AMERICAN NEW STYLE TRENDS OF TALL BUILDING DESIGN,
1985 - 1995
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ABSTRACT

Modern High-rise building has existed for at least one hundred years and will continue to be needed in future decades. At present, to break through the stereotype of tall buildings and create a new generation of distinctive high rises affected by the real demands of context is an important subject which has a close relation to the problem of endowing cities with individualities and improving our built environment. In this area, there are some new progresses made by American architects in recent ten years.

This Master’s report first reviews the development of the architecture of high-rise buildings, and then, through case studies of the typical works by the current leading American architects in tall building design, the report focuses on high-rise architecture designed or constructed between 1985 and 1995. On the basis of these case studies, the report examines and criticizes the new styles and new means in recent tall building design and identifies new trends and their significance for tall building design.

The report concludes that the most important aesthetic quality of a high-rise building is distinction which should and could grow from the specific characteristics of each project, such as its purpose, its construction technology, and its location, especially its real environmental, cultural, and historical context.
PART A

INTRODUCTION:
CURRENT ISSUES
IN TALL BUILDING
DESIGN PRACTICE
A.1 THE DEMAND FOR TALL BUILDING

High rise building has been continued for over one hundred years and will also be needed in the foreseeable future throughout the world, particularly in newly modernizing countries with high population density such as the eastern and southeastern Asian countries.

Actually, in these countries there has been a great demand for skyscrapers since 1985 and the demand remains strong at present and should be even stronger through the rest of 1990’s. For example, China, which has 22% of population of the world (totally 1,200,000,000 people) but has only 8% of the available farm land on the earth, needs to condense its cities. Consequently the need for tall building is extremely great. Just as Don Hackl, the principal of Loebl Schlossman & Hackl Architects Inc., said, “the high-rise buildings we associate strongly with in North America are actually quite appropriate to dense Asian cities. In fact, the major Chinese cities today are
comparable in some key ways to the American cities that spawned the skyscraper: they are highly centralized, rely strongly on public transportation, and want to proclaim their commercial eminence to the world * [Note 1].

Once there is a rapid economic development, the great demand for tall buildings becomes the reality of tall building construction. At present Asia is riding a widespread economic boom, one so potent that The Economist says the modernization of Asia is likely to be the most earth-shaking public event in the lifetime of those living today. Countries such as Indonesia, Malaysia, Thailand, and above all the People's Republic of China are hungry for monuments to their fast-rising prosperity. So the modernizing nations of the East are providing plentiful high-rise work for both local and foreign architects.

To architects in the United States, East Asia represents not merely an alternative to the domestic doldrums, but a gold rush in its own right. Asian clients, through invitational competitions and select negotiations, are tapping American firms to design office
buildings, retail centers, housing, hotels, resorts, and entire new towns, creating an aggregate Pacific Rim construction market worth hundreds of billions of dollars. Clients in Asia are affirming their newfound prosperity with heroic high rises and Modernist statements, offering American architects a programmatic slate that is free of Western doubts about daring, large-scale design. Undoubtedly the prosperous economy in the countries on the Asian Pacific rim has formed the main and largest market of high rise building design and construction in the world.
In this largest design market, however, there are some problems with the practice of high rise architectural design. The high rise buildings being produced there raise questions about the responsibilities architects should bear when they take their advanced technical skills into societies that have had little experience with the problems that big, Modern, Western-style development brings.

China, the largest and typical Asian country, will serve as a vehicle for the discussion of these problems.

Since 1985, the waves of a great amount of construction of tall buildings spread out in almost all the 40 major cities in the country with the economic boom. All the foreigners visiting China observe that the entire country is like one huge construction site. But much of this construction growth proceeds with little regard
for larger urban patterns. In this kind of growth a large number of high rise projects have been faced by Chinese architects. But most Chinese architects have had few opportunities to go abroad to see prominent architecture in the world and far few contacts with foreign architects. They lack knowledge about current concepts of high rise building in the industrialized countries. While the technical problems of tall buildings have been considered and solved in order to ensure that they can be built, the other aspects of high rise construction, such as urban context, environmental identity, and cultural distinctiveness, closely related to the design of tall building, have rarely received serious consideration. Also the Chinese public, clients, and government officials tend to think, in accordance with their understanding of modernization, that the new architecture of a modernizing country should look like that in the developed countries. As a result, the Chinese prefer the American form of tall buildings.

This incorrect and unacceptable preference always puts a great pressure on architects. Even though a few Chinese architects aware of
current practice concerning the construction of concepts of high-rise architecture. They eventually surrender under this pressure without making a correct choice and producing a suitable high rise architecture. So the forms of the high-rise buildings designed by Chinese architects in late 1980's seem like copies of the Western style of the 1950's and 1960's. Although built just a few years ago, the design quality of these buildings is much lower than that of similar architecture in the West thirty to forty years ago. *(Fig. A-1 *Bird's-eye view of a Chinese city*)

Since the beginning of 1990's, because of the new and stronger waves of economic boom in East Asia and a continued recession in the West, more and more foreign architectural firms,
mostly American, have entered China once the government opened the gates of its huge market to foreigners. Among these American firms are S.O.M., RTKL, John Portman & Associates, KMD, The Callison Partnership, NBBJ, Taliesin Architects, HOK, and KPF. * [Table - 2 "American architect's firms working on the projects in China *"]. With the encouragement of cooperation with foreign firms in architecture by the government's construction management policy, most projects these Western firms obtained in China are huge, primarily tall buildings.

The American knowledge of how to integrate elevators, air conditioning, and industrialized curtain walls into big commercial structures is very much in demand. Frequently projects involving American architects rank among the most ambitious China has ever built. Although the design work they did in China have been of higher level and better quality than the average level of design work by Chinese architects, unfortunately, most of these foreign firms have not made enough studies of the urban contexts of Chinese cities before completing their designs except a very small number of projects. Sometimes like the Chinese architects, the
Western architects also cater to their Chinese clients and the government departments, who have control of projects, in order to get the jobs when they also confront pressures for incorrect form preference of these clients and officials. As a result, their high rise practice in China is not as successful as expected compared with their practice in other places. *

In the monumental effort to modernize, China now is building an impressive number of high rises, some of which will be among the tallest in the world. Other foreign architects, besides the Americans, from all around the globe are now working on plans for skyscrapers to be located throughout the nation.

Only in Shanghai, the largest and most cosmopolitan city in China, hundreds of tall buildings are under construction, some designed by Western architects. There is no question that tall buildings are being used in Shanghai to boost its position as an economic center and to add a facade of high-tech stature to the city. But designs for this new generation of tall buildings should also address a range of

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*[Fig. A-2, 3, 4 "Foreign architects' works in China"]*
key issues---from exploiting innovative technology and responding to the local climate and urban context to incorporating Chinese culture and creating new landmarks. However, the new buildings are most certainly not contributing to the richness of the environment for the average Chinese man or woman. It is sad that an artistic culture as mature as China's has not found an appropriate high-rise vocabulary in which its heritage could be both preserved and expressed.

Fig. A-4:
Bank of China Headquarters,
Shanghai
A.3 THE SIGNIFICANCE OF THIS TOPIC

As we know, the high-rise is a building type that represents one of the major contributions of the USA to building history of human beings. Among all the building types, the high-rise is a type which has the greatest impacts on built environment. Because of the great effect of the huge mass volume of tall buildings on cities, the design quality of high rise building is critical to the success of urban construction. Therefore, to study and summarize the progress in tall building design in time, especially those achievements made in recent years by the architects of the US, the leading country in tall building design, is of great significance for both the present and the future of the practice of tall building design in the world.

For the Asian architects, study of tall building design, especially in the aspects of their impacts on urban context, would be very beneficial and very pressing, because their country's urban contexts with distinguished and valuable culture
are being threatened by the huge amount of construction of tall buildings which are mostly designed there improperly or unconsciously from the contextual point of view.

As a response to the current and pressing problems raised in the potentially largest marketplace of tall building construction in the world, the emphasis of this study is put on the relevant aspects, especially aesthetic aspect, of skyscraper or tall building as environmental art in urban context of social, cultural characteristics. The intent of this report is to promote the further enrichment and evolution of manners of architectural design of high-rise building based on concerns for context. According to this intent, this report concerns tall building in general, but the objects of this study are mainly tall office building and mixed-use tall building including hotel, apartments, retail, and cultural-recreational facilities. Although the new developments in structure, material, equipment, and technology of tall buildings during the period between 1985 and 1995 are not in the scope of this research, this report involves these aspects if they are related
to creating architectural style of tall building based on contextual demand.

Due to the nature of the topic, this report mainly deals with such things as facade, mass, space, form and style of tall building design. However, it does not mean that the issues of the basic functions such as usage, vertical transportation, and horizontal dispersion, the issues of the special functions such as maintenance, fire-proof, earthquake-proof, and the technological issues such as structure, material, equipment are less important in the tall building design. On the contrary, these considerations on functional and technological issues should be primary in shaping tall building forms, and take more crucial roles in tall architecture than in other types of architecture. Neither the internal driving forces of functions and technology nor the external forces of environmental and contextual demands can be neglected in design of a tall building. Both of them must be taken together into account to reach an initial concept for the formal design of a tall building comprehensively. Unlike sculpture, buildings have functional, technological, and contextual requirements
other than the artistic, and if any of these is ignored then the building has failed.

At a time almost entering the 21st century, we need particularly to establish this value: the urban context and the visual stimulation of the public should be considered as important as the needs of the users in tall building design.

However, the facts in developing countries have proved an opinion that new technology and new equipment can be introduced or imported relatively easily but the cares for cultural issues is hardly to get taken. Undoubtedly, the seriousness in the anxious situation of current tall building design practice in the Far-East has indicated the significance of this study topic.

In order to make this significant topic discussed clearly in this report, the definitions of the topic subjects are conducted as follows:

----- High-rise > 20 stories
Tall buildings ------ Skyscraper > 40 stories

---- Super skyscraper > 80 stories

From perspectives of the formal design and structural pattern, the tall buildings are
relatively different in the above three groups of the heights over 20 stories, 40 stories, and 80 stories, and meanwhile from a macroscopical perspective of city-planning, the three groups of the tall buildings shape three height classes of urban blocks in cityscape * [Fig. A-5], which can be regarded as a defining method for the separations of meanings of terms.

Fig. A-5: Cityscape: The three height classes of urban blocks

This definition not only provides clarity in expressing concepts for the special needs and purpose of this study, but also it is given without conflict with usual use of terms in the published literature in both general areas and the area of tall building architecture. Thus, the tall buildings are discussed here in this report according to these definitions.
PART B

BRIEF REVIEW OF

STYLISTIC HISTORY IN

TALL BUILDING DESIGN
In the last third of the nineteenth century, tall buildings evolved in Chicago and New York City, and skyscraper became the symbol of those cities. The idea, an American invention, was a great success and spread throughout the country and throughout the world, creating high density centers for commerce that provided convenience, efficiency, excitement, and entirely new concepts of architecture, engineering, and planning.
In the 1860s, all of the prerequisites for the skyscraper had developed, including the elevator (First practical elevator was installed in 1857), available ferrous metal, fire protection systems, and a need for tall buildings.

An entirely new idea evolved in the 1890 decade: thick masonry bearing walls were replaced by steel framing. In Chicago, this efficient new method of construction was not hidden behind eclectic facades but was clearly expressed. An honest gridiron pattern of columns and beams gave the new Chicago architecture a new appearance. No longer were tall buildings Romanesque or Gothic.

These structures were built higher and higher. In the 1890s some buildings were over 91 m (300 ft) high; in 1913, the Woolworth Building rose to 242 m (792 ft). By 1930, the Chrysler Building in New York was over one thousand feet in height, and in the following years, the Empire State Building was completed at a height of 381 m (1,250 ft)----a record that stood until 1974 when Chicago's 110-story Sears Tower reached 443 m (1,454 ft).
The rise of the skyscraper in Chicago after the Great Fire of 1871 was due in part to an understanding of the urban infrastructure as an open network or grid and of its vertical dimension as open to unrestricted growth. In the past, on the contrary, the vertical as a rule represented the sacred, and the tower acted as a landmark symbolizing the presence of forces and meanings that transcended everyday life. In other words, daily life did not take place in the tower but was provided with a spiritual component through the presence of the vertical element both in ancient Asia and Europe.

"In the American city, however, the role of the tower is fundamentally different, and accordingly the city as a whole takes on a new appearance. That is, the city was no longer the expression of a closed, integrated society but was an open framework where individuals could make their success manifest as buildings of varying height. Thus in the American city, the achievements of the individual are presented in terms of architecture, and the city becomes a
forum for freedom of choice. Today most American cities present themselves as a cluster of high-rise buildings of varying size and shape.”

* [Note 2]

In the late nineteenth century in Chicago, a unique combination of industrialization, business, and real estate came together for the development of a new and distinctive building type: the American office building.

The architectural and technical achievement of the Chicago school marked the establishment of a new style of architecture, but at the same time it was the culmination of a structural evolution that extended over the century preceding it.

The step that completed the most radical transformation in the structural art since the development of the Gothic system of construction in the twelfth century was the invention of complete iron framing or skeletal construction.

In the first Leiter by William LeBaron Jenney, for example, the interior floor and roof loads are
carried on timber joists and girders supported in turn by cast-iron columns. It has brick piers, which, however, are not essential bearing members. The piers support only themselves and serve chiefly to inclose the predominantly glass envelope of the building. Since they are not bearing members, Jenney was able to reduce them to a very narrow width. * [Fig.B-2]

The appearance is a series of slender, widely spaced piers and spandrels forming a continuous pattern from base to roof. Each of the large rectangular panels enframed by the brickwork is filled with three windows extending from floor to ceiling and separated by cast-iron mullions that extend between successive spandrels and have no bearing function. The wide openings of glass anticipate the big "Chicago window" of the next decade.

The famous Chicago window----a three-part, projecting bay that created the extremely lively, plastic facades of structures like the Tacoma and Reliance buildings of 1889 and 1890 and Adler and Sullivan's old Stock Exchange of 1893 - 94----was a device to capture as much light
and space as possible for the purpose of increasing the rental value of the offices.

The Home Insurance Building is generally believed to be the first example of true skyscraper construction* [Fig. B-3]. It represented the decisive step in the evolution of iron and steel framing, and a century of experiment and practical achievement lay behind its creation. A metal skeleton frame supported both its inner weight and outer walls. From the Home Insurance building on, the height and appearance of the tall building were to be controlled only by engineering ingenuity, economic formulas, and personal ambition.

B.1.2 ECLECTICISM and ART DECO

The Chicago School of Architecture, however, was destroyed by new forces of eclecticism, demonstrated forcefully at the 1893 World's Columbian Exposition, where eastern architects educated at the Ecole des Beaux Arts in Paris imposed the old architecture of Europe on the
World's Fair buildings. Americans were impressed, and they wanted Greek temples, Roman banks, Renaissance and Gothic skyscrapers. For thirty years, historic styles were common.

In 1922, the international competition for the Chicago Tribune tower demonstrated the full strength and variety of the eclectic skyscraper. The range of entries, from avant-grade to retardataire, documents the state of the art of the tall building at the end of the first quarter of the twentieth century. The first-prize was designed by Howells and Hood, and the second-prize was designed by Eliel Saarinen* [Fig. B-4, 5].

A style called as Art Deco can be regarded as late phase of eclecticism. The great achievements of the early 1900s culminated in the period of the Art Deco style in such fine examples as the Chrysler Building, the Empire State Building and the very model of the contemporary urban complex, Rockfeller Center.

The chrysler was the world’s tallest building for a few months, the Empire State for more than
thirty years. Both buildings are skycolumns whose capital recapitulates the overall form; both use stainless steel on a scale at the top which makes them beacons, and lighthouses at night. The mixed metaphors applied to the Chrysler crown (frozen fountain, fleche, beacon, needle, halo, sunburst, glowing dome, coroUNET, skyblender) are somewhat different from those of the Empire State (inverted test-tube, landlocked light-house, mooring mast, radio antennae), but there is no doubt what these tops do to the clouds: puncture them. The Chrysler has Art Deco stainless steel hub caps, radiating from a center line. The contour of the Empire State Building creates a graceful silhouette. * [Fig.B-6, 7, 8]
When tall buildings began to be built in US after World War II, Art Deco had faded from the scene, and there was another attempt to establish a definitive skyscraper style. The leader of this movement was the modernism architect Ludwig Mies van der Rohe. The modernists endorsed sweeping revolution in everything from art to the human condition; the modern skyscraper was seen as a creative challenge requiring an original response to technological and cultural change. This yielded
a stringent structural aesthetic of deceptive simplicity capable of a suave and distinctive elegance.

Modernism came slowly to architecture. The early modern, or International Style, skyscrapers are few in number. Their combination of form and function was supposed to be beyond style, but style was their most enduring product. Modern was the austere, avant-garde, revolutionary International Style, which became the favored style of the commercial and cultural establishment by mid-20th century.

By the end of World War II, "less is more", Mies's statement, became a governable rule for the design of high rise architecture. The mid-century corporate skyscraper brought business and technology together in a pragmatic, cost-effective way that paralleled the early Chicago School. The standard for star corporate clients and consistent commercial quality was set by the firm of SOM. All of these buildings go back to the seminal designs of Mies van der Rohe.
Skidmore, Owings and Merrill’s Lever House and Mies van der Rohe’s Seagram Building, built in New York in 1952 and 1958, respectively, are considered to be the most important representatives of Modern or International style skyscrapers and therefore directly responsible for the proliferation of “glass boxes” that beset American cities in the 1960’s.

After World War II, people in the United States were preoccupied with rebuilding America, increasing the manufacturing and labor capacity to accomplish this. Then American entered the era of increased comfort and improved performance when manufactures introduced modern air conditioning systems, better lighting, new appliances, and a host of more functional and attractive interior and exterior products. Following that, the Age of Construction Management helped improve the process of building. Then the Age of Life Safety came along, when seismic, fire safety, and environmental regulations proliferated. Following the oil embargo of 1973, we entered the Age of Energy Conservation.
Mies was a great enough architect to come close a number of times. Mies's view and expectations of a skyscraper style arose from the intellectual ferment of utopian modern architecture that appeared in Europe after World War I. Mies had begun his career as a neoclassicist, but he announced his conversion to modernism with projects for two skyscrapers enclosed entirely in glass * [Fig. B-10]. published in 1922. He too saw the novelty of this building type as the basis for a new style.

In 1946 Mies designed his first high-rise towers. He was able to realize the all-glass skyscraper with the twin apartment towers at 860-880 North Lake Shore Drive. They were designed as residential apartments, but they became the international prototype for thousands of high-rise office buildings. They were the first apartment buildings anywhere in the United States to be sheathed entirely in glass. The glass and steel structure expressed in the facade represents an ideal proportional order governed by the constraints of material and technology.
Mies's archetypal tower was a prismatic shaft with a recessed loggia at the base, which expressed the structural columns of the frame; above the frame was infilled entirely with glass and superimposed over it was a vertical array of metal mullions; its termination was a mechanical penthouse [Fig. B-11].

Seagram, another typical example of Mies's works, was a certain kind of model—it revealed a new set of possibilities for skyscrapers. The tower is a 38-story tower of bronze and glass. It rises sheer, without setbacks. It is a 'heavyweight' solution to the glass curtain wall with its bronze I-Beams, dark spandrels and glass. The bronze curtain wall is serene, the proportions are exquisite, and the detailing is almost perfect. The I-Beams serve a decorative, non-structural purpose (although they stabilize window cleaning equipment): they give vertical accent and proportion to the mass. This became the "classic" solution for modern offices [Fig. B-12].

In the design of his towers, Mies was faced with the problem of elements of the structure and at the same time expressing the nature of the
material from which the structure was formed. He developed his vocabulary from standard rolled steel sections. I-Beams, angles, and plates were welded together to form the exterior skin, the framework to which windows were attached. As a result, not only do the details reveal the architect's conceptual and structural intention, but they clearly express the technological means by which they were achieved. With the buildings, Mies established his stylistic formula for the high rise. It emphasized functionalism, structure and material.

The predominant interpretation of Mies's work was that clarity of structure was its most significant element. What he provided was structural symbolism as a high art form for a technological age. Although Mies described the source of his architecture simple as "technology", he clearly means it in the larger context of our civilization. The Miesian aesthetic has produced a twentieth-century "vernacular" style that is singularly suitable for the modern city's unique and overpowering scale.
SOM, the giant Chicago architectural firm, has brought, sometimes almost miraculously, a great aesthetic quality to the buildings of corporate America from 1950's to 1970's. The contribution of SOM was not only their own direct contribution but the broader results of the international emulation of their methods of working and their kind of design. Although their most conspicuous works were perforce fitted into the inherited urban scene, with only some slight amelioration of the immediate neighborhood by the introduction of open plazas at the base and crisp outlines at the top, they provided many of the most important and useful architectural ingredients of American city then. It can be asserted that Modernist high rise continuously evolved with the production of SOM's works.

The most important works in this period are: Lever Brothers Company Building (1952), John Hancock Center (1970) and Sears Tower (1974).
Lever Building was built in 1952 as a leading American manufacturer of household products [Fig. B-13]. Its glass-sheathed facade and new design concept set trends in office building construction that were to be reflected in many later projects and become dominant element of Modern architecture. The structure consists of two intersecting masses, balanced in their proportions but contrasting in shape. The curtain wall consists of dark green spandrel glass, contrasting window glass, and stainless steel framing.

Situated on prestigious North Michigan Avenue, John Hancock Center is the one-hundred-story, multi-use tower which tapers from bottom to top in order to accommodate the different floor space requirements of a variety of uses. The tapered form provides structural as well as space efficiency. The exterior columns and spandrel beams, together with the diagonal members and structural floors, create the steel tube. The diagonals, spandrels and columns are clearly articulated to depict the primary elements of this tube. Less than thirty pounds of steel per square foot of floor area were used in the building, equaling that of a forty-to fifty-
story traditional tower. The exterior cladding is black anodized aluminum with tinted bronze glass * [Fig. B-14].

The Sears Tower was the world's tallest building before 1985. The stepback geometry of the 110-story tower was developed in response to the interior space requirements. The configuration incorporates the unusually large office floors necessary to Sears' operation. Sears Tower is very direct in its structural solution----a new concept of cluster tubes. The building plan consists of nine 75x75 foot column-free squares at the base. Floor sizes are then reduced by eliminating 75x75 foot increments at varying levels as the tower rises. A system of double-deck express elevators provides effective vertical transportation, carrying passengers to either of two skylobbies where transfer to single local elevators serving individual floors occurs. The tower is clad in black aluminum and bronze-tinted glass * [Fig. B-15].
Although Modernist architects continually produce some excellent architecture in Late-Modern roles today, the most identical phenomenon of contemporary period is Post-Modernism. With Post-Modern appearing, some prominent American architectural firms began to exploit Post Modern skyscrapers since late 1970's. Naturally, the designs differ from one firm to the next: Helmut Jahn's skyscraper designs are different from those of Cesa Pelli.
just as Philip Johnson's vary from those of KPF. But they all have one important thing in common: a strong reaction against designs of the Modern or International style type.

The characteristics of the Post-Modern skyscraper seem to have evolved as a kind of solution to the faults of the Modern skyscraper. The Modern skyscraper, with its parallelepipedal form, appeared as an isolated object in the city, while the Post-Modern skyscraper becomes an integral part of its context. Modern design produced skyscrapers that are the result of a rarefaction of the form, of the destruction of formal values; Post-Modern design produces skyscrapers that are varied, colored, decorated. There is hardly anything to distinguish one Modern style skyscraper from the next; the Post-Modern skyscraper is distinctive, original. It possesses, it is said, an identity. In the Modern skyscraper those parts dedicated to aesthetic perception (the base and the top) have been eliminated, and the facade consists of a succession of identical floors [* Fig. B-17 ]; in the Post-Modern skyscraper, the whole is dedicated to aesthetic perception. In its transformation of skyscrapers into simple glass parallelepipeds,
Modern design took meaning away from architectural language; Post-Modern design, it is said, gives architectural language a new meaning.

B.3.1 KEVIN ROCHE

In the history of tall building design, the turning from abstract message of Late-Modernism to metaphorical language of Post-Modernism is evident in Kevin Roche’s series of high-rise works.

Kevin Roche’s youthful years were spent in Ireland; his first work experiences took place in England. After arriving in America, he decided to enroll in the university courses given by Mies van der Rohe at the Illinois Institute of Technology, then went on to work for the firm of Eero Saarinen. In his earlier works there was greater emphasis on the pointing out the structural framework because that period coincided with a general interest on everyone’s part in structural expression as the artistic
expression, really a hangover from Mies's influence in general. That attitude has gradually dissolved through the years.

His high-rise buildings completed in the 1960's and 1970's tend to become minimalist sculpture----the tight economical skin, the absence of scale, and the enormous size. Sometimes it is possible to put color on the surface by expressing the floor levels or windows, or use it to change scale, all of which address the abstract form. High-rise buildings, he believed in that period, generally should be dealt with as something seen from a considerable distance and something seen close up. His design of United Nations Plaza towers represents this thought * [Fig. B-18] and became a declaration of a form which relates to a particular period in the time of Late-Modernism.

But since 1980, his style for the tall building has an apparent turning which is seen in the projects of the E. F. Hutton building, of the two couple towers designed for Denver in 1981 * [Fig. B-19], and of the competition project of the same year for a skyscraper in Houston. All these buildings reveal the inclination toward a
certain expression other than the attitude underlying his treatment of the U. N. Plaza towers. The forms of these projects are derived not from minimalist sculpture, but more from traditional "columnar forms".

The E. F. Hutton building is a twenty-nine-floor tower. The exterior walls are made of granite, aluminum, and glass, and recede in steps from the 70-foot base to the top floor, which presents a complicated setback profile. The base, characterized by tall, modeled columns, runs along the north, west, and south fronts, linking visually on the remaining side with the roof line of the surrounding neighbor building

* [Fig. B-20].

Since the Hutton Building, Roche's works exalt the effect of the typical: his skyscrapers are one after another shaped as columns or bell towers. It is the typicality that guarantees the transmissibility of the message. Determining the appearance of the exterior, making the mask a means of communication rather than an instrument of indifference----these were the problems that Roche attempted to formulate in the 1980's.
Philip Johnson as former follower of Miesian style transferred his role in American architectural history to one of the leaders of Post-Modernism. While many American members, mostly older, of the architectural profession were passing postmodernism off as childlike folly, Johnson, who is years earlier, had sensed public dissatisfaction with modern architecture. So he drove himself to become the country's expert at stylish high-rise buildings. From Mid-1970's, his skyscrapers rely heavily on historical architectural elements, sometimes taken literally, more often reinterpreted, sometimes put together into an neo-eclectic mixture, sometimes used in a more narrow stylistic framework. Johnson has also brought back decoration with a flourish.

His AT & T Building made postmodernism, especially its historicist branch, acceptable as one of valid directions for the profession, and stands as a kind of symbolic parent of the Post-Modern generation of high-rise * [Fig. B-21]. AT & T, the icon of postmodernism, is sheathed in
13,000 tons of granite instead of glass, a decision that has since sparked a rediscovery of stone as a high-rise building material. Johnson looked back towards the great towers of the 1920s for inspiration with AT & T. In the top, a distinctive broken pediment caps the building; in the lower, a superscale archway admits visitors into a stately public lobby on the ground floor. Its walls are lined in the pink granite of the exterior and arcaded at the base.

The style of PPG and its satellite buildings by Johnson is a kind of simplified neo-Gothic * [Fig. B-22]. As the headquarters for one of America's most important glass manufacturers, the building not only "says" glass, it explores its potential as an architectural material. The complex makes the most of this situation by exploring the possibilities inherent in the material, through the use of a jagged facade that offers limitless reflections and rereflections. On the exterior, the obtuse angles of the triangular projections create reflections that add extra sparkle while the right angles of the square projections create so many rereflections that the facets appear black, even solid. Thus from any one vantage point, the facade appears to have
an alternating pattern of black and sparking facets. Yet as someone walks around, these seem to change, flickering back and forth from bright to dark.

The Republic Bank sits across from the firm’s earlier Pennzoil Place, a complex by Philip himself from another decade, inspired by minimalist sculpture [Fig. B-23]. The Bank’s 1.4 million-square-foot project is, in contrast, historist, with steep serrated gables inspired by Renaissance palaces and immense galleries in the nineteenth century tradition. One corner of the site was occupied at ground level and below by a Western Union equipment building that proved too costly and complicated to relocate. In response, the tower is sheathed in the same red granite as the low building and detailed, up to the low building’s cornice line, in a similar pattern of rustication, square insets, and four-paned windows, making a base commensurate with the small building and distinct from the shaft rising above. The tower steps back twice. Both setbacks, as well as the tower’s top, terminate in gables similar to those of the low building but set perpendicularly in such a way...
that the tower seems an amalgam of medium-sized as well as tall buildings* [Fig. B-24].

*Fig. B-24: Gable details
CASE STUDIES:
TYPICAL WORKS OF REPRESENTATIVE ARCHITECTS IN TALL BUILDING DESIGN TODAY
C.1 CRITERIA FOR TALL BUILDING FORMATION

C.1.1 OVERALL GUIDELINES

"It has been stated that the skyscraper and the twentieth century are synonymous and there can be no doubt that tall building is the landmark of our generation. The skyscraper is this century's most stunning architectural accomplishment. But the question of how to design the tall building still continues to taunt, disconcert, and confound practitioners. The swing in taste and style is as predictable as night and day." * [Note 3]

A successful skyscraper solution and the art of architecture itself depends on how well the structural, utilitarian, environmental, and public roles of the tall building are resolved. Style and style, must be intrinsic to, and expressive of, these considerations. But, architecture is, above all, an expressive art.
Tall buildings are the major building blocks of the urban environment, creating a city's spectacular skyline. They define public spaces that create urban theaters providing the backdrop for human activity in cities. In respect to their effect on the environment and their visual perception, all tall building can be regarded as being composed of three sections which are cognized by the viewer from three vantage points. The first is the distant viewpoint, from which the entire form may be perceived. The second is the middleground. The third is the immediate foreground from which only the bottom of the building is seen.

* [Fig.C-1, 2, 3, 4]
The ideal tall building must speak in form and detail to each of these separate perspectives [* [Note 4]]. Let us consider, then, the esthetic demands of the three parts: the base, the middle, and the top and the relationship of each to the other. The key for generating architectural coherence from these three sections lies in how to make the transformations from one to another. It is the interrelationship between the base, the middle, and the top that gives a tall building its appeal, its oneness.

Also, an ideal form must be subjected to the real demands of context so that it may give to, and take from, that context elements that allow it to be a meaningful participant in a society of buildings. Ideal form must be affected by the external forces of this context; it must bend and adjust to them while always retaining the unique characteristics that define its personality.

Ordinarily, The geometric cues must be drawn from what already exists, the context, and the urban ecoenvironmental condition. The more the contextual consideration are applied, the more responsive the resulting building is to its urban settings, and the greater is their mutual
integrity. Although the range of these concerns is vast, it can be reduced for practical purpose to only those factors that affect physical urbanity. However, at best they will expand to include the nonpragmatic values drawn from applicable humanistic culture, particularly in a setting which has a strong and special cultural background.

The tall building designer can use the above information differentiating the three parts as a basis for an analysis of tall building design for an effective, pragmatic methodology that could bring everything clearer toward more responsible architecture. In the following case studies and the summary Part D, the three main sections of the tall building viewed vertically are discussed.
The top of the tall building generally has a reduced footprint compared to its midsection. As a result, it rarely affects the ecoenvironmental conditions. In the rare occasion where the imprint of this section of the tall building is the same size or larger than that of the midsection, it does affect ecological circumstances and must be analyzed accordingly. Its architectural significance lies in the formal transformation from the midsection and its delineated silhouette upon the sky. This section of the tall building is a
important determinant of the tall building's urban contextual quality. This section of the tall building accentuates the building's own identity, and its ideally formed by formal influences of both the lower section, the midsection, and the city's skyline.

The top of the tall building gives to the mass its distant reading *(Fig. C-5)*. It establishes the tall building as a personality in a community of structures: It is the tall building's signature on the skyline and is extremely important for
shaping urban individuality and distinction. The most crucial factor determinging the imageability * [Note 5] of the tall building is just this portion. As such, it represents the final culmination of what is one of architecture's potentially most noble creations: the skyward thing. Whereas demands for a functional usage of the top place limitations on its poetic expression, they also present the kind of challenge that is the basis of true accomplishment.
C.1.3 SHAFT:

BLOCK SURFACE TEXTURE

This section extends from the tall building's base upward and becomes the prominent form signifier of a tall building. It gives to the mass its middleground reading *(Fig. C-6)*. It is most critical in altering the quality of interaction between the tall building and the ecoenvironmental conditions. This section of the tall building is a great determinant of the building's block contextual quality. This section of a tall building is potentially detrimental for the reason that it covers a major portion of the atmospheric sky dome, and it alters the patterns
of air movements in its surroundings. The negative consequences of air patterns, such as downdrafts, updrafts, and turbulence, must be considered in the design process. The configuration of the midsection is critical in determining whether the building's scale is perceived as imposing or considerate, overwhelming or accommodating. This section of the tall building is ideally formed through a careful analysis of the site, the context, and the environmental conditions of the tall building's site.
The middle of the tall building houses floor upon floor of repetitive office space. The nature of this repetition is fundamental to the expression of the very tall office building. The various sides of the middle, or shaft, of the building should respond, in their surface treatment, to both the needs of the solar orientation and to the esthetic nature of the structural system of the building.

The breakup of the tall building facade into related human-size parts can be accomplished by definition of window openings, balconies, joint patterns of solid walls, floor lines, and the application of lateral inhibition enhancement. Other effective and practical measures consist of mechanical and structural expression on the facade or as projection elements, either engaged or separated.

The shape, color, and texture of enclosure of tall building must be given very careful consideration for the rhythm of a series of blocks on the streets surrounding it and for pleasing impression of the space between and around tall buildings.
C.1.4 BASE:

STREET WALK SCALE

The tall building's base, the part that is seen from street level, is contained within the 40 cone of vision. Depending on the depth of open space in front of the tall building, this section of the building usually rises to a height of five to ten stories [*Fig.C-7*]. Interfacing with the urban setting, this section of the tall building is a crucial determinant of the tall building's street contextual quality. It anchors the building into the metropolitan fabric, defines the street wall and its texture, and contains the tall building's public-oriented uses. Being relatively low in
height, the base of the tall building has little effect on the urban ecology. However, it has significant impact on the scale and definition of the street and the "humanizing" effect of tall buildings.

The bottom of a tall building must allow a relationship to be established between the human being and the tall building as a whole. It is at the bottom of the tall building that the detail and refinement of the mass is most evident. Since it has already been concluded that, from a structural point of view, the
bottom of the tall building is necessarily the widest portion of the mass, it seems logical that this width can be articulated into smaller volumes embellished with rich detail and ornamented to entertain the eye while affording the scale transition from tall building to street. The bottom of the tall building also provides entry. The significance of entry and procession offer possibilities to enrich and strengthen a tall building's place in the urban fabric that surrounds it.
On the American stage of architectural design, including the design of tall building, all the performances of various styles in recent ten years belong to four main streams of thoughts: Late-Modernism, Post-Modernism, Regionalism, and Deconstructionism.

Late-Modern architecture is an adaptation and continuation of modernist principles such as functional expression, structural expression, and technological expression to complex issues.
of theory and context, with its persistent preference for abstract form.

The Post-Modernism places primary emphasis on the stylistic characteristics of the facade, which represents an attempt to realign modern technology and construction methods with historical references.

Regionalism in architecture is a trend of thoughts seeking more suitable architecture respond to not only universality but also locality, which influence architectural style by emphasizing vernacular, traditional, or local characteristics of special country, city, or area.

Deconstruction in architecture seeks to arrive at new solutions by turning away from structural restraints and functional and thematic hierarchies towards often non-rectangular, fantastic, and seemingly disjointed designs.

The following list and chart show variations of styles and their practical works in the field of tall building design:
♦ Late-Modernism

Structural Expression Style

Typical example: Bank of China Hong Kong
Branch Tower by I. M. Pei

Abstract Symbol Style

Typical example: Shanghai Commercial Center
by J. Portman

High-Tech Style

Typical example: Hong Kong-Shanghai Bank
by N. Foster

♦ Post-Modernism

Neo-Eclectic Style

Typical example: 125 East 57 Street by KPF

Ornamental Style

Typical example: Humana Building by M. Graves

♦ Regionalism

Typical example: Jin-Mao Building by SOM

♦ Deconstructionism

Typical example: Max Reinhardt Haus
by P. Eisenman

* [ Chart C-1 ]
1. Abstract Symbol Style
   Shanghai Commercial Center, 1990

2. Structural Expression Style
   Bank of China, 1988

High-Tech Style

1. Hong Kong-Shanghai Bank
2. Humana Project
1. Ornamental Style
   Humana Building

2. Neo-Eclectic Style
   125 E. 57th Street

1. Regionalism
   Jin-Mao Building

2. Deconstructionism
   Max Reinhardt Haus
The prominent high rise works by the leading American architects, who are representatives of the above styles and streams of the thoughts, are the key to investigation of American architects' concepts, methods, treatments, accomplishments, and mistakes in the design of tall building. Selected here for case studies are some successful, or "distinctive", high rise works by these representative architects of the styles.
The 26-story office tower located in downtown Louisville, was designed as a corporate headquarters. In contrast to the tendencies of modern architecture, evident in the plazas of several surrounding developments, the building occupies the whole site, helping to re-establish the street edge as an essential form [Fig C-9]. The building’s orientation to the Ohio River, and its attempt to mediate the difference in scale between the small townhouses on the side and a skyscraper on the other, reinforce its contextual
relationship with this particular site * [Fig C-10, 11]. Within the outdoor loggia, which acts as the entrance to the building, a large waterfall fountain refers to the nearby falls of the Ohio River * [Fig C-12].

![Diagram showing the relationship between small town houses, modern high rise, Ohio River, Humana Building, and the steel bridge.]

*Fig. C-10: Surroundings around Humana Building

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The overall form: mediation between the small town houses (front) and the modern high rise (behind)

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The base: mediation between the street of the small town houses and the overall mass of the building itself

*Fig. C-11: Between the Modern high rise and the small town house*
The building includes retail shops on the 1st floor, Humana's office, and a conference center. The lower portion, six floors high, is devoted to public space and to Humana's executive offices. General offices are located in the shaft of the building. The conference center occupies the 25th floor, with access to a large outdoor porch overlooking the city and the river beyond. The building's formal organization reflects its division into these significant parts.

In the building, Graves takes the issue of Post-Modernism a step further. Its loggia, balcony, pilasters, and earth-tone polychromy are clear references to historically inspired buildings [*Fig C-13]. A monumentally-scaled six-story
base mediates between the pedestrian scale of the street and the height of the tower * [Fig C-11].

The granite-clad shaft completely encloses and conceals the building's steel skeleton and is punctuated by small, square openings. A projecting balcony is supported by a structural steel truss which is intended to relate contextually to Louisville's steel bridges. Finally, the building is capped by a multi-story loggia which acts as a symbolic beacon on the city's skyline * [Fig C-14].

Fig. C-14: Top of Humana Building
The complex massing of this building is a result of its direct adherence to the complicated zoning regulations which affect the site. The building draws on the principles of the two separate zoning districts which govern the different parts of the site. The task was to design a “right” building that would satisfy both the new midtown zoning’s quest for compatibility with neighboring buildings on 57th Street and the old zoning’s requirements for a plaza on Lexington Avenue * [Fig C-15].
The overall mass of the building is conceived as two structures, paired side by side, created as autonomous, individually centered entities, each with its own distinct and separate entrance *[Fig C-16]. The division of the facade into three vertical elements gives the building a comprehensive scale, similar to that of the Fuller and Ritz building on 57th Street. Each of these vertical elements is capped by a stone cornice *[Fig C-17].
At the corner, the building envelope is carved away, providing a public plaza [Fig C-18]. A 33-foot-high pavilion of granite and marble denotes the streetline along Lexington Avenue [Fig C-19]. On 57th Street, the base of the building conforms to the street grid, maining a unity with the existing buildings around it [Fig C-20]. The base accommodates the pedestrian scale by introducing finely detailed storefronts in combination of granites, glass, bronze, and stainless steel.
C.2.3  BANK OF CHINA TOWER
Hong Kong
1988
By I. M. Pei

The bank tower is the tallest building in Asia at the present, reaching a height of 368m. The tower is supported by an innovative structural system that acts both to strengthen the building’s capacity against high-velocity winds and typhoon frequently in Hong Kong area and to strengthen its imageability * [Note 6] on the public’s remembrance * [Fig C-21, 22, 23, 24].
The Strong Visual Impact on Viewer from Far Viewpoints: The Prominent form of the Tower in Forest of High-rises
Similar to an unbuilt project of New York Coliseum by SOM [Fig C-25], this tower brings together the diagonal bracing idea of the John Hancock Center and the cut-off tube idea of the Sears Tower in an original way, and achieves a much better outcome than that of the Coliseum [Fig C-26].

The building is square in plan and is divided by its diagonals into four triangular tubes [Fig C-27], which rise up individually to different height. The cut-off tube idea is handled differently than at the Sears Tower as the sections are cut on a slope rather than horizontally. This is
consistent with the accent on the diagonals on the facade as well as with the theme of triangles throughout the building. The sloped cuts also contribute to the elegant tapering of the structure toward the sky. This tapering is in turn complemented by a visually strong base.

The diagonal bracing exposed on the exterior is framed by the four large corner columns. There are no visible horizontal ties above and below the Xs as at the Hancock center. These diagonals and corner columns not only make up the primary vertical and horizontal force-resisting system of the building, but also give the tower a striking sculptural appearance. They are accented from behind by the light grid of the exterior glass wall. Both the diagonal ties and the major vertical columns are made of structural steel box members filled with concrete. The result is a structural configuration equal in its own right to the eloquence of the architectural design. The system is outstanding for its economy of material and its efficiency in structural form

* [Fig C-28].

Compared to buildings of the same height and area, the Bank of China will use approximately
40 percent less structural steel. This tall building illustrates another of the many possibilities for new forms with structural expression, particularly through the close collaboration of engineers and architects.

The building starts as a cube at the bottom and diminishes in quarters until a single triangular prism remains at the top where it is tapered to a point. It is in the middle that the tower's geometry emerges from the 52m cube and is then sliced on its diagonal to create four triangular shafts, which are cut at different elevations. The north quadrant, facing the harbor, begins to taper at the 17th floor, creating an atrium lounge. The other quadrants are similarly sliced at the 38th, 51th, and 70th floors. The penthouse on the 70th floor uses a screen of aluminum rods on the sloped roof to filter out the sun, whereas great qualities of clear glass on the vertical walls provide panoramic views to the harbor and surrounding mountains [*Fig C-29*].

The building also had to be designed to meet many site challenges, including a steeply sloped, two-acre site with limited access due to
a tangle of highways, ramps, and bridges on the three sides of the site [Fig C-30]. In order to separate the building's lower stories from noisy surroundings, the building’s design, around and within the base, includes: 1) a landscape layout incorporating the geometry of the facade’s triangular motif with the style of Chinese traditional garden typical in hometown of I. M. Pei’s childhood [Fig C-31, 32, 33, 34]; 2) an arched...
Fig. C-33: Suzhou garden's influence on the base design of the bank tower

Fig. C-34:

Suzhou Garden
entry sequence leading to a multistoried lobby, making a successful transition from the busy urban street to the peaceful and impressive interior of the bank * [Fig C-35, 36].

Fig. C-35: Base of the bank tower

Fig. C-36: Section of base
Shanghai Center is a bridge connecting the international business world to the City of Shanghai. As such, it had to be responsive to its unique location [*Fig C-38*], the culture of China and the approaching 21st century world of technology. To accomplish the goal of integration, architectural forms were abstracted and influenced by Chinese architecture of the past.
The complex, finished in 1990, includes two 220-unit, 30-storey apartment towers, a 700-room, 48-storey hotel, 250,000 square feet of offices, a 1,000-seat theater, a retail village and a large exhibition center. Everything an international business person might require to visit or establish an operation in Shanghai will be available within the complex [Fig C-39].

At street level, where the Center meets the city, the three-level retail village relates in form and scale to the city and opens out to the sidewalk traffic. The open pedestrian walkways of the retail village introduce the activity and rhythms of Shanghai street life into the complex. Two traditional monumental Chinese entry gateway fragments are used as free-standing sculpture
providing a transition from the old to the new as one is led into the courtyard entry [Fig C-40, 41].

The office floors float above the retail village in a horizontal podium-like structure, while the apartment towers and the hotel rise above and flank the three remaining sides of the complex. Traditional Chinese gardens and shallow pools of water relate back to the entry gates and serve in the additional role of transition. These elements are interspersed throughout the public spaces. Thus, the natural elements, which in Chinese cultural enhance the human condition, are provided [Fig C-42].
Some details of the facade and the form of the entire top of this center come from quotation of Chinese classical vocabulary of architecture. Especially the form of the top bigger than its shaft below is, in one hand, a magnified transform and metaphor of gable of traditional two-storey houses [Fig C-43] which are still scattered all over the region of Shanghai including surroundings of the site of the center [Fig C-38]; In the other hand, this form of the top has striking and interesting contrast and correspondence with the spire top of an opposite exhibition building [Fig C-38] which is of a typical Russian classical style and was designed by a Russian architect in the 1950's [Fig C-44].
However, the site of the center is located on Nanjing Rd. instead of Yan-An Rd. to which the exhibition building faces so that the presence of the center destroys the original elegant contour of the exhibition building from the front angles of the exhibition building----angles on Yan-An Rd., a main traffic road of Shanghai.

* Fig C-45, 46, 47

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Fig C-45: Elegant front view of SEC before the construction of SCC
Fig C-46: The destroy of the original skyline and scale of SEC after the construction of SCC

Fig C-47: The better place for the location of SCC.
Among the more remarkable proposals for reunified Berlin is Max Reinhardt Haus, a one-million-square-foot, 34-story multiuse project. The scheme includes theaters, a hotel, office space, and a host of other recreational and entertainment facilities. The building is to be located on the north bank of the Spree River, on the site where famed theatrical producer Max Reinhardt once had his "Great Playhouse." It would stand at the intersection of two major streets, Friedrichstrasse and Unter den Linden Strasse, and across the Spree from the site of Mies Van der Rohe's famous unbuilt glass skyscraper project * [Fig C-48, 49].
Eisenman says that the inspiration for the building's form comes from the Mobius strip, "an unending three-dimensional form with only a single surface. That strip lacks the hierarchy of 'inside' and 'outside,' of private and public. By twisting on itself, the Mobius strip talks about a blurring of distinctions." * [Fig C-50, 51].

This scheme apply architectural philosophy of deconstruction to tall building design * [Fig C-52]. Here, the result of deconstruction is a regular
shape cut irregularly * [Fig C-53, 54, 55, 58], which is like a giant rock * [Fig C-57]. Such a weird and uncanny form of this project strongly expresses itself in the traditional district of Berlin without perceivable links with its surroundings * [Fig C-58]. Nevertheless, it is, after all, the first high-rise work by deconstructionism architects.
Fig. C-57: A giant rock in traditional district of Berlin

Fig. C-58: Arbitrateness in context
The 88-story Jin-Mao office and hotel tower will be the centerpiece of Shanghai's emerging Pudong district when it is completed in 1998. At 1,375 feet high, the building would be the second tallest in the world if completed today, and when completed in 1998, the Jin Mao building will be the tallest in China and will serve as a flagship for the Pudong New Area.

The project is a winning entry of an international competition held by municipal government of
Shanghai. SOM's Chicago office, under design partner Adrian Smith, submitted a design that suggested, in a gracefully abstracted way, a Chinese pagoda; it promised to be distinctively Chinese while avoiding clichés such as a pagoda roof on top of a skyscraper [Fig C-60]. Since the tower gets narrower as it goes up, this scheme offers larger floor plates to office tenants and great views for hotel guests [Fig C-61, 62, 63].

Fig. C-60: Front View

Fig. C-61: 30th-40th floor plan

Fig. C-62: 58th-59th floor plan

Fig. C-63: Section
Told by the client, the China Shanghai Foreign Trade Centre Co., to use the lucky number eight in their design, the architects devised a pagoda-like system of tower segments and setbacks based on the number.

The building has a composite concrete and steel frame. Lateral stiffness comes from an octagonal concrete core and eight concrete and steel columns. A curtain wall of glass and stainless steel will enclose the building [*Fig C-64].

The form of Jin-Mao Building reflects that its designer Smith has conducted a careful investigation of various pagodas in ancient China [*Fig C-65, 66, 67, 68]. With twelve times of
setbacks on its four corners it represent a basic feature of Chinese ancient pagoda—Shou Fen, and acquire the exquisite curve contour similar to that of pagodas *(Fig C-69).* The exterior walls enclosing the 16th, 30th (+14*), 42nd (+12), 52nd (+10), 60th (+8), 67th (+7), 73rd (+6), 78th (+5), 82nd (+4), 85th (+3), 87th (+2), 88th (+1) floors are downward a little to imitatethe eaves of brick pagoda in ancient China *(Fig C-70)*, so that the characteristic rhythm of the contour of pagoda has more exactly been realized.

* "+14"—14 floors higher than the 16th Floor.
From plan of a square on the bottom *[Fig C-71],
the building's shaft gradually becomes plan of a
cross through the setbacks of its four corners
*[Fig C-72]. At the top, the cross plan is
culminated by a rhombic cap volume, both of
which consist of compositional factors of
Modernism Architecture so that the form of the
whole building gets rid of a simple imitation like
only a copy of ancient thing *[Fig C-73]. The result
is such a meaningful design which integrates
both contemporary and traditional vocabulary
and grammar of architecture.

Fig. C-71: 3rd-6th floor plan

Fig. C-72: 88th floor plan

Fig. C-73: Top of Jin-Mao Building
PART D

NEW APPROACHES TO
THE FORMAL
ORGANIZATION OF
TALL BUILDINGS
Through the above case studies of tall building design by the leading American architects in the decade from 1985 to 1995, we can summarize some new means and approaches for the formal organization, both in the three parts and in the overall, of high-rise buildings during the decade.

D.1 TOP FORMATION APPROACHES

For the formal organization of the top of high-rise, most of means created by American architects in this decade can be generalized as below:

- Multi-storey building as a cap
- Huge openings as a culmination
- Hollow frame
- Non-flatroofs
- Luminous lantern
- Thin pieces as diminished shaft mass
- High-tech components
- Downward eaves

* [Chart D-1, D-2]
Multi-Storey Building as a Cap

1. S.L. Brothers Plaza, 1988
2. Humana Building, 1985

Huge Openings as a Culmination

1. New Umeda City, 1988
2. CNG Tower, 1987
| Hollow Frame | 1. 10 Columbus Circle, 1985 |
| | 2. Yerba Buena Tower, 1992 |

<p>| Non-Flatroofs | 1. World Financial Center, 1987 |
| | 2. Patranas Tower, 1992 |
| | 3. Harris Trust &amp; Savings Bank, 1990 |</p>
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<thead>
<tr>
<th>Luminous Lantern</th>
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1. 900 N. Michigan Ave., 1988
2. Russia Tower, 1995

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<td>2. ABC Headquarters, 1989</td>
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<td>3. Times Square Project, 1985</td>
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<td>2. DG Bank, 1993</td>
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<td>3. Shanghai Commercial Center, 1990</td>
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### Chart D-2: American Leading Architects' Formal Design for the Top of Tall Building

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<th>H.Jahn</th>
<th>SOM</th>
<th>J.Portman</th>
<th>M.Graves</th>
<th>I.M.Pei</th>
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<td>Luminous lantern</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Thin pieces as diminished shaft mass</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>High-tech components</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Downward eaves</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
D.2 SHAFT FORMATION APPROACHES

For the formal organization of the shaft of high-rise, most of means created by American architects in this decade can be generalized as below:

♦ Patternization of various materials-members
♦ Complicated setbacks
♦ Up-heaped units
♦ Outward expression of structure
♦ Convex and concave
♦ Division of one storey facade into several horizontal lines
♦ Curved surface
♦ Enlargement of classical details as one storey facade
♦ Peeling of elevations
♦ Mid-connection among stems

* [Chart D-3, D-4]
Patternization of Various Materials-Members

1. 383 Madison Avenue, 1989
2. Carnegie Hall Tower, 1990
3. Wilshine-Midcale, 1986
4. Metropolis Phase, 1988

Complicated Setbacks

1. 383 Madison Avenue, 1989
2. Yerba Buena Tower, 1992
3. Jin-Mao Building, 1993
Up-Heaped Units

1. 2. Marina Square, 1987
3. Riverwood Building, 1988
4. Peachtree Center, 1992

Outward Expression of Structure

2. Endless Tower, 1995
3. Russia Tower, 1995
4. Jakarta Communication Tower, 1995
Convex and Concave

1. Sotheby's Tower, 1985
2. Patronas Tower, 1992
3. 225 W. Wrecker, 1985

Division of One Storey Facade into Several Horizontal lines

1. Tohishima Building, 1990
2. Warsaw Bank, 1995
3. Morrison Tower, 1994
Curved Surface

1. DG Bank, 1993
2. 777 Tower, 1990
3. NTT, 1995
4. Ameritrust Center, 1995

Enlargement of Classical Details as One Storey Facade

1. 2. Jin-Mao Building, 1993
3. 900 N. Michigan Ave., 1988
4. 10 Columbus Circle Project, 1985
Peeling of Elevations

1. World Financial Center, 1987
2. S.I. Brothers Plaza, 1988
3. 1111 Brickell Avenue, 1988

Mid-Connection among Stems

1. 2. Patranas Tower, 1992
## Chart D-4: American Leading Architects' Formal Design for the Shaft of Tall Buildings

<table>
<thead>
<tr>
<th></th>
<th>KPF</th>
<th>C.Pelli</th>
<th>H.Jahn</th>
<th>SOM</th>
<th>J.Portman</th>
<th>M.Graves</th>
<th>I.M. Pei</th>
<th>P.Eisenman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patternization of various materials-members</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>P.Eisenman</td>
</tr>
<tr>
<td>Complicated setbacks</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Up-heaped units</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outward expression of structure</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convex and concave</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Shaft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division of one storey facade into</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>several horizontal lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curved surface</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enlargement of classical details as</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>one storey facade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peeling of elevations</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-connection among stems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
D.3 BASE FORMATION APPROACHES

For the formal organization of the base of high-rise, most of means created by American architects in this decade can be generalized as below: * [Chart D-5, D-6]

- Stilts as public space
- Footing as an enlarged bottom below shaft
- Footing as a joint root of multi-stems
- Extended underlying levels as infrastructure

*Chart D-5*

---

1. Frankfurt Convention Center, 1986
2. Shanghai Commercial Center, 1990
1. Footing as an Enlarged Bottom below Shaft

1. Miglin Beiler Tower, 1993
2. 125 E 57th Street, 1986
3. 383 Madison Ave, 1989

2. Footing as a Joint Root of Multi-Stems

1. Liberty Place, 1985
2. World Financial Center, 1987
3. Shanghai Commercial Center, 1990
1. DG Bank, 1993
2. 10 Columbus Circle, 1985
3. SL Medical Center, 1990

<table>
<thead>
<tr>
<th>Extended Underlying Levels as Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
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</tbody>
</table>

chart D-6: American Leading Architects’ Formal Design for the Base of Tall Building

<table>
<thead>
<tr>
<th></th>
<th>KPF</th>
<th>C.Pelli</th>
<th>H.Jahn</th>
<th>SOM</th>
<th>J.Portman</th>
<th>M.Graves</th>
<th>I.M.Pei</th>
<th>P.Eisenman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stilts as public space</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Footing as an enlarged bottom below shaft</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Footing as a joint root of multi-stems</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended underlying levels as infrastructure</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

111
The various approaches to the treatment for the top, the shaft, and the base of tall building have been summarized as above. But what about formal composition of the three parts as a whole? There were six most common formal compositions for high rises in the decade: geometric abstraction, obelisk-like composition, tripartite relationship, hybridized scales, spiral organization, and special form. * [Chart D-7]
Geometric Abstraction

1. Shanghai Commercial Center, 1990
2. Patranas Tower, 1992

Spiral Organization

1. 10 Columbus Circle, 1985
2. Humana Building Project, 1985
1. Liberty Place, 1985
3. Society Center, 1992
4. Television City, 1986
Tripartite Relationship

1. AT & T Corporation Center, 1986
2. 225 N Wacker Drive, 1985
3. Block Five Tower, 1988
4. 125 E 57th St., 1986
Hybridized Scales

1. Metropolis Phase One, 1988
2. Humana Building, 1985
The American leading architects’ preferences for the formal compositions of tall building are shown as follows * [Chart D-8]:

**Chart D-8: American Leading Architects’ Approaches to the Formal Composition of Tall Building**

<table>
<thead>
<tr>
<th>Approach</th>
<th>KPF</th>
<th>C.Pelli</th>
<th>H.Jahn</th>
<th>SOM</th>
<th>J.Portman</th>
<th>M.Graves</th>
<th>I.M.Pei</th>
<th>P.Eisenman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric Abstraction</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obelisk-Like Composition</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripartite Relationship</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybridized Scales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spiral Organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Special Form</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
In conclusion, the American style trends in the tall building design between 1985 and 1995 are conducted from the following summary of the leading architects' basic tendency shown in the design of tall buildings * [Chart D-9]:

<table>
<thead>
<tr>
<th>Styles</th>
<th>Representative Architects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late-Modern</td>
<td>KPF C.Pelli H.Jahn SOM J.Portman M.Graves I.M.Pei P.Eisenman</td>
</tr>
<tr>
<td>Structural Expression</td>
<td>○ ● ○ ○ ● ○ ○</td>
</tr>
<tr>
<td>Abstract Symbol</td>
<td>○ ○ ○ ○ ○ ○</td>
</tr>
<tr>
<td>High-Tech</td>
<td>○ ○ ○ ○ ○ ○</td>
</tr>
<tr>
<td>Post-Modern</td>
<td>Neo-Eclecticism ○ ○ ○ ○</td>
</tr>
<tr>
<td>Ornamentalism</td>
<td>○ ○ ○ ○ ○ ○</td>
</tr>
<tr>
<td>Regionalism</td>
<td>○ ○ ○ ○ ○ ○</td>
</tr>
<tr>
<td>Deconstructionism</td>
<td>○ ○ ○ ○ ○ ○</td>
</tr>
</tbody>
</table>

- ● Primary tendency of design works
- ○ Subsidiary tendency of design works

All the above trends represent new approaches to an improved architectural design in tall building. But in the author's opinion, tall
buildings with High-Tech style will not become a main stream of tall building design in the world, because the price of steel will remain much higher than that of concrete and brick in the Far East countries which will have the highest demand for tall buildings and become a major marketplace for tall building in the near future. The architectural works of high-rise in High-Tech style are creative indeed but will be unsuitable for the largest marketplace in the near future so that they will be only very few. It is also the author’s opinion that Post-Modernism and deconstructionism will not have a long-lasting life in the architectural history of human being as they expect if they continuously put their major concern only on the expression of individual distinguished languages without integrating other aspects such as ecological sensitiveness, environmental response and technological pioneering into their architectural ideologies.

Besides the above current trends of tall building design, there are other two main explorations which are emerging and may pioneer new trends
in tall building design in next decade. These two are the explorations for Intelligent tall building * [Note 7] and Green High-Rise * [Note 8].

In the author's estimate, by the end of the next decade, around the year of 2005, the two explorations not only will be applied extensively in the world, but also will become the basic, popular and dominant design principles and methods. A convergence or a new synthesis of the two trends is very likely to happen under the guidance of sustainable strategies. So, the coming decade will be the years during which sustainable designs of high-rises will become the main direction of tall building development. Their rapid maturity will be recorded in the history as a main mark of the new development of the high-rise design in the next ten years.

In the future, the Intelligent Tall Building and the Green High-Rise are likely to change considerably the modeling of tall buildings as well as their facade pattern, texture, and composition, produce a new high rise appearance different from the past, and lead to
the birth of a new style of architecture. So, it can be asserted that among all of the new approaches the most promising and principal will be Intelligent Tall Building and Green High Rise, both of which may probably give great contributions to creating a new breed of tall buildings and consequently fostering new styles and new aesthetics of high rises.

However, it is because the principles of either intelligent tall building or green high rise belong to global universality rather than locality, we should not forget to address the issues of local contexts when the intelligent or the green tall buildings become popular. How to associate the globalism of the intelligent and the green tall buildings with the regionalism concerning contexts will be a great challenge to us, to the architects around the globe. For keeping the diversity of world architecture, the intelligent and the green tall buildings must be integrated into distinguished local cultures in alternative forms and styles.
Whatever the future appearance the skyscraper may take, it must provide a sense of presence and identity. It must be integrated into its urban cityscape, and must relate the horizontal movement at street level with the vertical thrust of the tower. At the same time it must be for people, giving them a feeling of well being and enjoyment as well as a place to live and be happy. — This is our expectation for the year 2000 and beyond.
NOTES:

1) John Morris Dixon, " Chinese Boom Town ";
   Progressive Architecture, 94-09.


4) The classical viewpoint on this issue of the separation of tall
   buildings was outlined by Louis Sullivan in 1896, not long after
   the advent of the earliest high-rise. He explained his approach in
   an essay entitled "The Tall Building Artistically Considered".

5) 6) The concept of imageability was introduced by K. Lynch.
   By studying the visual images of 60 individuals from three major
   American cities, Lynch was able to identify five key components
   that described how people viewed cities: landmarks, edges,
   paths, nodes, and districts. Building upon the work by Lynch,
   Appleyard developed a model of landmark form and urban
   cognition in order to understand how people perceive buildings
and cities. Although neither the studies by Lynch nor those studies by Appleyard et al. deal exclusively with tall buildings, their findings offer insights about how all buildings, including tall buildings are remembered.

7) "Intelligent building" refers to a regulation afforded to big buildings by the advent of the computer and other high technology. The aim, according to one avatar of such technologism, is to make buildings behave much like living things, continually gathering information through different senses and adjusting their behavior in response. Current "intelligent" buildings are in preliminary stage and refer to those that integrate systems and structure for energy efficiency and flexibility. In response to this new phenomenon, more and more tall buildings offering packages of integrated systems, the brain of which is both a communication and control system that continuously monitors and performs building functions. Linked by fiber optics, central control is imposed on heating, ventilation, elevators, lighting, security, fire protection, as well as telecommunications and electronic office services.

8) Green Architecture refers to environmentally conscious architecture.
### TABLE - 1

**THE 20 TALLEST BUILDINGS IN THE WORLD**

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Stories</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Century Tower</td>
<td>Tokyo, Japan</td>
<td>?</td>
<td>800</td>
</tr>
<tr>
<td>Grollo Tower</td>
<td>Melbourne, Australia</td>
<td>120</td>
<td>503</td>
</tr>
<tr>
<td>Chongqing Tower</td>
<td>Chongqing, China</td>
<td>?</td>
<td>457</td>
</tr>
<tr>
<td>Petronas Towers</td>
<td>Kuala Lumpur, Malaysia</td>
<td>88</td>
<td>450</td>
</tr>
<tr>
<td>Sears Tower</td>
<td>Chicago, USA</td>
<td>110</td>
<td>443</td>
</tr>
<tr>
<td>Asia Plaza Complex</td>
<td>Gaoxiong, Taiwan-China</td>
<td>103</td>
<td>431</td>
</tr>
<tr>
<td>Jin Mao Building</td>
<td>Shanghai, China</td>
<td>88</td>
<td>421</td>
</tr>
<tr>
<td>Tour Sans Fins</td>
<td>Paris, France</td>
<td>?</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Location</td>
<td>Stories</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------</td>
<td>---------------</td>
<td>---------</td>
</tr>
<tr>
<td>9</td>
<td>World Trade Center - North Tower</td>
<td>New York, USA</td>
<td>110</td>
</tr>
<tr>
<td>10</td>
<td>World Trade Center - South Tower</td>
<td>New York, USA</td>
<td>110</td>
</tr>
<tr>
<td>11</td>
<td>Empire State Building</td>
<td>New York, USA</td>
<td>102</td>
</tr>
<tr>
<td>12</td>
<td>Bank of China Tower</td>
<td>Hong Kong</td>
<td>72</td>
</tr>
<tr>
<td>13</td>
<td>Amoco Tower</td>
<td>Chicago, USA</td>
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<td>14</td>
<td>John Hancock Tower</td>
<td>Chicago, USA</td>
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<td>15</td>
<td>Chrysler Building</td>
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<tr>
<td>16</td>
<td>Library Square Tower</td>
<td>Los Angeles, USA</td>
<td>75</td>
</tr>
<tr>
<td>17</td>
<td>Texas Commerce Plaza</td>
<td>Houston, USA</td>
<td>75</td>
</tr>
<tr>
<td>18</td>
<td>Allied Bank Plaza</td>
<td>Houston, USA</td>
<td>71</td>
</tr>
<tr>
<td>19</td>
<td>1 Wacker Drive</td>
<td>Chicago, USA</td>
<td>80</td>
</tr>
<tr>
<td>20</td>
<td>311 Wacker Drive</td>
<td>Chicago, USA</td>
<td>65</td>
</tr>
<tr>
<td>Firm Name</td>
<td>Firm Location</td>
<td>Project Name</td>
<td>Project Location</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>ADP (Anderson DeBartolo Pan)</td>
<td>Tucson</td>
<td>China Industrial &amp; Commercial Bank Pu Dong Branch</td>
<td>Shanghai</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Callison Partnership</td>
<td>Seattle</td>
<td>Grand Gateway Complex</td>
<td>Shanghai</td>
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<td></td>
<td>Bank of China Shanghai Branch Headquarters</td>
<td>Shanghai</td>
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<td></td>
<td>Beijng International City</td>
<td>Beijing</td>
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<tr>
<td>Fox &amp; Fowle Associates</td>
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<td>Jawa Tower</td>
<td>Shanghai</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shenghua Commercial Building</td>
<td>Shanghai</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pudong Financial Tower of the Industrial and Commercial Bank of China</td>
<td>Shanghai</td>
</tr>
<tr>
<td>Firm Name</td>
<td>Firm Location</td>
<td>Project Name</td>
<td>Project Location</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------</td>
<td>-------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Gensler &amp; Associates</td>
<td>San Francisco</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>HLW (Haines Lundberg Waehler)</td>
<td>New York</td>
<td>Hainan Royal Garden Development</td>
<td>Haikou, Hainan Province</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Haikou New World</td>
<td>Haikou, Hainan Province</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miami Resort Villas</td>
<td>Haikou, Hainan Province</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dallas Resort Villas</td>
<td>Haikou, Hainan Province</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malibu Resort Villas</td>
<td>Haikou, Hainan Province</td>
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<tr>
<td></td>
<td></td>
<td>Chongqing National Garden City</td>
<td>Chongqing, Sichuan Province</td>
</tr>
<tr>
<td>HOK (Hellmuth, Obata &amp; Kassabaum INC.)</td>
<td>St. Louis</td>
<td>Union Square Building</td>
<td>Shanghai</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Huangpu District Masterplan</td>
<td>Shanghai</td>
</tr>
<tr>
<td>Jeffrey M. Kalban &amp; Associates</td>
<td>Los Angeles</td>
<td>Times Square Complex</td>
<td>Tianjin</td>
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<td>Firm Name</td>
<td>Firm Location</td>
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<td>Project Location</td>
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APPENDIX C

All photographs or diagrams are made by author of this report except the figures credited below.

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APPENDIX D

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