermined *prism pur*
C2 with *pilotis*	**5** /28	17.86%	- Reclamation of ground space - Avoid need of retaining wall on sloping site
C2 with parallel *promenade architecturale*	**1** /28	3.57%	Repetitive interior space planning of multi-unit housing and institutional projects
C2 with Dom-Ino structure	**2** /28	7.14%	Partially free up wall from the structure need for controlled natural lighting and ventilation
Third Composition			
Prototypical C3	**18** /27	66.67%	Structural advantages of Dom-Ino system and effectiveness of *plan libre*
C3 without parallel *promenade architecturale*	**9** /27	33.33%	Non-repetitive-space dominant projects induced intertwined and overlapping *promenade architecturale*
Fourth Composition			
Prototypical C4	**13** /33	39.39%	Different combination possibilities and configurations allowed flexibility in adaptation of design strategy in according to specific project requirements and design intentions of architect
Vertically combined C2 and C3	**9** /33	27.27%	
Other variations of vertical combination	**5** /33	15.15%	
Horizontal addition on C4	**5** /33	15.15%	
Horizontally combined C2 and C3	**1** /33	3.03%	

Table 3-13 Variations of all 4 composition with reasons for the development of each variation

4 projects namely Palais des Soviets (1931), Palais des Nations Unies (1947), Musée National d'Art Occidental (1957) and Bâtiments de l'écluse (1960) were found to be uncategorizable by 'Les 4 Compositions'. These projects either does not fulfill any of the derived categorization of 'Les 4 Compositions', shows improved features of 'Les 4 Compositions', or is unable to be categorized as one specific composition.

CHAPTER 4

Analyzing Le Corbusier's design strategy 'post-Les 4 Compositions' (1929-1965)

4.1 Quantitative analysis of Le Corbusier's selection of Les 4 Compositions'

4.2 Chronological analysis of Le Corbusier's selection of Les 4 Compositions'

4.3 Analysis of Le Corbusier's application characteristics of 'Les 4 Compositions'

4.4 Summary

This chapter attempted to examine Le Corbusier's utilization of 'Les 4 Compositions' as the design strategy for his architectural projects, following the publication of the theory through *Œuvre Compléte* Vol.1 in 1929. Through both quantitative and qualitative analysis, better understandings of the architect's characteristic and tendency of selection for each composition and how it changes throughout the last 37 years of his career were made possible. Besides that, attempts to speculate reasons for the result of analysis were also made, in order for a better comprehension of the interrelations between Le Corbusier's architectural works and his 'Les 4 Compositions' theory.

4.1 Quantitative analysis of Le Corbusier's selection of 'Les 4 Compositions'

Composition	No. of Projects	Percentage
First Composition	12	11.54%
Second Composition	28	26.92%
Third Composition	27	25.96%
Fourth Composition	33	31.73%
Others	4	3.85%
Total	**104**	**100%**

Table 4-1 Total number of projects categorized under each respective composition

First of all, quantitative analysis of the result of categorization shows that among the 104 case studies, 12 projects (or 11.54%) are of First Composition, 28 projects (26.92%) of Second Composition, 27 projects (25.96%) of Third Composition, 33 projects (31.73%) of Fourth Composition and 4 projects (3.85%) of Others (projects not categorizable with 'Les 4 Compositions'), as shown in [Table 4-1]

A total of 12 projects with exterior form 'organically grown' from unrestricted and free *promenade architectural* within the interior space, identical to that defined by Le Corbusier as First Composition in 'Les 4 Composition' were found among the selected projects from 1929 to 1965. 11.54% of the total 104 projects placed First Composition as the least preferred design strategy of Le

Corbusier.

Next, for Second Composition, despite its '*trés difficile*' (or very difficult) comment by the architect himself, it is, in fact one of Le Corbusier's highly preferred design strategy, whereby a total of 28 projects were identified as of this particular composition. Hence, Second Composition came in second (5 projects less than that of the most preferred Fourth Composition). In other words, a total of 26.92% of projects were observed to have restricted platonic solid exterior forms within which *promenade architectural* were developed.

On the other hand, for Third Composition, where *plan libre* and free façade are made possible through the implementation of Dom-Ino structure, a total of 27 corresponding projects were identified, which accounts for 25.96% among the projects studied. This made Third Composition the 3rd most applied design strategy amongst the other compositions (2.25 times for than the number of projects for First

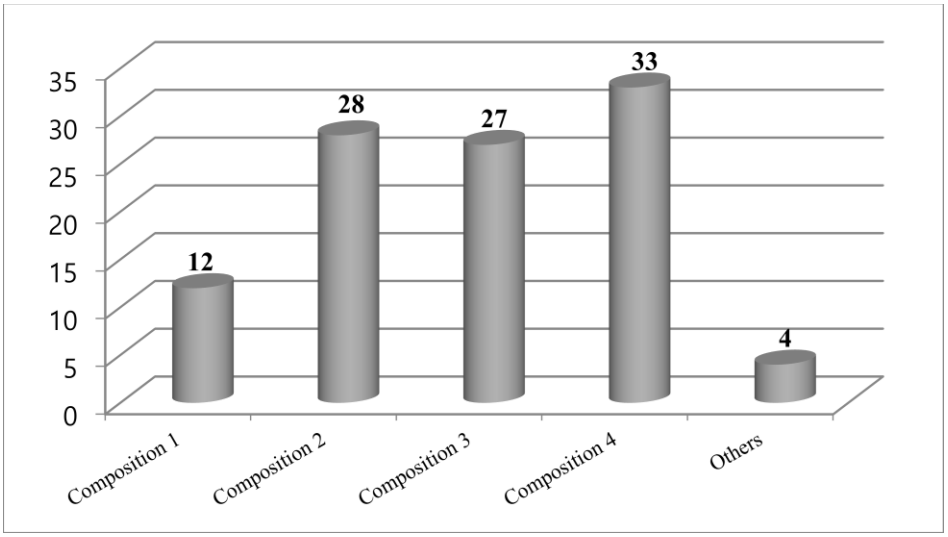


Figure 4-1 Comparison between number of projects for each category (Source: Author)

Composition and 1 project less than that of Second Composition).

Finally, Fourth Composition is the most applied design strategy by Le Corbusier himself, with a total of 33 corresponding projects, which is 31.73% amongst 104 projects.

A total of 4 projects were identified as Others, whereby these projects cannot be categorized with ‘Les 4 Compositions’ proposed by Le Corbusier. Projects namely, Palais des Soviets (1931), Palais des Nations Unies (1947), Musés National d’Art Occidental (1957) and Bâtiments de l’écluse II (1960) will hence be excluded in future discussion of this thesis.

4.2 Chronological analysis of Le Corbusier's selection of 'Les 4 Compositions'

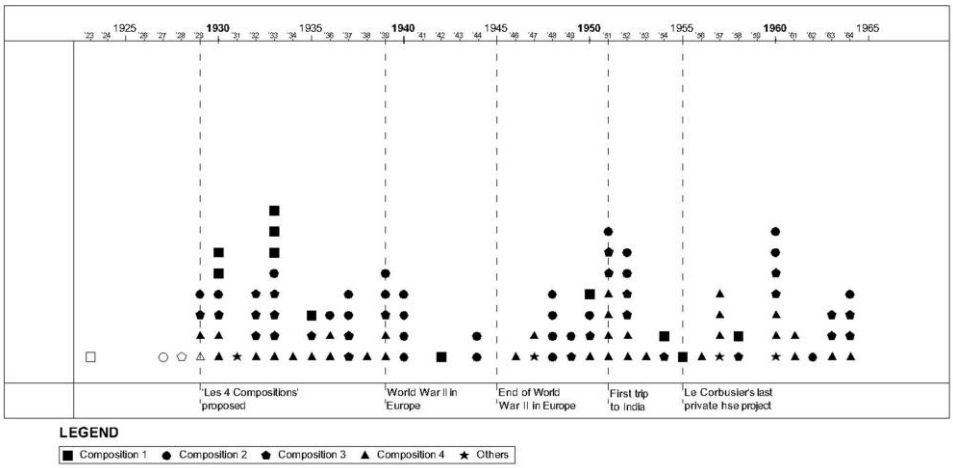


Figure 4-2 Total number of projects in chronological order with relation to major events of Le Corbusier's career (Source: Author)

Beginning from the year 1929, when 'Les 4 Compositions' were first proposed, up till 1965 when Le Corbusier was found dead in the Mediterranean Sea at Roquebrune-Cap-Martin, France, a total of 104 projects were selected from *Œuvres Complétes* Volume 1-8, represented in chronological order as shown through [Figure 4-2], in relation to major events that took place in Le Corbusier's career. The 5 distinct and vital periods are namely:

- The year 1929 – 1938 (After the introduction of 'Les 4 Compositions')
- The year 1939 – 1945 (Beginning of World War II in Europe)
- The year 1946 – 1950 (End of World War II)
- The year 1951 – 1955 (After Le Corbusier's first trip to India)

- The year 1956 – 1965 (After Le Corbusier's last private housing project)

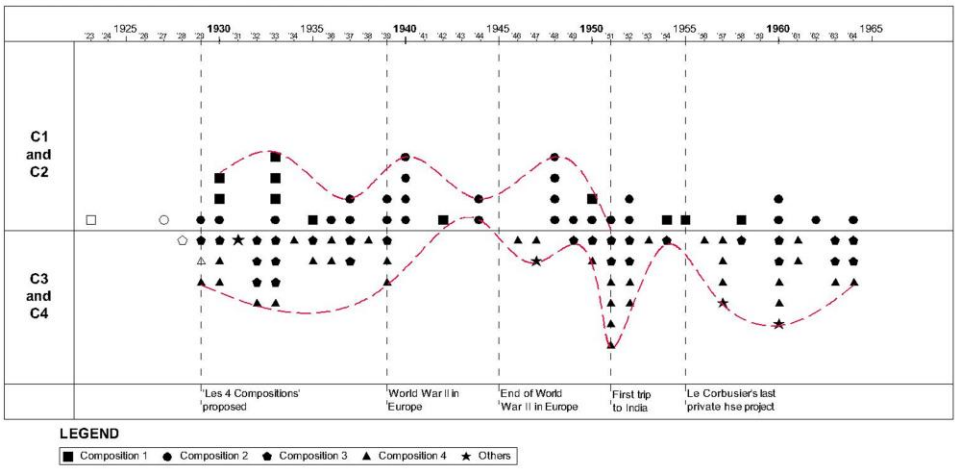


Figure 4-3 Trend comparison between Composition 1, 2 and Composition 3, 4

A comparison between the trend of selection by Le Corbusier for First, Second Composition and Third, Fourth Composition was attempted as shown in [Figure 4-3] and a recognizable trend of selection tendency can be identified from the result. It was found out that the architect started with a relatively even preference towards all 4 compositions, right after the proposal of 'Les 4 Compositions' in 1929. This may be viewed as the Le Corbusier's experimentation phase with all the design strategy, exploring feasibility and possibility of each composition through actual projects, without a definite inclination towards any particular composition.

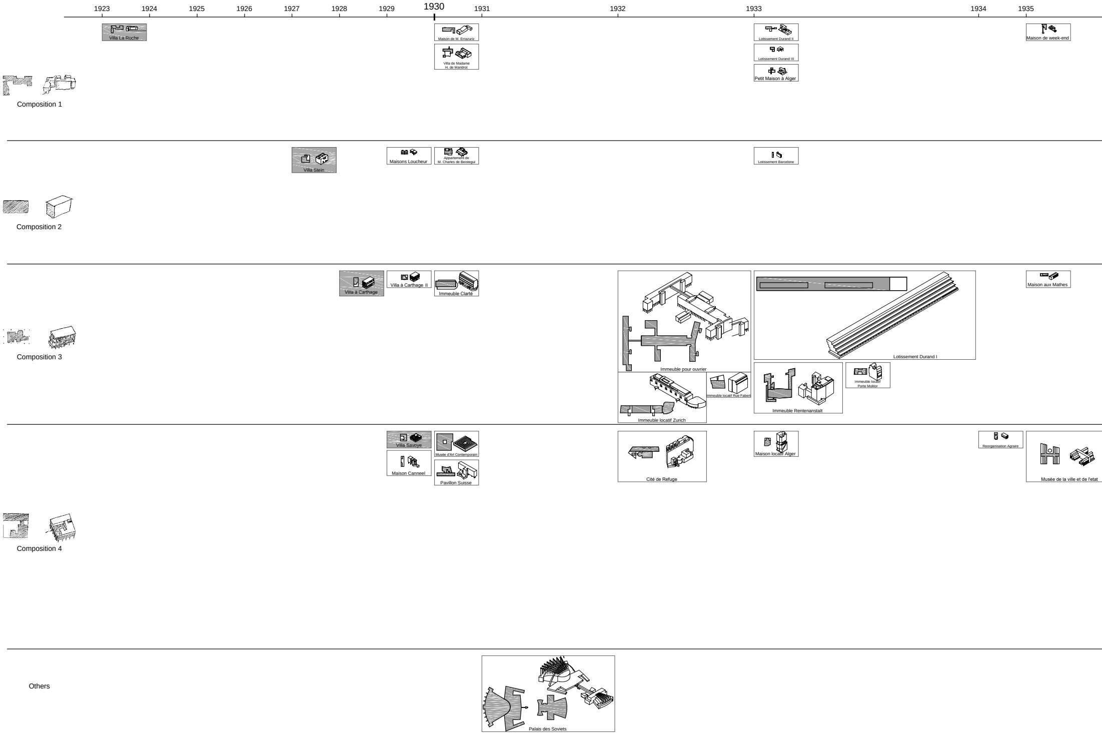
However, this drastically changed during World War II era in Europe from 1939 to 1945, when Le Corbusier's architectural practice was interrupted with a noticeable decline in project commissions. Instead, the architect focused on

urbanism proposals, his later influential Modular and Unite d'habitation principle, as well as a few prototype housing designs in which a slight inclination towards Second Composition can be observed. The proportionally ideal pure form limitation of Second Composition enables it to be less site-dependent, which conforms to Le Corbusier's preference of "making an exact site plan, corresponding ideally to the use one hoped from it…This done, to go out with the plan in hand to look for a suitable site", mentioned during his Buenos Aires lecture tour.[50]

Then, immediately after the end of World War II in 1945, following Le Corbusier's preoccupation with the attempt in realizing his city planning proposal, the inclination towards Second Composition continued. It was not only until 1951, after Le Corbusier's trip to India and his active architectural activities in Chandigarh and Ahmedabad, India, that preference of the architect in terms of design strategy switched drastically towards Third and Fourth Composition, up until his death in 1965. Through projects situated in hot climatic regions, as well as projects of requiring higher planning complexity, First and Second Composition are no longer deemed suitable. This explains the architect's preference change towards Third and Fourth Composition (which Le Corbusier claimed to be "full of possibilities")[51]

[50] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 127
[51] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 134

CHRONOLOGY OF LE CORBUSIER'S WORKS (Scale: 1 : 8000)

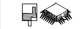

1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
Composition 1
Villa La Roche
Maison de M. Errazuriz
Villa de Madame H. de Mandrot
Lotissement Durand II
Lotissement Durand III
Petit Maison à Alger
Maison de week-end
Composition 2
Villa Stein
Maisons Loucheur
Appartement de M. Charles de Beistegui
Lotissement Barcelone
Composition 3
Villa à Carthage
Villa à Carthage II
Immeuble Clarté
Immeuble pour ouvrier
Lotissement Durand I
Maison aux Mathes
Immeuble locatif Zurich
Immeuble locatif Rue Fabert
Immeuble Rentenanstalt
Immeuble locatif Porte Molitor
Composition 4
Villa Savoye
Musée d'Art Contemporain
Maison Canneel
Pavillon Suisse
Cité de Refuge
Maison locatif Alger
Reorganisation Agraire
Musée de la ville et de l'etat
Others
Palais des Soviets

C1	●							●●			●●●		●
C2					●		●	●			●		
C3						●	●	●		●●●	●●●		●
C4							●●	●●		●	●	●	●
Others									●				

1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947

Résidence Peyrissac

Boutique Bat'a


Pavillon des Temps Nouveaux

Pavillon Bat'a

Maison Clarke Arundell

Maisons montées à sec (M.A.S.)

Ecole Volantes

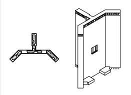
Maisons 'Murondins'

Maison pour contremaître

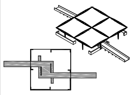
Maison pour ingéniuer

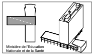
Unité d'habitation transitoire (avec rue extérieure)

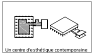
Unité d'habitation transitoire (avec rue intérieure)

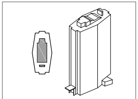

Gratte-ciel Cartésien

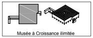
Maison de week-end Jaoul


Pavillon Français, Exposition de l'Eau

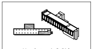

Ministère de l'Education Nationale et de la Santé

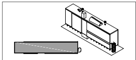

Un centre d'esthétique contemporaine

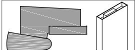

Quartier de la Marine


Musée à Croissance ilimitée

Station biologique


Manufacture de St-Di é


Unité d'habitation Marseille


Palais des Nations Unies

C1	
C2	●
C3	
C4	●●
Others	

C1	
C2	●●
C3	●●
C4	
Others	

C1	
C2	
C3	
C4	●
Others	

C1	
C2	●●
C3	●
C4	●●
Others	

C1	
C2	●●●●
C3	
C4	
Others	

C1	
C2	
C3	
C4	
Others	

C1	●
C2	
C3	
C4	
Others	

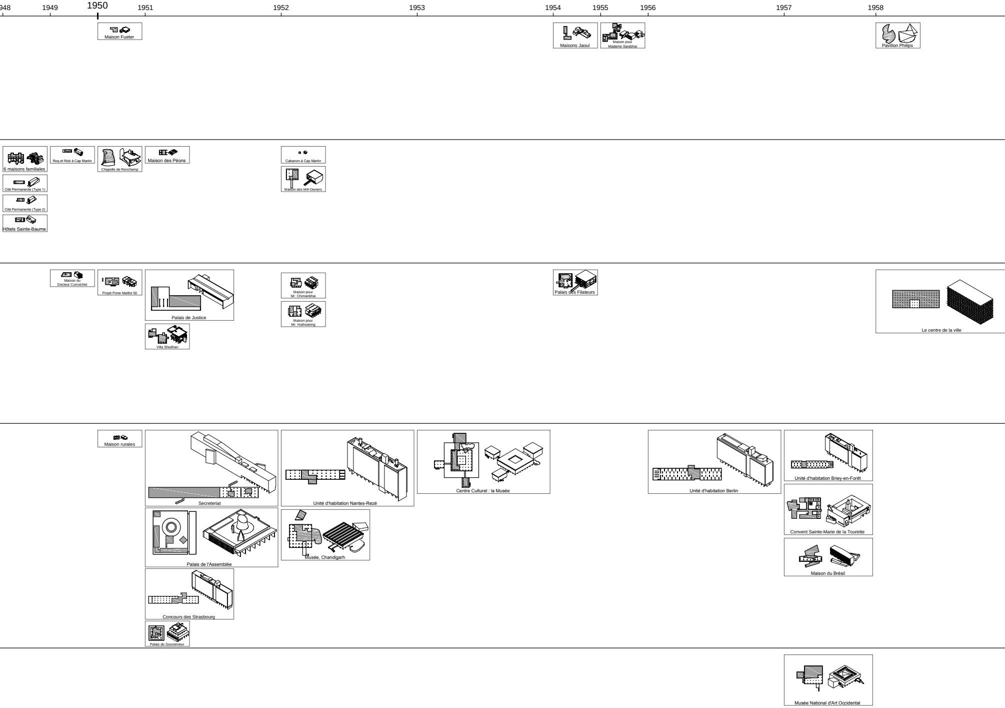
C1	
C2	
C3	
C4	
Others	

C1	
C2	●●
C3	
C4	
Others	

C1	
C2	
C3	
C4	
Others	

C1	
C2	
C3	
C4	●
Others	

C1	
C2	
C3	
C4	●
Others	●


948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
Maison Fueter
Maisons Jaoul
Maison pour Madame Sarabhai
Pavillon Philips
6 maisons familiales
Roq et Rob à Cap Martin
Chapelle de Ronchamp
Maison des Péons
Cabanon à Cap Martin
Maison des Mill-Owners
Cité Permanente (Type 1)
Cité Permanente (Type 2)
Hôtels Sainte-Baume
Maison du Docteur Curruthchet
Projet Porte Maillot 50
Palais de Justice
Villa Shodhan
Maison pour Mr. Chimanbhai
Maison pour Mr. Huthseeing
Palais des Filateurs
Le centre de la ville
Maison rurales
Secreteriat
Unité d'habitation Nantes-Rezé
Centre Culturel : la Musée
Unité d'habitation Berlin
Unité d'habitation Briey-en-Forêt
Palais de l'Assemblée
Musée, Chandigarh
Convent Sainte-Marie de la Tourette
Maison du Brésil
Concours des Strasbourg
Palais du Gouverneur
Musée National d'Art Occidental

C1	
C2	●●●●
C3	
C4	
Others	

C1	
C2	●
C3	●
C4	
Others	

C1	●
C2	●
C3	●
C4	●
Others	

C1	
C2	●
C3	●●●
C4	●●●●
Others	

C1	
C2	●●
C3	●●
C4	●●
Others	

C1	
C2	
C3	
C4	●
Others	

C1	●
C2	
C3	●
C4	
Others	

C1	●
C2	
C3	
C4	
Others	

C1	
C2	
C3	
C4	●
Others	

C1	
C2	
C3	
C4	●●●
Others	●

C1	●
C2	
C3	●
C4	
Others	

1959 1960 1961 1962 1963 1964

12 /104

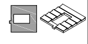
Total Area : 4,821.72 m ^{2}

Average Area: 401.81 m^2

Bâtiments de l'écluse I

Eglise Saint Pierre

Palais Ahrenberg

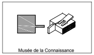

Ecole d'Art et d'Architecture

28 /104

Total Area : 21,252.83 m ^{2}

Average Area: 759.03 m^2

La Tour d'Ombres


Musée de la Connaissance

Club Lac Sukhna

Pavillon d'exposition ZHLC
(Maison de l'Homme)

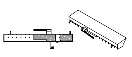
La Chancellerie
(Ambassade de France du Brasilia)

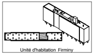
L'Ambassadeur
(Ambassade de France du Brasilia)

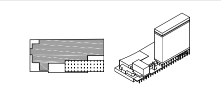
27 /104

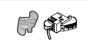
Total Area : 416,023.78 m ^{2}

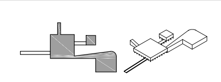
Average Area: 15,408.29 m^2


Maison de la Culture


Unité d'habitation Firminy


Hôtel et palais des congrés (Gare d'Orsay)


Carpenter Center for Visual Arts


Centre d'art international Erlenbach

Palais des congrés, Strasbourg

33 /104

Total Area : 831,035.85 m ^{2}

Average Area: 25,182.90 m^2

Bâtiments de l'écluse II

4 /104

Total Area : 221,694.62 m ^{2}

Average Area: 55,423.66 m^2

C1	
C2	
C3	
C4	
Others	

C1	
C2	●●
C3	●●
C4	●●
Others	●

C1	
C2	
C3	
C4	●●
Others	

C1	
C2	●
C3	
C4	
Others	

C1	
C2	
C3	●●
C4	●
Others	

C1	
C2	●
C3	●●
C4	●
Others	

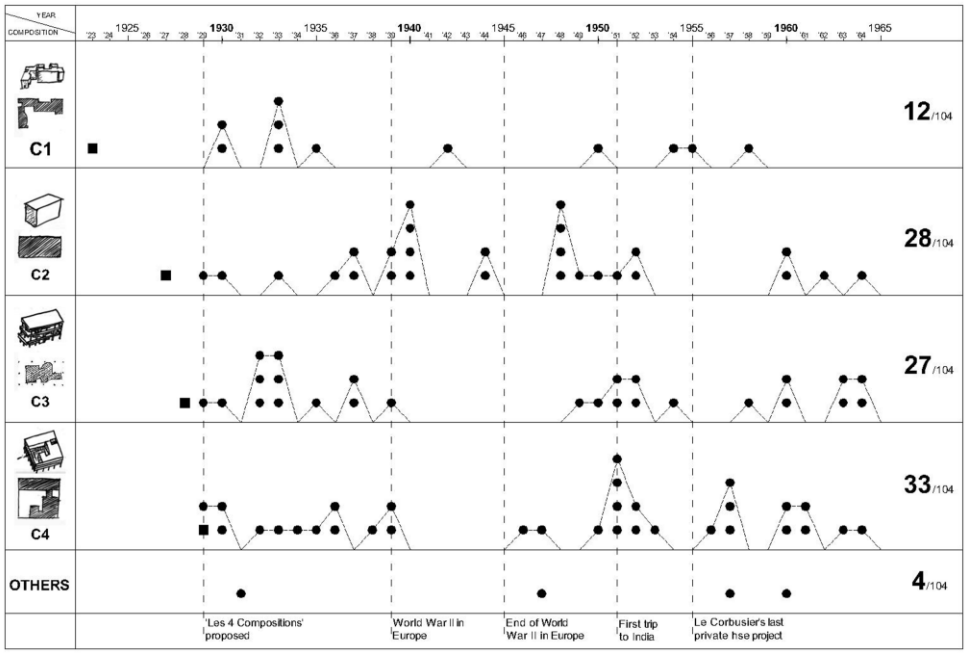


Figure 4-4 Application trend of each respective composition from 1929 to 1965

4.3 Analysis of Le Corbusier's application characteristics of 'Les 4 Compositions'

Le Corbusier stated in his South American lecture tour collection, 'Precision on the present state of Architecture and City Planning', that 'Les 4 Compositions' is the result of a study on his previous private dwelling designs, with the method of classification, dimensioning, circulation, composition and proportioning.[52] Hence, with reference to what Le Corbusier regarded as the 5 acts of architectural revolution, as well as the comment on Third Composition being "appropriate to certain climate", 4 aspects which might affect Le Corbusier's selection of design strategy were analyzed to have a better understanding of the architect's characteristics and reasons behind each selection of composition.

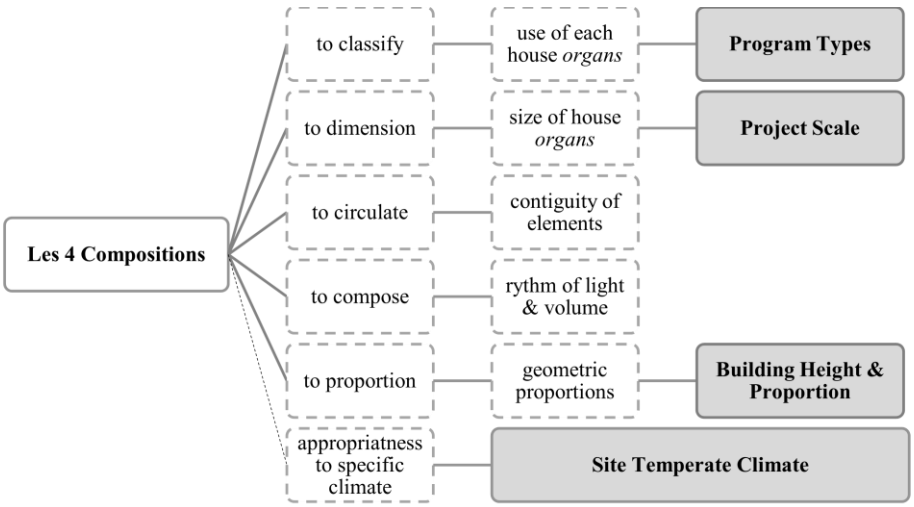


Figure 4-5 Factors analyzed for Le Corbusier's selection characteristics of 'Les 4 Compositions' (Source: Author)

[52] Le Corbusier, Precisions on the present state of architecture and city planning, 1991. pg 124-134.

4.3.1 Selection tendency based on program type

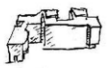
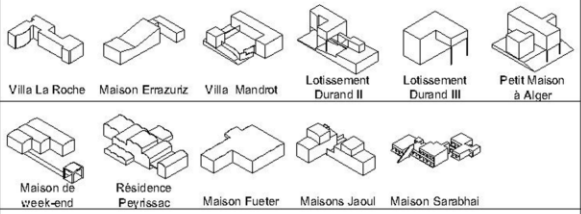
	PROGRAM TYPES	PROJECTS	NO. OF PROJECTS
 COMPOSITION 1	Private housing	 Villa La Roche, Maison Errazuriz, Villa Mandrot, Lotissement Durand II, Lotissement Durand III, Petit Maison à Alger; Maison de week-end, Résidence Peyrissac, Maison Fueter, Maisons Jaoul, Maison Sarabhai	**11** /12 (91.67%)
	Multi-unit housing		**0** /12 (0%)
	Hostel & Hotel		**0** /12 (0%)
	Institutional		**0** /12 (0%)
	Museum / Gallery		**0** /12 (0%)
	Pavillon	Pavillon Philips	**1** /12 (8.33%)
	Religious		**0** /12 (0%)
	Others		**0** /12 (0%)

Table 4-2 Program type comparison between projects of First Composition

[Table 4-2] shows program type comparison between projects categorized under First Composition. Among the 12 projects of First Composition 11 projects are of private housing, whereas only 1 is of a pavilion, showing a high tendency of application in private housing projects for this particular composition.

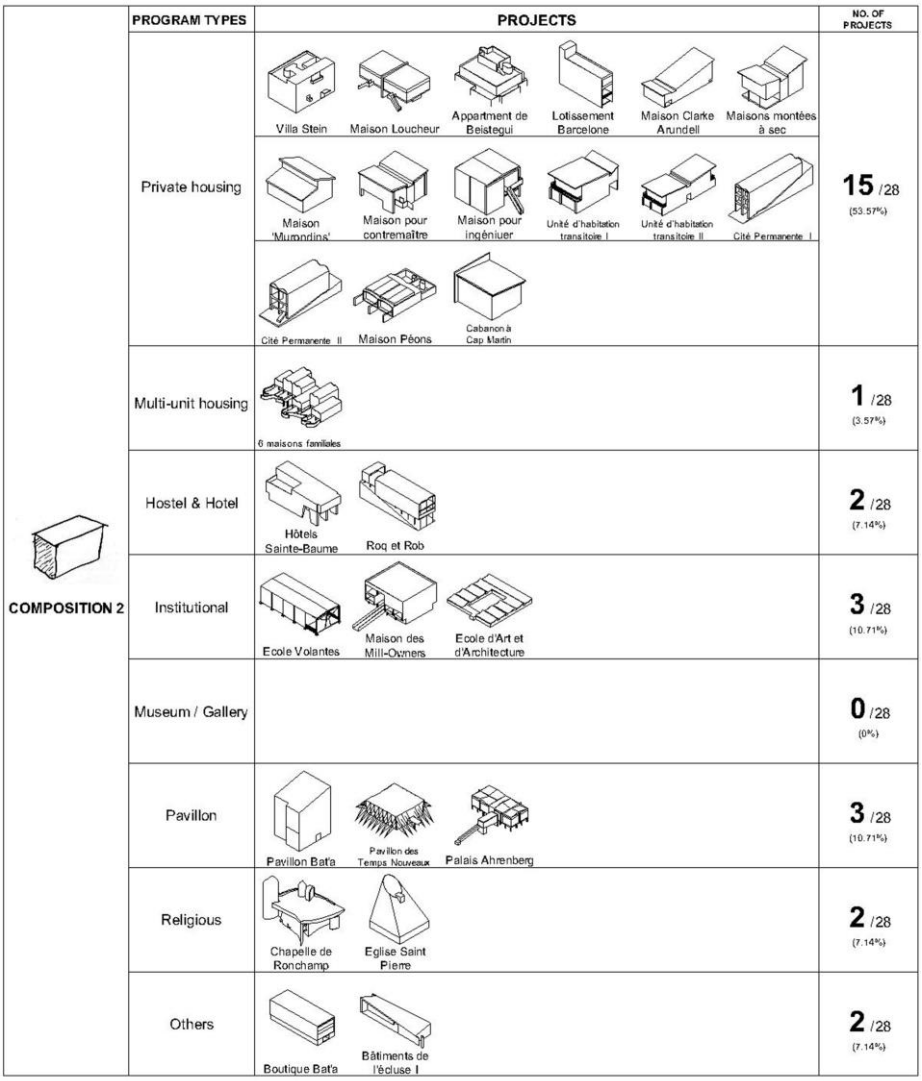


Table 4-3 Program type comparison between projects of Second Composition

Analysis into [Table 4-3] shows more program types involved for Second Composition as compared to that of First Composition. Although Second Composition can be seen used by Le Corbusier in various building types such as multi-unit housing, hotel and hostel, institutional building, pavilion, religious facility and others, a majority of 53.75% of projects are of private dwelling projects.

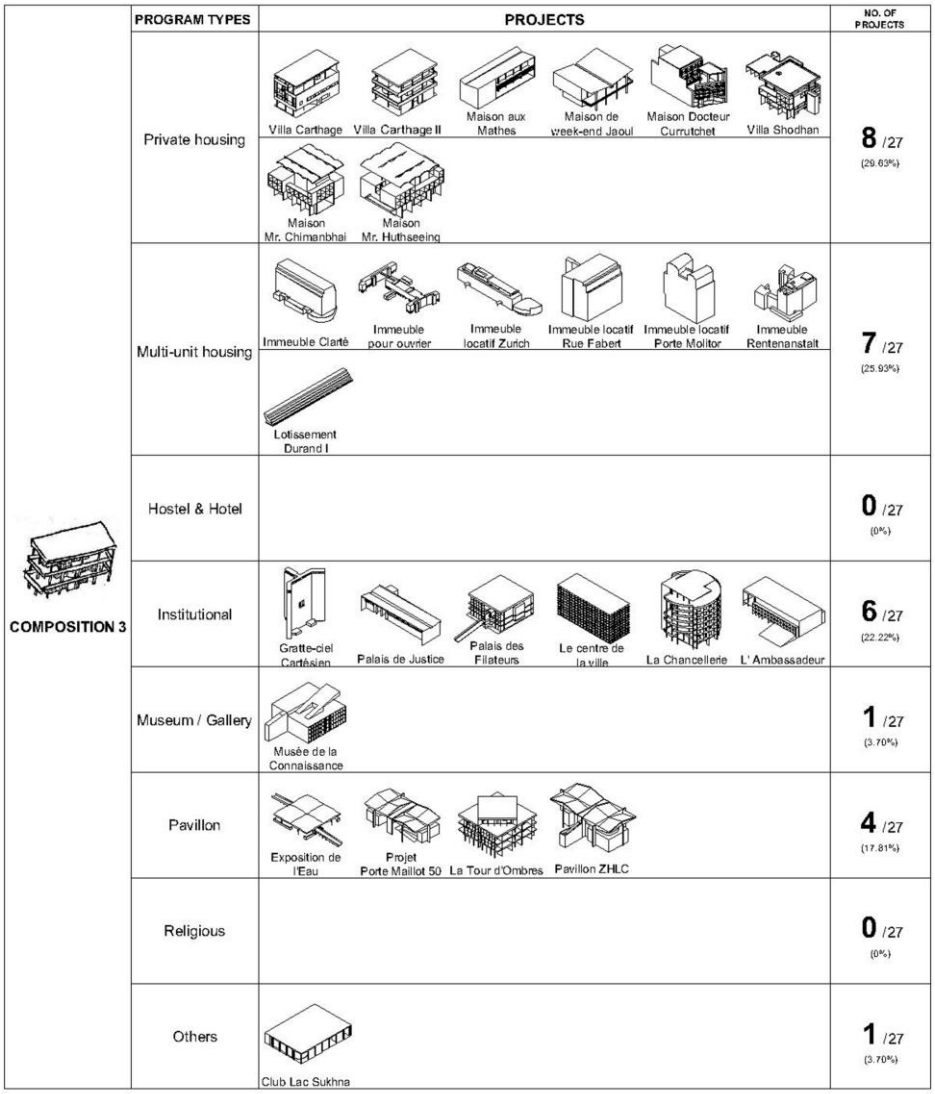


Table 4-4 Program type comparison between projects of Third Composition

Private housings, multi-unit housings, institutional buildings, museum, pavilions, and clubhouse are the program types found among projects of Third Composition. Compared to First and Second Composition, Third Composition has a considerably balanced ratio of housing projects to non-housing projects, at 15:12.

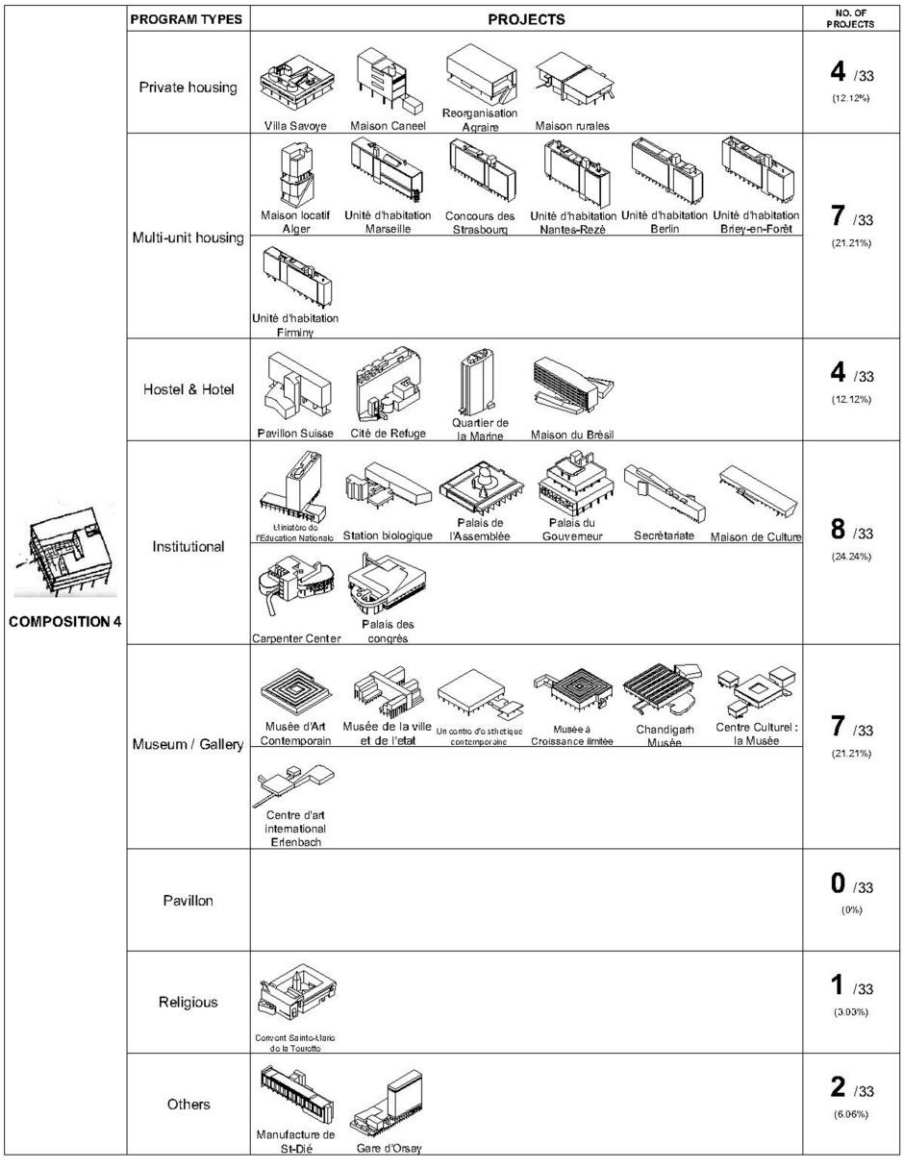


Table 4-5 Program type comparison between projects of Fourth Composition

Fourth Composition on the other hand, has the most variety of program types among its projects. With the exception of pavilion, Fourth Composition was applied in all the identified project types among the 104 case studies, as shown in [Table 4-5]. A closer look into the result of comparison also shows the ratio of

housing to non-housing program type at 11:22, hence suggesting Le Corbusier's preference on non-housing projects with Fourth Composition.

4.3.1.1 Speculation on reasons for program type-based selection tendency

The result of comparison between program types of projects for each respective composition suggested Le Corbusier's selection tendency of the composition to be used for each project. For example, First Composition which organically grows from *promenade architectural* into exterior form is seen to be used mainly in private housing projects. The non-repetitive space planning of private dwellings that encourages a free and unrestricted *promenade architecturale* coincides with that of First Composition. Hence, this results in a '*mouvementé* and *pittoresque*' interior space and later exterior form.

Next, self-determined limitation of *prism pur* enabled Le Corbusier in dealing with program types of higher complexity, without the need to be cautious of the resulted building proportion. This hence expanded the possibility of Second Composition towards application in projects beyond private housings. However, due to the limitation of load bearing structure, this design strategy is only restricted towards low-rise and small-scale projects, explaining why the application of Second Composition by Le Corbusier was still directed more towards private housing projects compared to the other project types.

In contrary, Third Composition that is 'easy, full of possibilities' and Fourth Composition that is 'pure, ample and full of possibilities' show better flexibility and versatility for various program types. Third Composition with the

utilization of Dom-Ino structure enables *plan libre* that is adaptable to any interior space requirement; Fourth Composition is compliable to most project types through modification of combination configuration between First, Second and Third Composition. The flexibility and modifiability nature enables both Third and Fourth Composition to deal with requirement and limitation of various project types. As a result, Third and Fourth Composition was highly experimented by Le Corbusier in dealing with projects of different nature and genre.

4.3.2 Selection tendency based on project scale

Compositions	Total Area (m^2)	Average Area (m^2)
First Composition	4,821.72	401.81
Second Composition	21,252.83	759.03
Third Composition	416,023.78	15,408.29
Fourth Composition	831,035.85	25,182.90
Others	221,694.62	55,423.66
Total	**149,428.80**	**14,373.35**

Table 4-6 Total area and average area of projects for each composition

Analysis of average area for projects categorized under each composition in [Table 4-6] above shows Le Corbusier's tendency of design strategy selection in relation to project scale. An apparent difference between average project area between First, Second Composition and Third, Fourth Composition can be observed.

First Composition, consisting mostly of private dwelling projects has a total area of 4,821.72 m^2, with 401.81 m^2 average area for 12 projects. Being the least utilized composition and mostly utilized in private housing projects, First Composition shows the lowest project average. Second Composition which is the 2nd most used composition by the architect surprisingly comprises of comparatively small-scaled projects. A total of 21,252.83 m^2 for 27 projects, with an average of 759.03 m^2, Second Composition has the second lowest average project area among the 4 compositions, suggesting a possible preference of Le Corbusier towards First and Second Composition in dealing with private housing as well as other small-scale projects.

On the other hand, Third Composition, with 15,408.29 m^2 of average project area, occupies the mid-scale project range of Le Corbusier's post 'Les 4 Compositions' works. Fourth Composition, comprising of high-rise projects such as Le Corbusier's infamous *Unité d'habitations*, museum designs based on *Musée à croissance illimitée* prototype, Cite de Refuge and etc made up the largest average project area amongst the 4 compositions, with 31,059.37 m^2 average project area. This indicates a clear preference of Le Corbusier in resorting to both Third and Fourth Composition for projects of larger scale and higher complexity.

4.3.2.1 Speculation on reasons for project scale-based selection tendency

The lack of order and hierarchy nature of First Composition requires the use of *traces regulateurs* in order to control and regulate the proportion of the exterior forms poses a limitation to the applicability of this composition with respect to the size of a particular project. Hence, private housing projects which are of low-rise and smaller total area were preferred by Le Corbusier for First Composition due to the need to be extra cautious of the resulted exterior form.

Despite being the 2nd most preferred design strategy of Le Corbusier, with 27 among 104 identified as Second Composition, this *trés difficile* composition has a comparatively low average project area. The rigid predetermined *prism pur* limitation of this composition is highly vulnerable in producing large building volume with unbalanced 'center of gravity of architecture' following the increase of project scale, similar to that of an old masonry architecture in which Le Corbusier

was trying to avoid.[53]

Instead, skeleton structure of Dom-Ino creates 'architecture with lighted floors', where floors are carried on thin columns spaced far apart.[54] This effectively and economically resolves structural difficulties faced by traditional masonry architecture, especially in multi-storied and high-rise projects which were made possible with design strategy proposed through Third Composition.

Similarly, Fourth Composition with the largest average floor area of 55,423.66m² among the 'Les 4 Compositions', suggested Le Corbusier's inclination towards large-scale projects for this composition. Typically utilizing *pilotis* to carry the measurable rigid volume above ground, center of gravity of the architectural composition is raised above the ground, resulting in a lighter, proportionally and dimensionally ideal overall building volume[55], as shown in Le Corbusier's explanatory sketch of [Figure 4-6]. This is especially critical with the increase of project size and scale.

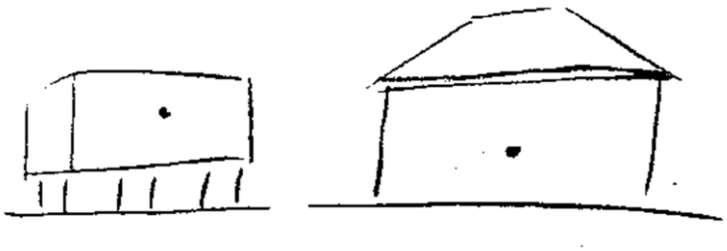
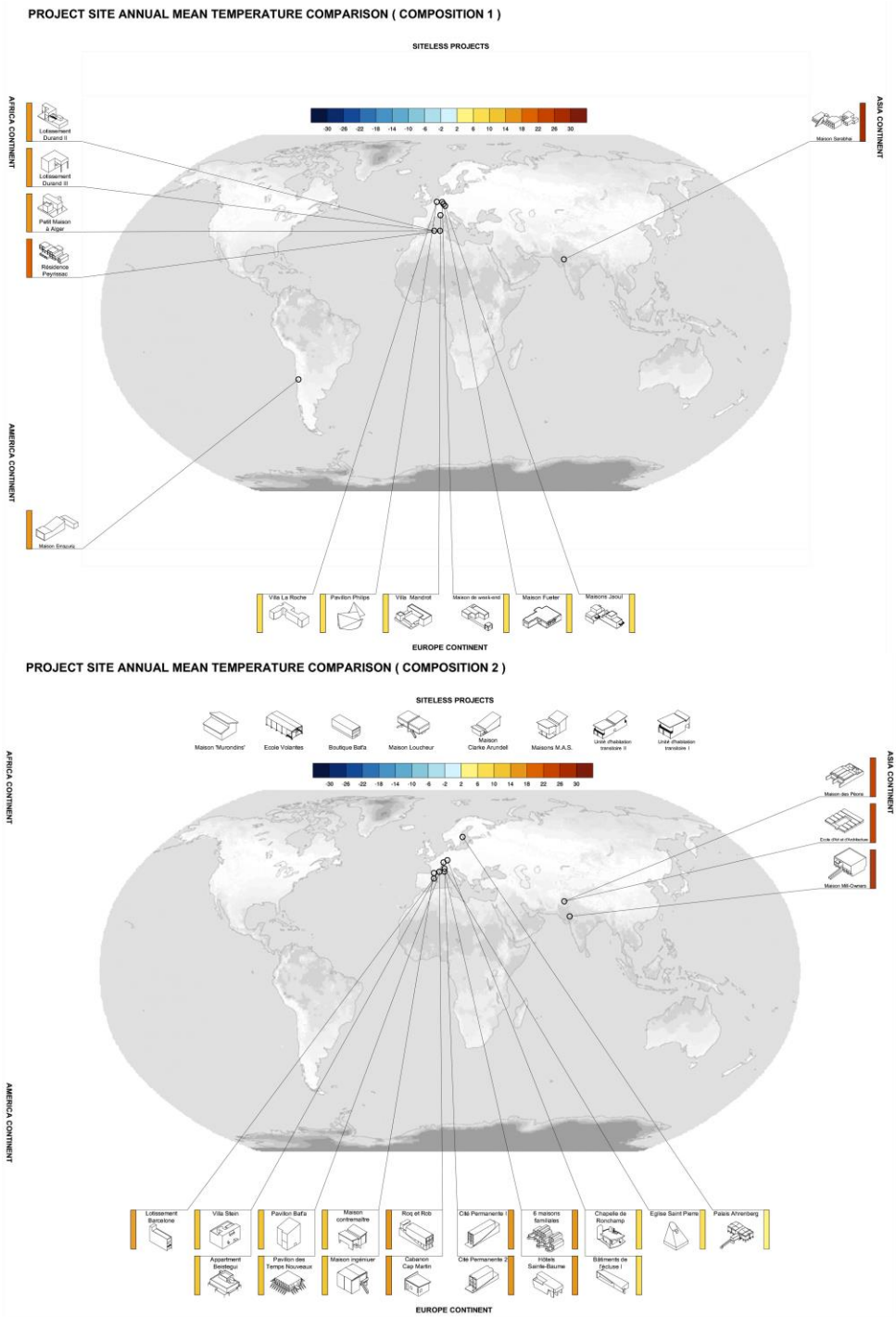


Figure 4-6 Comparison between center of gravity of architectural composition between volume lifting *pilotis* and traditional masonry architecture (Source: Precisions)

[53] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 50-52
[54] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 38
[55] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 56-57

4.3.3 Selection tendency based on project site location and temperate climate



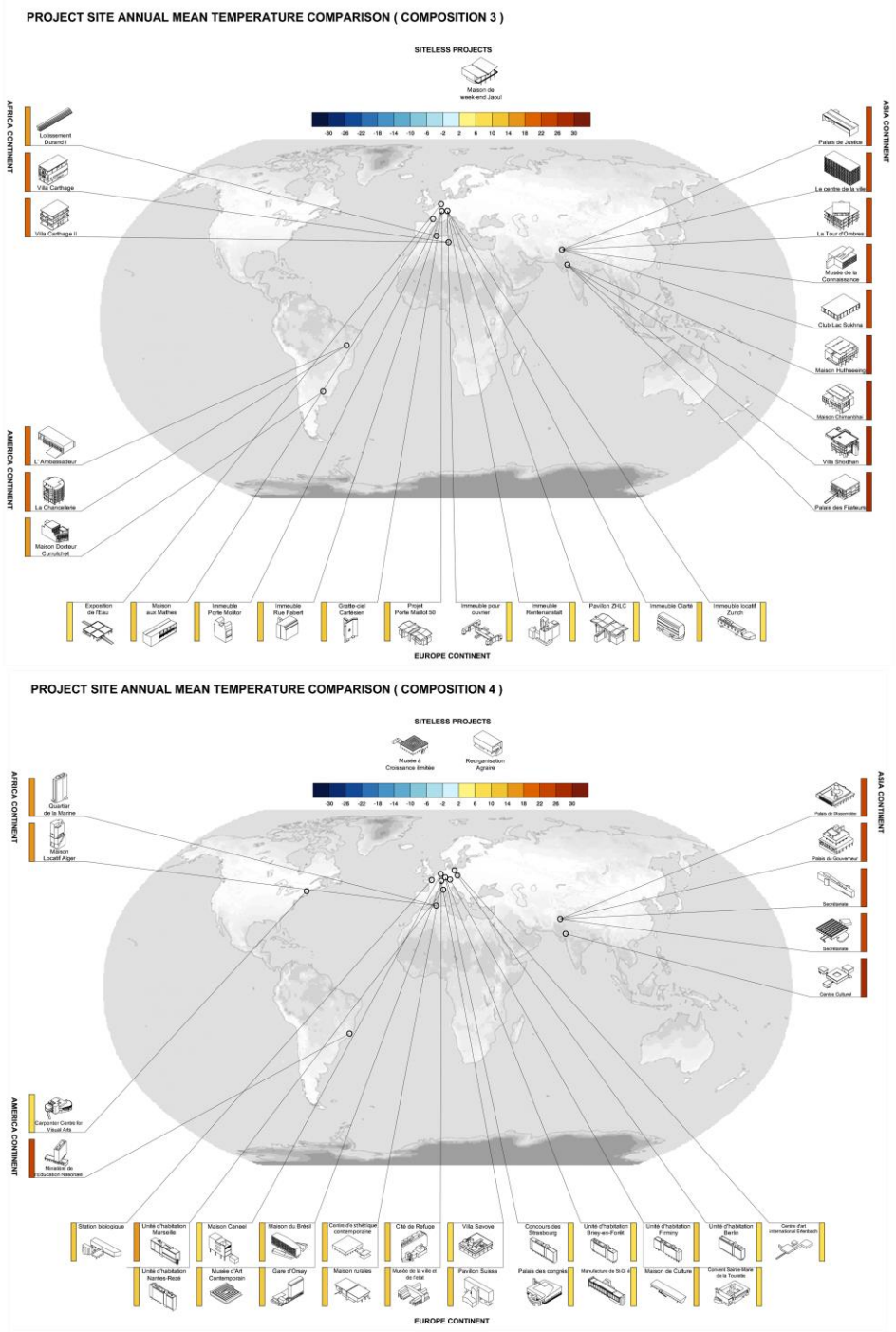


Figure 4-7 Comparison between site temperate climate and location of projects for each composition (Source: Author)

Compositions	No. of projects based on annual mean temperature of site			
	< 0 °c	0 °c – 18 °c	> 18 °c	Siteless
First Composition	0	10	2	0
Second Composition	2	15	3	8
Third Composition	0	13	13	1
Fourth Composition	0	25	6	2
Others	0	4	0	0
Total	**2**	**67**	**24**	**11**

Table 4-7 Number of projects for each composition based on site annual mean temperature

Investigation into result of comparison between site temperate climate and location of projects for each composition, as shown in [Figure 4-7] and [Table 4-7], First and Second Composition, mostly of masonry or concrete load bearing structure, were shown to be preferred for projects located in the European continent, where annual mean temperature are mostly low, and range between 0°c to 18°c. However, few exceptions of projects located in the comparatively hotter region of Africa, Asia and America can be found among both compositions (First Composition with 16.67% and Second Composition with 10.71% of projects with sites of annual mean temperature higher than 18 °c). As a matter of fact, Second Composition has the most number of siteless projects, with 8 non-site specific prototype projects.

Third Composition has the highest percentage of hot temperate climate project, at 48.15% of projects located in regions of hotter climate (annual mean temperature higher than 18 °c). Whereas, Fourth Composition even though consists of Third Composition characteristic, were found to be not as preferable as of Third

Composition for projects in hot climatic areas. Fourth Composition was still mainly used for projects in the cold European continent, with 75.76% of projects of site annual mean temperature between 0 ℃ to 18℃ and only 18.19% of projects with average temperature more than 18℃.

4.3.3.1 Speculation on reasons for site location and temperate climate-based selection tendency

The load-bearing structure nature of both First and Second Composition were deemed suitable to the climatic characteristics of European region by Le Corbusier. However, Second Composition though composed mainly of projects located in European region with cool temperate climate, few exceptions of projects can be found. Maison Peons (1951), Ecole d'Art et Architecture (1964) and Maisons des Mill-Owners (1952) were added with *brise soleil* façade feature, in order to allow better air ventilation as a countermeasure towards the hot temperate climate of Indian region. Similarly, for First Composition, the 2 projects located in hot climatic regions are Résidence Peyrissac (1942) and Maison pour Madame Sarabhai (1955), where semi-porous skin is achieved through controlled application of *brise soleil* to encourage air flow while regulating downpour and day lighting into the building.

As stated by Le Corbusier, that Third Composition is an "ingenious type appropriate to certain climates"[56], which in this case proven to be of hot temperate

[56] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 134

climate. Dom-Ino structure of Third Composition enables structure-free façade, in which encourages air flow and control natural lighting through the feature of *brise soileil*. Hence, Third Composition was highly preferred by Le Corbusier as a countermeasure in dealing with projects of hot climates.

However, though view as the solution among the 4 compositions of 'Les 4 Compositions', Fourth Composition has a low hot to cold temperate climate ratio of 6:25. Generally made up of *pilotis* that raise the main volume above ground, the use of Third Composition elements in a Fourth Composition project usually consist only of the lower section of the overall building form. Whereas, Second Composition still made up the main body of the building. Hence Fourth Composition was deemed less ideal, as compared to Third Composition in dealing with site context of hot temperate climate.

4.3.4 Selection tendency based on building height

The investigation into building height of projects for each composition shows that both First and Second Composition were only preferred for projects of lower building heights. For example, projects categorized under First Composition have building height ranging from 1 to 3 floors, while Second Composition is of 1 to 4 floors.

In contrary, with projects of height ranging between 1-58 floors (mostly ranging from 1 to 12 floors, with an extreme value of 58 floors), Third Composition can be seen utilized mainly in low-rise projects. Whereas, Fourth Composition is utilized in low rise, high rise as well as skyscraper projects, with buildings ranging from 2 to 48 floors (mostly between 2-27 floors, with an extreme value of 48 floors).

4.3.4.1 Speculation on reasons for building height-based selection tendency

Mostly of load bearing concrete or masonry structure, First and Second Composition pose limitation in dealing with multi-storey building. Technical and economical constraint in resolving structural issues of load bearing structures hence limited Le Corbusier's application of both First and Second Composition in projects of building height between 1 to 4 floors.

With the use of Dom-Ino structural system for 'architecture of lighted floors'[57], the Third and Fourth Composition are highly feasible with multi-storey buildings (may it be of high-rises or skyscrapers). By having the floor weights are

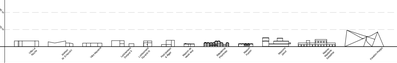
[57] Le Corbusier, *Precisions* (Massachusetts: MIT Press, 1991). pg 40

carried with thin columns spaced far apart, one hundred percent of the ground is free in every direction.

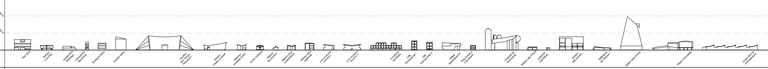
Furthermore, the use of *pilotis* in carrying the measurable rigid volume above ground raises the center of gravity of architectural composition, resulting in a lighter, proportionally and dimensionally ideal overall building volume. This hence enables Fourth Composition to be applied in high-rise or skyscraper projects without the concern of the overall proportion of the resulted building.

PROJECT HEIGHT COMPARISON (SCALE 1 : 3000)

COMPOSITION 1

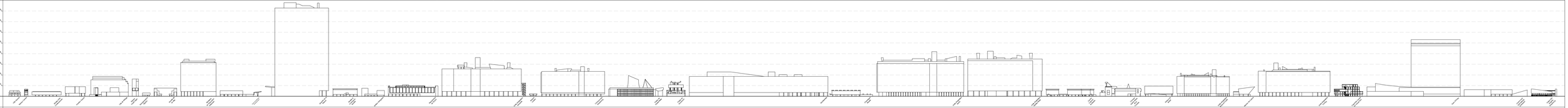


COMPOSITION 2

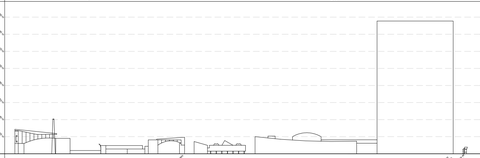


COMPOSITION 3

COMPOSITION 4



OTHERS



4.4 Summary

This chapter attempted to examine Le Corbusier's utilization of 'Les 4 Compositions' though both quantitative and qualitative analysis for better understandings of his selection characteristics and tendencies for all the 4 compositions.

Quantitative analysis of the categorization result shows that Fourth Composition is the most preferred design strategy by Le Corbusier, with 33 out of the total 104 projects (31.71%) identified as of this composition. On the other hand, with 11.54% or only 12 projects, First Composition was found to be the least utilized design strategy among the 'Les 4 Compositions'. Second Composition with 28 projects (26.92%) and Third Composition with 27 projects (25.96%) came in as second and third place respectively.

Next, chronological analysis of Le Corbusier's trend of selection of 'Les 4 Compositions' also exhibited recognizable changes throughout the 37 years, from the year 1929-1965. Le Corbusier started with an almost even preference towards all 4 compositions right after the proposal of 'Les 4 Compositions' in 1929, this trend changed drastically during and after World War II era in Europe. From the year 1939 to 1945, when Le Corbusier's architectural practice was interrupted with a noticeable decline in project commissions, he showed an inclination towards Second Composition, as the design strategy for prototype housing designs that were site-independent. It was not only until 1951, following Le Corbusier's active architecture activities in India that his preference switch intensely towards the Third

and Fourth Composition that are ‘full of possibilities’.

Then Le Corbusier’s application of ‘Les 4 Compositions’ was examined from the 4 aspects of program type, project scale, site temperate climate, and location as well as building height, in order to have better understandings of the architect’s reasons and considerations behind the selection of each composition. The result of analysis is shown in [Table 4-8]

Composition	Findings	Speculation of reasons
Selection tendency analysis based on program type		
First Composition	High tendency of application in private housing projects	Limitation of load-bearing structure
Second Composition	More variations of project type but still mostly of private houses	Limitation of load-bearing structure
Third Composition	Even distribution among various project types and even ratio of housing projects to non-housing projects at 15:12	Dom-Ino structure enables *plan libre* that is efficient in both repetitive and non-repetitive space planning
Fourth Composition	Even distribution among various project types with ratio of housing to non-housing projects at 11:22	Compliable to most project types through modification of combination configuration between C1, C2, and C3
Selection tendency analysis based on project scale		
First Composition	Smallest average project area at 401.81m^2	Lack of order and hierarchy nature of First Composition poses limitation to the applicability of this composition
Second Composition	Average project area at 759.03m^2	Rigid *prism pur* limitation is highly vulnerable to producing heavy building volume
Third Composition	Average project area at 15,408.29m^2	‘Architecture with lighted floors’ that resolves structural difficulties of traditional masonry architecture
Fourth Composition	Largest average project area at 25,182.90m^2	Use of *pilotis* raise the center of gravity of architectural composition, resulting in light, and proportionally ideal volume

Composition	Findings	Speculation of reasons
Selection tendency analysis based on project site location and temperate climate		
First Composition	Preferred for projects located in European continent of cooler climate	Advantage of load-bearing structure
Second Composition	Preferred for projects located in European continent of cooler climate	Advantage of load-bearing structure
Third Composition	Highest percentage of hot temperate climate project, at 48.15%	Dom-Ino structure enables structure-free façade which encourages air flow and control of natural lighting
Fourth Composition	75.76% of projects with cool site climate and only 18.19% of projects with hot site climate	Usually made up of rigid and solid main volume which is less ideal in projects with hot site climate
Selection tendency based on building height		
First Composition	Building height ranging from 1 to 3 floors	Limitation of load-bearing structure
Second Composition	Building height ranging from 1 to 4 floors	Limitation of load-bearing structure
Third Composition	Building height ranging mainly from 1 to 12 floors	Dom-Ino structure economically and effectively resolve limitation of traditional masonry architecture
Fourth Composition	Building height ranging mainly from 2 to 27 floors	Use of *pilotis* raise the center of gravity of architectural composition, resulting in light, and proportionally ideal volume

Table 4-8 Summary of selection tendency analysis

CHAPTER 5

Conclusion

Le Corbusier in 1929 through the publication of *Œuvre Complète* Volume I proposed 4 different compositions or design strategies of 'Les 4 Compositions', which remained as a perfect example of the architect's attempt in approaching the relationship between internal programs and external form. 'Les 4 Compositions' can be regarded as a vital milestone in the architect's career.

Through this study, 'Les 4 Compositions' is shown remained highly utilized by Le Corbusier even after his proposal of the principle in 1929. 'Les 4 Compositions' was proved to be highly applicable in varieties of building typology, besides the originally intended private housing projects, through the observation into the architect's post-1929 architectural proposals published in *Œuvres Complétes* Volume 1-8.

Described by Le Corbusier as a composition 'very pure, very ample, also full of possibilities', Fourth Composition is identified to be the most preferred design strategy by Le Corbusier, with 33 projects (31.71%) out of 104 projects. The 2nd most preferred design strategy is the *trés difficile* Second Composition with 28 projects (26.92%), next to Third Composition with 27 projects (25.97%). First Composition with only 12 projects (11.54%) is the least preferred design strategy by Le Corbusier.

Through the development of variations for all the 4 compositions, the original 'Les 4 Compositions' design strategy can be seen changed and modified in

adapting to factors such as program types, project scale, site temperate climate as well as building proportions by Le Corbusier. This hence proved that Le Corbusier's application of 'Les 4 Compositions' is site-specific and site-dedicated.

Distinct application trend of 'Les 4 Compositions' by Le Corbusier can be observed through the analysis of categorization result of this study, in relation to major events that took place in Le Corbusier's last 37 years of career. Evenly distributed among all the 4 compositions shortly after the proposal in 1929, Le Corbusier's preference of design strategy can be seen first inclined towards Second Composition during World War II in Europe (1939-1945) and finally towards Third and Fourth Composition following his architectural activities in India.

Though a few projects, namely Palais des Soviets (1931), Palais des Nations Unies (1947), Musée National d'Art Occidental (1958) and Bâtiments de l'écluse II (1960) were deemed uncategorizable with 'Les 4 Compositions'. These projects either show mere attachment of different compositions, an improved and developed 'Les 4 Compositions', or a totally new design strategy attempt other than the proposed 'Les 4 Compositions'. This suggested possible development of a brand new composition, in which further investigation into this particular topic was not possible due to time and resource constraints of this study. Hence, future studies on 'Les 4 Compositions' may be directed towards this particular subject, for a more comprehensive understanding of this less known principle by Le Corbusier.

Appendix

Annual Mean Temperature of Projects

No.	Project	Year	Location	Annual Mean Temperature
Others				
1	Palais des Soviets	1931	Moscow, Russia	4.0
2	Palais des Nations Unies	1947	New York, USA	13.1
3	Musée National d'Art Occidental	1957	Tokyo, Japan	15.0
4	Bâtiments de l'écluse II	1960	Kembs-Niffer, France	8.0
First Composition				
5	**Villa La Roche**	1923	Paris, France	12.4
6	Maison de M. Errazuriz	1930	Chile	17.0
7	Villa de Madame H. de Mandrot	1930	Le Pradet, France	15.0
8	Lotissement Durand II	1933	Algiers, Algeria	17.0
9	Lotissement Durand III	1933	Algiers, Algeria	17.0
10	Petit Maison à Alger	1933	Algiers, Algeria	17.0
11	Maison de week-end	1935	La Celle-St-Cloud, France	9.0
12	Résidence Peyrissac	1942	Cherchell, Algeria	18.1
13	Maison Fueter	1950	Constance Lake, Switzerland	8.0
14	Maisons Jaoul	1954	Neuilly-sur-seine, France	10.0
15	Maison pour Madame Sarabhai	1955	Ahmedabad, India	27.8
16	Pavillon Philips (exposition internationale Brussels)	1958	Brussels, Belgium	10.0
Second Composition				
17	**Villa Stein**	1927	Garches, France	10.0
18	Maisons Loucheur	1929	-	-
19	Appartement de M. Charles de Beistegui	1930	Paris, France	12.4
20	Immeuble Clarté	1930	Geneva, Switzerland	10.5
21	Immeuble locatif Rue Fabert	1932	Paris, France	12.4
22	Immeuble locatif Zurich	1932	Zurich, Switzerland	9.3
23	Immeuble locatif Porte Molitor	1933	Paris, France	12.4
24	Lotissement Barcelone	1933	Barcelona, Spain	15.5
25	Boutique Bat'a	1936	-	-
26	Pavillon Bat'a	1937	Paris. France	12.4
27	Pavillon des Temps Nouveaux	1937	Paris, France	12.4
28	Maison Clarke Arundell	1939	-	-
29	Maisons montées à sec (M.A.S.)	1939	-	-
30	Ecole Volantes	1940	-	-
31	Maison 'Murondins'	1940	-	-
32	Maison pour contremaître	1940	S.P.A. Lannemezan, France	-1.0

No.	Project	Year	Location	Annual Mean Temperature
33	Maison pour ingéniuer	1940	S.P.A. Lannemezan, France	-1.0
34	Unité d'habitation transitoire (avec rue exéterieure)	1944	-	-
35	Unité d'habitation transitoire (avec rue intérieure)	1944	-	-
36	6 maisons familiales	1948	La Sainte-Baume, France	14.0
37	Cité Permanente (Type 1)	1948	La Sainte-Baume, France	14.0
38	Cité Permanente (Type 2)	1948	La Sainte-Baume, France	14.0
39	Hôtels Sainte-Baume	1948	La Sainte-Baume, France	14.0
40	Roq et Rob à Cap Martin	1949	Cap Martin, France	14.8
41	Chapelle de Ronchamp	1950	Ronchamp, France	9.0
42	Maison des Péons	1951	Chandigarh, India	24.0
43	Cabanon à Cap Martin	1952	Cap Martin, France	14.8
44	Maison des Mill-Owners	1952	Ahmedabad, India	27.8
45	Bâtiments de l'écluse I	1960	Kembs-Niffer, France	8.0
46	Eglise Saint Pierre	1960	Firminy, France	11.5
47	Palais Ahrenberg	1962	Stockholm, Sweden	6.0
48	Ecole d'Art et d'Architecture	1964	Chandigarh, India	24.0
Third Composition				
49	**Villa à Carthage**	1928	Carthage, Tunisia	18.2
50	Villa à Carthage II	1929	Carthage, Tunisia	18.2
51	Immeuble pour ouvrier	1932	Zurich, Switzerland	9.3
52	Immeuble Rentenanstalt	1933	Zurich, Switzerland	9.3
53	Lotissement Durand I	1933	Algiers, Algeria	17.0
54	Maison aux Mathes	1935	Les Mathes, France	12.0
55	Gratte-ciel Cartésien	1937	Paris, France	12.4
56	Maison de week-end Jaoul	1937	-	-
57	Pavillon Français,	1939	Liege, Belgium	9.0
58	Maison du Docteur Currutchet	1949	La Plata, Argentina	15.9
59	Projet Porte Maillot 50	1950	Paris, France	12.4
60	Palais de Justice, Chandigarh	1951	Chandigarh, India	24.0
61	Villa Shodhan	1951	Ahmedabad, India	27.8
62	Maison pour Mr. Chimanbhai	1952	Ahmedabad, India	27.8
63	Maison pour Mr. Huthseeing	1952	Ahmedabad, India	27.8
64	Palais des Filateurs	1954	Ahmedabad, India	27.8
65	Le centre de la ville	1958	Chandigarh, India	24.0

No.	Project	Year	Location	Annual Mean Temperature
66	La Tour d'Ombres	1960	Chandigarh, India	24.0
67	Musée de la Connaissance	1960	Chandigarh, India	24.0
68	Club Lac Sukhna	1963	Chandigarh, India	24.0
69	Pavillon d'exposition ZHLC (Maison de l'Homme)	1963	Zurich, Switzerland	9.3
70	La Chancellerie	1964	Brasilia, Brazil	20.6
71	L'Ambassadeur	1964	Brasilia, Brazil	20.6
Fourth Composition				
72	Maison Canneel	1929	Brussels, Belgium	10.0
73	**Villa Savoye**	1929	Poissy, France	9.0
74	Pavillon Suisse	1930	Paris, France	12.4
75	Musée d'Art Contemporain	1931	Paris, France	12.4
76	Cité de Refuge	1932	Paris, France	12.4
77	Maison locatif Alger	1933	Algiers, Algeria	17.0
78	Reorganisation Agraire	1934	-	-
79	Musée de la ville et de l'etat	1935	Paris, France	12.4
80	Ministère de l'Education Nationale et de la Santé	1936	Rio de Janeiro, Brazil	24.2
81	Un centre d'esthétique contemporaine	1936	Paris, France	12.4
82	Quartier de la Marine	1938	Algiers, Algeria	17.0
83	Musée à Croissance ilimitée	1939	-	-
84	Station biologique	1939	Roscoff, France	11.9
85	Manufacture de St-Dié	1946	Saint-Dié, France	10.9
86	Unité d'habitation Marseille	1947	Marseille, France	15.0
87	Maison rurales	1950	Lagny, France	11.8
88	Concours des Strasbourg	1951	Strassburg, France	10.0
89	Palais de l'Assemblée, Chandigarh	1951	Chandigarh, India	24.0
90	Palais du Gouverneur, Chandigarh	1951	Chandigarh, India	24.0
91	Secrétariate, Chandigarh	1951	Chandigarh, India	24.0
92	Musée, Chandigarh	1952	Chandigarh, India	24.0
93	Unité d'habitation Nantes-Rezé	1952	Rezé, France	12.0
94	Centre Culturel : la Musée	1953	Ahmedabad, India	27.8
95	Unité d'habitation Berlin	1956	Berlin, Germany	9.0
96	Convent Sainte-Marie de la Tourette	1957	Eveux-sur-l'Arbresle, France	10.0
97	Maison du Brésil , Cité Internationale Universitaire	1957	Paris, France	12.4
98	Unité d'habitation Briey-en-Forêt	1957	Briey-en-Forêt, France	9.0
99	Maison de la Culture	1960	Firminy, France	11.5
100	Unité d'habitation Firminy	1960	Firminy, France	11.5
101	Carpenter Centre for Visual Arts	1961	Cambridge, USA	9.0
102	Hôtel et palais des congrés (Gare d'Orsay)	1961	Paris, France	12.4
103	Centre d'art international Erlenbach	1963	Erlenbach, Germany	7.0
104	Palais des congrés, Strasbourg	1964	Strassburg, France	10.0

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국문 초록

‘4구성’ 분류 방식을 통해 본 르 꼬르뷔지에 1929년 이후 설계구성방식의 변화와 특성에 관한 연구

-*Œuvres Complètes* Le Corbusier 작품집 1-8권에 게재된 ‘4구성’(1929)후 설계 작품을 중심으로-

서울대학교 대학원 건축학과 빌 리 탄

지도교수 김 현 철

본 논문은 르 꼬르뷔지에 (Le Corbusier)의 건축 작품에 적용된 건축 설계 전략에 대한 분석과 이러한 전략이 그의 일생에 걸쳐 어떻게 변화하였는가에 대하여 다루고 있다. 그 시대에 가장 영향력 있는 건축가 중의 한 명이며, 또한 현대 건축의 선구자로 알려진 르 꼬르뷔지에는 순수한 볼륨 (pure forms)을 추구하기 위한 노력을 지속해서 시도하였다.

‘4구성(Les 4 Compositions)’은 1929년 발행된 *Œuvres Complètes*에 처음 소개되었다. 4개의 서로 다른 방법을 통해 내부 공간 구성과 건물 외부 형태의 관계에 대하여 설명하고 있다. 1923년에 지어진 *Villa La Roche*, *Villa Stein*(1927), *Villa Carthage*(1928)과 *Villa Savoye* 4개의 개인 주택이 설명에 사용되었고 사용된 설계전략의 장단점에 대하여 언급하고 있다. 르 꼬르뷔지에의 다른 건축 이론보다 널리 알려지지 않았지만, ‘4구성’은 공간구성과 형태구성의 관계를 *tracile regulateur* 로 조화시키는 설계전략

으로 볼 수 있다.

본 논문에서는 1929년 이후 르 꼬르뷔지에가 ‘4구성’ 이론을 적용하여 설계했는지를 증명하하기위해 *Œuvres Complètes* 책에 수록된 건축 작품과 설계안을 이용하였다. 분석 방법은 4구성을 기준으로 각각 어떤 구성에 속하는지에 대한 양적 분류로 진행하였으며 4구성의 사용 빈도를 각 작품의 연도, 용도, 크기를 기준으로 분석하였다. 이 결과로 그의 인생 전반에 걸친 건축 설계를 4구성의 관점에서 어떤 구성을 더 선호하였는지를 판단하며 시기별로 각 구성을 선택하는 빈도수가 어떻게 분포되고 변화하였는가를 분석하였다. 그리고 ‘4구성’이 아닌 다른 설계전략을 시도하였는지에 대한 연구도 하였다. 끝으로 이러한 분석결과를 토대로 ‘4구성’이 실제 건축 설계에 미친 영향 및 유용성을 판단하였다.

키워드 : 르 꼬르뷔지에, 4 구성, 4 구성후 시기, 설계구성방식, 내부공간, 외부형태

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