Roberto Gargiani

A NEW ERA OF AMERICAN ARCHITECTURAL CONCRETE: FROM WRIGHT TO SOM

FIRST VOLUME
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prologue
Surface Finishes by the Book: The Accomplishments of Architectural Concrete

chapter one. The Self-Built Construction of Wright and Residential Fabrication Systems
Wright’s Desert Concrete: Toward a Constructional Primitivism
Textile and Concrete Blocks for the Usonian Houses
The Experimental Residential Construction of Rudolph and Goldberg
The Monolithic Houses of Le Tourneau and IBEC
The Lift Slab Method by Youtz & Slick and by the Vagtborg Corporation

chapter two. The Primitive Frame of Mies
Beauty is the Splendor of Truth: Mies’s Chicago Debut
Belluschi’s Equitable Building: The Copy
The Promontory Apartments: The Degree Zero of the New Chicago Frame
Prototype Variations
Affordable Housing in Chicago, or the Miesian Aesthetic

chapter three. Prestressing and New Structures for Concrete
Prestressed Girders and the Walnut Lane Bridge
Wright’s Butterfly Bridge and Soleri’s Tubular Bridge
The Helio-Laboratory Tower in Racine
Pei and Severud’s Structure for the Helix Apartment Tower

chapter four. Kahn’s Space Frame
The Tetrahedron Floor System and Béton Brut of the Yale Art Gallery
Growth, Stratification, and Groove: The Impossible Monolith
A Space Frame for the City Hall Building

chapter five. Effects of Scale and Prestressing: Works by SOM and Mies
Goldsmith: Superstructure and Bracing
Learning from Nervi
SOM’s Quest for an Expressive Structure
The Bridges and Prestressed Girders of SOM and Kahn
New Paths of Gravity: Goldsmith and Lin
Mies’s Reinforced Trilith

chapter six. The Skyscrapers of Mies, Kahn, and Wright
The Unclear Structure of Mies and Severud for the Seagram Building
Johnson and the Enigma of Diagonal Bracing
Kahn’s Tower of Triangular Concrete Frames
The Richards Laboratories: Prefabrication and Post-Tensioning
Wright’s Tripod Frame Construction and Molded Ornament
The Illinois Mile-High Cantilever Sky-City

chapter seven. Architectural Concrete Variations, from Breuer to Saarinen
Mo-Sai Precast Concrete Cladding Panels
The Bush-Hammered Concrete of Breuer and the Sandblasting of Anshen & Allen
The Ineffable Material Substance of Saarinen’s Concrete
SOM’s Experiments for a Concrete Skyscraper
Rudolph, Pei, Harrison & Abramovitz, and Prefabricated Panels
Saarinen’s rubble aggregate concrete
Applied ornament versus texture: plastic and transfers
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Translated from the Italian by Maureen Young, with the collaboration of Silvia Groaz and Nicholas Rigo Elliott
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The volumes of the *Treatise on Concrete* intend to offer a new and documented vision of the evolution of construction techniques and of the creative potential and formal expressions of concrete, from antiquity to the present time. Each book in the series will be based on specific archival research; the analysis of scientific, technical, and iconographic original sources; and the investigation into documents made available by companies, engineers, architects, and artists. The full spectrum of the use of concrete will be covered, including the building of foundations, ports, moles, bridges, vaults, domes, fortresses, bunkers, houses, and monuments, as well as the manufacture of artificial stones and sculptures. In addition, the volumes will address the theoretical issues of béton brut, Brutalism, and the true nature of matter. All volumes focus on the techniques and materials for the manufacture of formwork, from wood to fabric; on the meaning of the imprint; on the surface processing of concrete by hand or with machine; and on the composition of the mixture. The series of books aims to provide the scientific community with a unique and updated reference on the historical and contemporary uses of concrete, which will open a new chapter in the knowledge of this crucial material for architectural construction, as well as for masterpieces of engineering and art.

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Table of Contents

**FIRST VOLUME**

Prologue
9 Surface Finishes by the Book: The Accomplishments of Architectural Concrete

Chapter One. The Self-Built Construction of Wright and Residential Fabrication Systems
17 Wright’s Desert Concrete: Toward a Constructional Primitivism
32 Textile and Concrete Blocks for the Usonian Houses
43 The Experimental Residential Construction of Rudolph and Goldberg
47 The Monolithic Houses of Le Tourneau and IBEC
53 The Lift Slab Method by Youtz & Slick and by the Vagtborg Corporation

Chapter Two. The Primitive Frame of Mies
59 Beauty is the Splendor of Truth: Mies’s Chicago Debut
65 Belluschi’s Equitable Building: The Copy
66 The Promontory Apartments: The Degree Zero of the New Chicago Frame
74 Prototype Variations
83 Affordable Housing in Chicago, or the Miesian Aesthetic

Chapter Three. Prestressing and New Structures for Concrete
93 Prestressed Girders and the Walnut Lane Bridge
102 Wright’s Butterfly Bridge and Soleri’s Tubular Bridge
108 The Helio-Laboratory Tower in Racine
113 Pei and Severud’s Structure for the Helix Apartment Tower
117 The Tetrahedron Floor System and Béton Brut of the Yale Art Gallery
123 Growth, Stratification, and Groove: The Impossible Monolith
127 A Space Frame for the City Hall Building

Chapter Four. Kahn’s Space Frame
135 Goldsmith: Superstructure and Bracing
139 Learning from Nervi
147 SOM’s Quest for an Expressive Structure
153 The Bridges and Prestressed Girders of SOM and Khan
157 New Paths of Gravity: Goldsmith and Lin
165 Mies’s Reinforced Trilith

Chapter Six. The Skyscrapers of Mies, Kahn, and Wright
171 The Unclear Structure of Mies and Severud for the Seagram Building
177 Johnson and the Enigma of Diagonal Bracing
179 Kahn’s Tower of Triangular Concrete Frames
182 The Richards Laboratories: Prefabrication and Post-Tensioning
187 Wright’s Tripod Frame Construction and Molded Ornament
195 The Illinois Mile-High Cantilever Sky-City

Chapter Seven. Architectural Concrete Variations, from Breuer to Saarinen
201 Mo-Sai Precast Concrete Cladding Panels
206 The Bush-Hammered Concrete of Breuer and the Sandblasting of Anshen & Allen
214 The Ineffable Material Substance of Saarinen’s Concrete
223 SOM’s Experiments for a Concrete Skyscraper
226 Rudolph, Pei, Harrison & Abramovitz, and Prefabricated Panels
238 Saarinen’s Rubble Aggregate Concrete
246 Applied Ornament Versus Texture: Plastic and Transfers

**SECOND VOLUME**

Chapter Eight. Shells and Formwork: A New World of Forms
255 Neff’s Airform House
259 Wright’s Guggenheim Museum, or the Gunite Spiral
265 The Construction Site of the Monolith without Imprints
273 Kiesler’s Endless House and Johansen’s Sprayed Concrete House
287 Cosanti and Arcosanti by Soleri: Modeling Concrete with Earth
298 Saarinen, Nowicki, and Yamasaki: The New Search for Symbolic Forms
310 The Rise of Shells and Candela’s Hyperbolic Paraboloid
318 Warped Surface Structures by Catalano and Caminos
324 The Prefabrication of Structural Shells in the Manner of Nervi
331 Breuer’s Hyperbolic Paraboloids and Pleated Walls
347 The Pleated Shells of Harrison & Abramovitz
355 Distinctive and Memorable: Saarinen’s Airport Terminals
356 Thin Shells in Sprayed Concrete at the New York World’s Fair
375 Cast and Prefabricated Earth Form Shells
379 The Diffusion of Gunite Shells
388 Empathic Shells by Johnson and Lautner

Chapter Nine. The Béton Brut and Architectural Concrete of Kahn, Breuer, Pei, Mies, and Le Corbusier
395 Kahn’s Concrete Blocks
397 The Béton Brut of the First Unitarian Church
399 The Concrete of Kahn’s Disciples
402 Graphic Textures of Breuer’s Begrisch Hall
408 The Cast-in-Place Technique Restudied by Pei & Associates
416 Prestressing and Sandblasting
422 Structure versus Plasticity: The Immutable Concrete of Mies and his Epigones
430 Le Corbusier Smooths His Style: The Carpenter Center

Chapter Ten. Truth and Disguises: Johnson, Stone, Harrison, and Yamasaki
437 Concrete and the Reasoned Copy According to Johnson
443 Distorted Conjunctions: Non-Miesian Directions
447 Neo-Classicism versus Concrete
455 Edward Durell Stone and Concrete Veils
460 Accumulation of History
465 Harrison and the Egg
470 The Metaphors of Yamasaki
Chapter Eleven. The Liquid Stone of Rudolph and Kahn
477 The Highly Textured Surfaces of Rudolph
485 Graphic Surface Effects or Concrete Techniques
488 The Sieve Tray Device and the Nature of the Material
490 Corduroy Concrete: Grooving and Chipping
503 Concrete Block with Chipped Grooves
514 The Discovery of Concrete Dripping
519 Ready-Made Transfers: The Horrors of Double Casting
522 The Liquid Stone of Kahn: the Construction Site of the Salk Institute
526 The Philosophy of the Panel: Juncture Strip, Pour Joint, Shrinkage Joint, Cold Joint
530 The Erasure of Wood Imprints
532 Post-Tensioned Shells for the Kimbell Art Museum
536 Research into the Inherent Properties of the Material

Chapter Twelve. Against the Metallic Curtain Wall
539 The Exotic Farce of Modernity, from Hawaii to Kentucky
547 The Prefabricated Panels of Gropius and Emery Roth & Sons
553 The Schokbeton of the American Architects, from SOM to Breuer

THIRD VOLUME

Chapter Thirteen. SOM and the Vital Spirit of America
563 Structures in Concrete or Steel: Prototypes in Chicago and Houston
571 The Era of Exposed Reinforced Concrete According to Bunshaft
581 The Power of Prestressing and Post-Tensioning: Exceptional Measures of Space
591 The Oakland Coliseum: The Building of a Roman Dream—and Its Variations
597 The Arbeton of Shilstone and SOM

Chapter Fourteen. In Search of New Structural Systems
603 The Spirit of Building: Saarinen’s CBS Building
608 The Tube Concept and the Transfer Girder of Khan and SOM
618 Rigid Tube Projects
620 True Structural Expression: The Formless Masterpieces of Graham and Khan
626 New Facades for Exposed Concrete for Skyscrapers According to Breuer
633 Yamasaki’s Anti-Acrophobia Mullions for Skyscrapers
640 The Teachings of Goldsmith and Khan at the Illinois Institute of Technology
645 Space Grid Structures at the Massachusetts Institute of Technology
649 Aesthetics and Technology in the Works of Nervi and Belluschi

Chapter Fifteen. Slip Forms for Skyscrapers, from Goldberg to Roche & Dinkeloo
661 Goldberg’s Marina City: A Structure for the Slipform System
672 “Structure Follows Space”: Variations
684 Condit and the New Chicago School
685 Ornament and Slipform Construction: Bay View Terrace
687 The Knights of Columbus Building by Roche & Dinkeloo
693 Johnson’s Hollow Cores and Their Disguise
699 Kahn, Catalano, Pei and the Slipform
704 Eccentric Structures for Towers and Skyscrapers

Chapter Sixteen. Monolithic, Sculptural, Graphic: the Concrete of Pei and Breuer
715 Pei’s Ribbed Concrete: Searching for the Monolithic Style of Perfection
727 The Style of Perfection
736 The East Building, Cabinet Makers’ Concrete
743 Ramified Pilotis and Molded Panels: Breuer’s “Depth of Facade”
760 Sculptor in Concrete and Cladding
766 The Ultimate Surfaces of Sympathetic Textures

Chapter Seventeen. The Monuments of Roche & Dinkeloo, Johnson, and Kahn
771 Roche & Dinkeloo’s Viaduct Structure
782 Johnson, or the Death of the Idée Fixe
787 Kahn’s Concrete: “Nothing Else”

Chapter Eighteen. Composite or Non-Linear Structure: The Enigmas of SOM
791 Bunshaft’s SOM and the Triumph of Exposed Concrete
801 Kahn’s Composite System
809 Non-Linear Structures: Netsch’s Field Theory and Béton Brut

Chapter Nineteen. Nostalgia for Béton Brut
823 Architectural Concrete: Trends and Achievements
826 Textured Beton Surface and the Anti-Establishment Years
840 Johansen’s Irreverent Brut
845 An Epigone of Béton Brut: Sert
848 The Boston City Hall: Difficult Architecture

Chapter Twenty. Epilogue: The Grid and the Mask
863 Hejduk’s Nine Square Problem and Rowe’s Chicago Frame
857 Eisenman’s “Formal Structure”
865 Venturi’s Pop Icons
872 Name Index
864 Illustration Credits
A new era for concrete begins to unfold from the early 1940s onward as a result of wartime construction, post-war economic restrictions, experimentation on the part of certain architects, and the inventions of engineers, technicians, and builders. The decision to leave materials exposed, the most distinctive and widespread characteristic of the era, gives rise to a series of technical and artistic investigations into the specific textures and symbolic values of concrete. Multiple solutions are devised reflecting wide-ranging differences in building practices and cultures: from the local and national concrete manufacturing traditions that emerged during the early decades of the twentieth century to the direct influence of contemporary art movements, the craftsmanship of construction workers and builders, and lastly, technical evolutions in the building materials industry in terms of both concrete mixes and formwork fabrication. It is during this period that concrete reveals itself to be the most suitable material for expressing the contemporary crisis of the universal values propagandized in the name of the International Style. Concrete demonstrates the impossibility of establishing fixed aesthetic canons. It is workable in endless ways—even becoming the means to a baffling eclecticism—and can give substance to any form and to any structure that can be modeled not only according to the orthogonal geometries of the frame but also to those of ruled surfaces.

From the 1940s onward, architects from Le Corbusier to Louis I. Kahn, from Kenzo Tange to Giovanni Michelucci, from Eero Saarinen to Paul Rudolph, Ieoh Ming Pei, and Marcel Breuer, begin a systematic exploration of concrete production in search of its true nature. Before then, those who have dared to leave concrete exposed, including Frank Lloyd Wright and Jože Plečnik, have been unable to create a significant artistic orientation, with the exception of Auguste and Gustave Perret, who have gained a certain following since the 1940s.

With its increasingly sophisticated choice of compound ingredients and production techniques, exposed concrete affirmed itself as an architectural
material in particular for its ability to produce an economical artificial stone with characteristics similar to those of natural stones. In American construction culture, this approach to concrete treatment resulted in the definition of “architectural concrete.” Coined in the early 1920s to describe the work of John J. Earley (1881–1945), architectural concrete will become a fundamental benchmark for concrete research after the World War II.¹

Technical and formal refinements in architectural concrete are documented in a popular book written by Francis S. Onderdonk, Jr., *The Ferro-Concrete Style: Reinforced Concrete in Modern Architecture*, published in 1928.² Masterworks such as those by Auguste and Gustave Perret, Max Berg, Dominikus Böhm, Karl Pinno & Peter Grund, Julius Maria Luthmann, Karl Moser, Rudolf Steiner, Antonin Raymond, Allison & Allison, and Harbin Hunter, erected with a reckless desire to leave the defects of imperfect formwork exposed, constitute isolated exceptions, the explosive force of which will not be fully grasped except by a handful of critics after World War II. In regard to the board imprints left visible in Perret’s works, “probably for the sake of economy,” Onderdonk emphasizes their contradiction with the “monolithic cube” of the “concrete structure,” in that they call attention to “the limited pieces that make the molds for unlimited concrete.”³

And yet, the practice of leaving exposed concrete untouched after stripping, and thus tattooed by the imprints of the formwork, was already taking place well before its extraordinary occurrence on the building site of Le Corbusier’s Unité d’Habitation in Marseille. Booklets and manuals devoted to concrete, issued between the 1920s and 1930s by such institutions as the American Portland Cement Association in Chicago, and by publishers like Concrete Publications Limited in London,⁴ promoted technical knowledge regarding the composition and implementation of a material capable of replacing every kind of stone and coating. These publications had already registered a broader interest in concrete textures obtainable directly by means of form imprints. The cases discussed were almost never the works of Perret or Moser, celebrated by international journals or essays on architecture, but those of lesser-known

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² For some general guidelines on concrete developments in the early 1940s, see John W. Shaver, *Improved Concrete Technology Will Aid Postwar Designer and Builder*, in “Concrete,” vol. 53, February 1945, No. 2, pp. 5–8.

architects, authors of ordinary works, thereby indicating a progressive generalization of a certain taste for exposed concrete left untouched after stripping.

While over the course of the 1940s the stated purpose of the authors of the various manuals continues to be the elimination of “imperfections in the concrete wall surfaces,” as this was the orientation of the principal and most advanced technical research in the early decades of the twentieth century, in the late 1930s and the 1940s these same manuals begin to document a growing taste for rough surfaces obtained by means of visible wood grain imprints. One can only make assumptions on the reasons for this emerging taste. The textured surfaces of wood imprints are discussed in the context of a more general explanation of ways to treat concrete to make it smooth or similar to stone. This fact should not be overlooked in an attempt to understand how the transfer of wood grain—a transmutation of concrete into wood—asserts itself as a new method for decorating the principal material of contemporary construction directly by means of its fabrication process. This low-cost type of ornamentation begins to enjoy a certain popularity that precedes the cultural and social effects of the war, even though these effects will later be considered the direct origin of béton brut. In the 1950s, British and American construction manuals will consistently be the predominant sources of practical solutions for concrete implementation; their sporadic discussion of the graphic effects of concrete surface imperfections will gradually increase in the wake of the international success of béton brut.

The poetics of béton brut is announced by the widespread diffusion, already in the 1930s, especially in the United States, of exposed concrete surfaces marked with various types of formwork imprints. In this period, these surfaces generally appear alongside concrete patterned by means of geometric moldings that are often derived from ancient ornaments stylized according to the rules of Art Deco. Significantly, a handbook published in 1929 by the Portland Cement Association discusses the “practice of leaving the concrete exterior just as it comes from the forms,” with “artistic results” that “a few years ago would have been thought quite impossible.”

The practice of casting concrete with exposed surfaces inaugurates a quest for perfection in the implementation of formwork. Indeed, it is not uncommon for manuals and other publications to discuss the perception and acceptability of defects. The deflection of the formwork components is of particular concern because it causes recesses and protrusions on the concrete surfaces. This is considered acceptable only when wood boards are used rather than plywood panels, and above all only in the case of building surfaces hidden from close view. In the second half of the 1930s, attitudes towards defects evolve to the point that they even begin to modify the parameters of architectural concrete as defined by the processes proposed by Earley. These are the types of technical details that will give rise to the most original expression of American concrete of the 1960s, that created by Kahn.

One of the most important publications regarding the new trend of treating concrete surfaces is published in Chicago in 1936 (again by the Portland Cement Association, Monolithic Concrete Buildings, Chicago, Portland Cement Association, n.d. [1929], p. 7.}

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3 Ibid., p. 55.
Association) and dedicated to the technical issue that will become crucial over the following decades: *Forms for Architectural Concrete*. The experts at the Portland Cement Association note a propensity, after an initial quest for “smooth surfaces,” for architects “to swing in the other direction until the opposite extreme,” that is, toward the use of “unusually rough textures,” albeit occasionally. They observe that architects now have available a “range of textures from those of glass-like smoothness, produced with special liners or metal molds, to those rugged textures obtained with rough-sawed lumber in which the grain has been artificially raised by soaking with water or ammonia.”

Formwork accessories, such as nails, bolts, and ties, together with the types of wood, are discussed according to their potential for generating defects on the surface of the concrete. It is pointed out that construction joints and cold joints should be planned for, depending on the concrete castings and the general design: “sometimes the architect designates on the drawings where the joints must be located.” The use of tongue and groove joints is recommended for the formwork boards. The detail of a concrete wall shows “rough-textured surfaces” obtained “by using re-sawed square-edged lumber.” Precise descriptions are given for formwork with plywood or pressed wood panels in order to obtain a “smooth wall surface” as well as techniques to make the wood grain obvious, so as to create “rugged textures.”

*The Reinforced Concrete House*, a handbook published around 1938 by the Portland Cement Association and devoted to examples of textured walls for...
houses in exposed concrete, is another very important document, as it will be consulted in 1949 even by Kahn, the man responsible for America’s greatest original interpretations of architectural concrete. The handbook explains that “smooth forms such as metal, plywood or smooth-finish lumber are used in producing smooth and even surfaces. Rough-surfaced forms produce rough textures. Often interesting effects are produced, for example, by the impression of the grain and joint lines of form boards.” Detailed illustrations are provided for constructing the various types of forms.13

In the early 1940s, the various manuals dedicated to the enhancement of concrete surfaces tend to follow their predecessors of previous years. They are often reprints, updated with new examples and new techniques, as evidenced by the famous manual by Henry Langdon Childe (1893–?), Concrete Surface Finishes, Renderings and Terrazzo, written with William Samuel Gray (1889–1945) and published in 1935 by Concrete Publications Limited, with Childe as the editor. The manual is repurposed with significant variations in a second edition in 1943 and reprinted again in 1948. It is only in the manuals published in the late 1950s and early 1960s that we begin to see a radical renewal in the documentation of examples and techniques for concrete finishes. This fact bears witness to the international affirmation of an idea of concrete being shapeable in a wide range of finishes, ranging from the sophistication of architectural concrete to the artistic automatisms of béton brut.

In confirmation of the information provided by the Portland Cement Association regarding the popularity of certain rudimentary treatments of concrete surfaces, it should be noted that, in the 1948 edition of their manual, Childe and Gray indicate that, despite certain measures that can be taken to improve the surface quality of the concrete, “some architects have expressed a preference for concrete surfaces that resemble timber boards, and use rough boards with a view to emphasizing the grain of the wood on the finished concrete.”14 Childe and Gray apodictically outline the prevailing directions of formal research for the expression of concrete: “There appear to be two main trends in the textural finish of concrete, one striving to transfer to the concrete as faithfully as possible the grain of wood and the other requiring the surface to be as smooth as possible.”15 They also discuss “petrified timber boards.”16

Childe and Gray document other types of surface finishes, some of which are destined to become fundamental forms of expression of exposed concrete in the 1950s. A certain method of assembling the boards produces a wall subdivided into compartments, each individualized by grooves and marked by alternating imprints of vertical and horizontal boards. The resulting ornamentation of the wall surface can be seen in such examples as the Water Works building in Faribault, Minnesota, by Roy Long & Louis L. Thorshov, built by C. G. Victorson and Co.17, or the Norris Dam, built between 1933 and 1936 in Anderson County and Campbell County, Tennessee, by Roland A. Wank (1898–1970).
Other buildings with the same style of textures include the Sears Roebuck & Company Department Store, located on Wisconsin Avenue at Albemarle Street, Washington, DC, designed in 1941 by John Stokes Redden (1902–91), John Gerard Raben (1905–75), and built by the Consolidated Engineering Company, Inc., of Baltimore, Maryland, and the Community Building in Tola, Kansas.18

By now architectural concrete is heading toward an increasing prevalence of rough surfaces, including random placement of the form boards and even certain types of controlled defects. Exposed concrete of the type left unfinished after stripping and marked by form board imprints begins to be included in this category of concrete finishes. The Bathhouse, the Armory and Community Building, and the Municipal Stadium at Riverside Park in Iola, Kansas, all built by Garrold A. Griffin in 1937–38, become models for this type of finish. A photograph of the visible horizontal board imprints on the Armory and Community Building is used by the Portland Cement Association to demonstrate “ruggedness and vigor of texture” on “walls of architectural

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18 Selecting the Surface Texture for Sears Architectural Concrete Building, in “Concrete,” vol. 51, February 1943, No. 2, pp. 5–6.
19 Portland Cement Association, Wartime Vigor in Walls of Architectural Concrete, in, “Architectural Forum,” vol. 9, September 1943, No. 3, p. 135. Griffin explains that he preferred the “rough-textured walls,” because the buildings had to be erected in a park, as well as for economic reasons: “The original idea was that the lumber would be re-sawed with a band saw to produce vertical saw marks. However, the availability and price favored the use of rough lumber cut with a circle saw. This gave a slightly different texture than originally planned in that the saw marks are slightly curved. The basket weave is produced by driving small wedges between the boards and the studs. Wedges are driven behind alternate boards on the same stud and staggered on alternate studs” (Garrold A. Griffin, Park Building for Iola, Kansas, in “Architectural Concrete. Portland Cement Association,” vol. 8, 1942, (pp. 18–21), p. 20).
concrete,” and how “texture or ornamentation may be produced economically and quickly.”

The cult of smooth surfaces, which remain the principal goal of architectural concrete, also induces formwork producers to improve the quality of their products. Plyform, for instance, produced by the Douglas Fir Plywood Association based in Tacoma, Washington, results in “smooth, flawless concrete surfaces at lower costs” for “exposed concrete.” Each Plyform panel is “sanded satin-smooth, oil-treated and edge-sealed at mill,” and “joints and fins are absolutely minimized” during assembly. One of the expressive works of exposed concrete cast in formwork by the Douglas Fir Plywood Association is The South Stands, a covered addition of Husky Stadium at the University of Washington in Seattle, Washington, realized in 1949–50 by George Wellington Stoddard (1896–1967) & Associates with Sigmund Ivarsson (1899–1968) as the consulting engineer and Strang & Son as the general contractor. The building is exemplary of the smooth surfaces obtained by using this formwork.

The technical prerequisites for a wide variety of treatments for visible concrete surfaces are already well-established from the 1940s. What is still missing is a cultural and artistic vision that can give these technical prerequisites the authority to refound the very fundamentals of architecture and to move toward a new definition of truth in materials and exposed structures, in direct opposition to camouflaging of any kind.

chapter one
the self-built construction of wright and residential fabrication systems

Wright’s Desert Concrete: Toward a Constructional Primitivism
In the American culture of architectural concrete, research into form is focused on revealing the nature of materials, a concept set forth by Frank Lloyd Wright (1867–1959) and echoed in the 1942 book dedicated to his work, *In the Nature of Materials*, by Henry-Russell Hitchcock (1903–87). Wright’s reflections on concrete, including reinforced concrete, date back to the early 1900s, when he realized that one of its most important qualities, from both a technical and formal point of view, was its monolithic nature. These reflections are later articulated and enriched by his discovery of the material’s malleability, a quality that he exploits to create ornamentation, first by means of his textile blocks and culminating in the spectacular cantilevered terraces of the Edgar J. Kaufmann House, in Mill Run, Pennsylvania, also known as Fallingwater, which take full advantage of the invisible steel “nerves” within. Nonetheless, Wright proves tireless in his exploration of concrete, pursuing its hidden potential and envisioning new spaces and techniques. For several decades, to the end of the 1950s, Wright continues to pioneer various methods of working, placing, and shaping concrete into unusual structures, using Gunite and prestressing techniques.

Wright’s invention of an original mix for the construction, in the winter of 1937–38, of the low walls of Taliesin West, in the desert plains of Maricopa Mesa near Phoenix, Arizona, opens up questions about the very “nature” of concrete. The first fragment of this concrete masonry system consists in the construction of the fireplaces for Sun Trap, a temporary residence built in wood and canvas. Construction at Taliesin West continues with the Drafting Room, and is carried out during the winter months due to the desert heat. The site remains active for nearly a decade, and Wright’s approach to self-building...